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Over Three Decades of Persistence of a Small and Apparently Isolated Population of Painted Turtles (*Chrysemys picta*) in a Kentucky Reservoir

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Small populations of animals tend to persist for shorter periods of time than do large populations (Diamond et al., 1987; Berger, 1990). In conservation biology, it is axiomatic that the smaller a population is, the more likely it is to be negatively influenced by stochastic demographic, environmental, or genetic effects, which may interact with one another and result in local extinction (Gilpin and Soulé, 1986; Soulé, 1987).

Reliable capture records for painted turtles (*Chrysemys picta*) were reported by Ernst (1970) for Colson Bay of Kentucky Lake reservoir, an impoundment of the lower Tennessee River in western Kentucky (Fig. 1). He did not give date of capture, but it would have been no more recent than the late 1960s. Ernst's (1970) attempts to trap the species at this locality over four days were unsuccessful, and he speculated that it had been eliminated by winter drawdown of the reservoir. In 1992 PVL used a spotting scope to observe basking *C. picta* in Colson Bay. Here we report sighting and trapping records for *C. picta* and other turtle species in Colson Bay for the time period 1992–99 and conclude that the *C. picta* population is still extant but small. Further, we use sighting and trapping records from nearby bays of the reservoir and ponds east of it to establish that the population is probably isolated from conspecific populations, and that this small, isolated population has thus persisted for over three decades.

Study Area. — Colson Bay and the numerous other embayments of Kentucky Lake were formed from old creek beds by the impoundment of the Tennessee River in western Kentucky in 1945. In Colson Bay, visible turtle activity occurs along the forested northern shoreline of the bay (Fig. 1), primarily within 200 m of a creek inlet to the east. Virtually no turtle activity has been observed south of the creek inlet, where camping facilities are located, the shoreline is grassy, and emergent deadwood in the water (i.e., potential basking sites) is scarce. The northern shoreline region of the bay is shallow, with depths in summer generally < 1 m, and has a gravel and mud substrate. Basking activity of turtles was centered around a large fallen tree throughout the duration of the present study.

Lake Barkley, an impoundment of the Cumberland River, lies in a largely parallel orientation to Kentucky Lake ca. 8 km to the east of Kentucky Lake. The intervening region is an uninhabited area designated as the Land Between the Lakes National Recreation Area.

Methods. — Sighting records were made at distances of 20–75 m between May and September of 1992, 1994, 1995, 1998, and 1999 with a tripod-mounted spotting scope with 22–60x zoom magnification. Data taken were point-in-time counts of basking turtles (Lindeman, 1999). Turtles not identified to species were recorded as unidentified, and were not included in further data analyses. Trapping in Colson Bay was conducted in 1994–95 and 1998–99 primarily with a fykenet (Vogt, 1980) with 0.75-m hoops and a 15-m lead net, although a few captures (< 3% of the total) were made with basking traps, baited box traps, and hand capture of basking turtles.

Sighting records in nearby bays were derived from replicated surveys of the relative abundance of *Graptemys* and *Pseudemys* (Lindeman, 1997, 1998, 1999). Records of

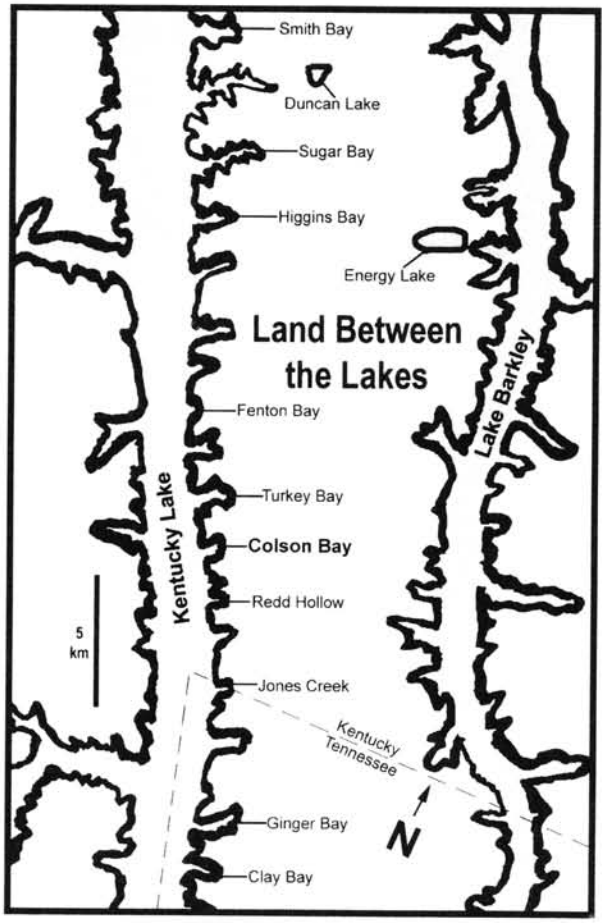

Figure 1. Map of Kentucky Lake and Lake Barkley, Kentucky, showing Colson Bay and other bays on the eastern shore of Kentucky Lake that are referenced in Table 1. Also shown are two impoundments where *Chrysemys picta* has been recorded, Energy Lake and Duncan Lake. A third site where *C. picta* has been recorded, Fort Henry Branch, is ca. 11 km south of the bottom border of the figure on the eastern shore of Kentucky Lake.

Table 1. Bays in the vicinity of Colson Bay (see Fig. 1) that have been surveyed for freshwater turtles via trapping (T) or spotting-scope counts (S). No painted turtles have been recorded from these bays.

Bay	Distance (km) from Colson Bay	Survey method	Total turtles	Predominant species (%)
Clay	13.1 south	T	43	*Trachemys scripta* (91)
Ginger	11.3 south	T	5	*Graptemys ouachitensis* (60) *T. scripta* (40)
Jones Creek	5.5 south	S	196	*T. scripta* (55) *G. ouachitensis* (30)
Redd Hollow	1.0 south	S	114	*G. ouachitensis* (59) *T. scripta* (39)
Turkey	2.0 north	S	102	*T. scripta* (85)
Fenton	6.1 north	S	77	*T. scripta* (55) *G. ouachitensis* (40)
Higgins	13.9 north	T	20	*T. scripta* (80)
Sugar	15.8 north	S	167	*T. scripta* (70)
Smith	21.5 north	T	7	*T. scripta* (86)

turtles trapped using custom-made wire funnel traps in nearby bays are those of AFS and his students.

Results and Discussion. — A total of 31 spotting-scope counts was made at Colson Bay between 1992 and 1999, with 467 turtles identified and 25 not identifiable. The average number of all turtles identified was 15.1 (range 3–57), and included an average of 1.1 painted turtles (range 0–5). The most commonly observed species was the slider turtle, *Trachemys scripta*, which was observed on every sampling occasion (range 1–56 individuals, mean 12.5) and constituted 83% of all turtle sightings over the course of the study. Painted turtles were the second most abundant species observed in both frequency of sighting (18 of 31 counts with at least one individual observed, 58%) and percentage of overall sightings (7%). Other species sighted basking were the Ouachita map turtle *Graptemys ouachitensis* (present in 26% of counts, 4% of all turtles sighted), the river cooter *Pseudemys concinna* (32%, 3%), the false map turtle *G. pseudogeographica* (10%, 1%), the smooth softshell turtle *Apalone mutica* (16%, 1%), the common mud turtle *Kinosternon subrubrum* (6%, 1%), and the stinkpot *Sternotherus odoratus* (3%, 0.2%).

Trappping records also indicated that *T. scripta* was the most abundant turtle species in the bay (126 of 166 total captures, 76%). Fifteen *C. picta* were captured (9% of the total catch) as follows: four males (mean plastron length = 103.8 mm, range 82–112), nine females (mean plastron length = 111.6 mm, range 84–127 mm), one unsexed juvenile (80 mm plastron length), and one recapture. Other species captured were the common snapping turtle *Chelydra serpentina* (n = 12, 7% of total catch), *S. odoratus* (n = 9, 5%), *P. concinna* (n = 2, 1%), *K. subrubrum* (n = 1, 1%), and the spiny softshell turtle *A. spinifera* (n = 1, 1%).

Sighting and trapping records from nine nearby bays within 20 km of Colson Bay on the eastern side of Kentucky Lake revealed no other populations of *C. picta* (Table 1). The nearest vouchered records for the species are from the mouth of Fort Henry Branch where it enters Kentucky Lake, 24 km to the south, and Energy Lake, an enclosed embayment of Lake Barkley 15 km to the northeast (AFS, distributional data from specimens in the Austin Peay State University collection). Sight records also place the species in Duncan Lake, a small creek impoundment 20 km northeast of Colson Bay (PVL, pers. obs.). Twenty-nine other small ponds in the Land Between the Lakes National Recreational Area have been surveyed for reptiles and amphibians, without yielding *C. picta* (AFS, unpubl. data).

The Colson Bay population of *C. picta* would appear to be small, as the species made up only 7% of all turtles observed and 9% of all turtles trapped in an area of the bay measuring approximately 50 x 150 m, with a lack of turtle activity noted in the remainder of the bay. Smallness of the population and scarcity relative to other species may have been responsible for Ernst's (1970) inability to record the species in four days of trapping. The apparent isolation of the population from other populations of the species suggests long-term population persistence, with few if any migrants entering the population.

The time scale for many of the negative stochastic effects associated with small populations (Gilpin and Soulé, 1986; Soulé, 1990) depends on generation length of the species in question. *Chrysemys picta* has a generation length of approximately 10 years in Michigan, based on the life table of Tinkle et al. (1981). A population in Kentucky would be expected to have a somewhat shorter generation length in response to increases with latitude in age at maturity (Iverson and Smith, 1993), thus Colson Bay *C. picta* appear to have persisted as a small population isolated from conspecifics for a minimum of 3–4 generations.

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On the Possible Occurrence of the Marginated Tortoise, *Testudo marginata*, in Turkey

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The possible occurrence of the marginated tortoise, *Testudo marginata* Schoepff, 1792, in Turkey was first reported by Brinckmeier et al. (1989) from the vicinity of the ancient city of Ephesus, 80 km from Vilayet Izmir, in the western part of Turkey. They based their report on a single specimen, without providing an illustration or detailed description, and the fate of this specimen was not mentioned. The area in which the specimen was found, the Küçük Menderes Delta, has been visited by many herpetologists, including ourselves on several occasions, but no further *T. marginata* have been encountered. We therefore believe that either the original identification was incorrect, or else that the specimen had been transported there by man.

The marginated tortoise occurs in southern and central Greece as far north as the Vermion Oros (Loumbourdis and Kattoulas, 1983) and on several Aegean islands including Skyros and Kyra Panagia, in the Northern Sporades, and Euboea as well as smaller islands in the Argo-Saronic Gulf (Dimitropoulos, 1985). It has been introduced on Sardinia and Tombola in southern Italy (Honegger, 1981; Kock and Storch, 1979). The distance from the Küçük Menderes Delta where the single reported Turkish specimen was found to the nearest known insular site of the species, Paros (Dimitropoulos, 1985) is nearly 250 km.

In the course of reaching maturity, *T. marginata* undergoes dramatic ontogenetic change, such that juveniles are often confused with other species, even by professional herpetologists. There is no hint of the diagnostic posterior marginal flare in hatchlings and many juveniles. The feature that hatchlings and adults have in common is the presence of paired triangular dark blotches on the plastron scutes, from the pectorals to the anals (Bour, 1983). The interpectoral seam is long, approaching or even exceeding the length of the interfemoral. Typically but not universally, *T. marginata* lacks thigh spurs, and although the coloration of the carapace varies considerably, the large carapace scutes rarely have a dark central blotch but tend to be pale in the center, surrounded by contrasting dark pigment. In some adult specimens, the carapace may be entirely black (Bour, 1983).

Methods. — In this study, the estuary of the Küçük Menderes River and the nearby wetlands located close to ancient Ephesus (Selçuk) (Fig. 1) were investigated for the presence of tortoises. The research area was visited two times, in August and September. We investigated areas in the vicinity of the ancient city of Ephesus, the Zeytinköy and Barutçu regions, as well as Meryemana and Belevi.

Tortoises were examined in the field and released after the following measurements had been taken. SCL (straight carapace length): straight-line measurement from the outermost projection of the nuchal to the outermost projection of the supracaudals; MW (median width): straight-line measurement from the center of the carapace; MWM (maximum width at marginals): straight-line measurement between the widest section of the marginals; CH (carapace height): maximum height within the bridge area parallel to horizontal level; PL (plastron length): straight-line measurement from the outermost projection of the gulars to the outermost projection of anals; PW (plastron width): maximum width across the abdominals; GuL: length of gular scute at mid-seam; HuL: length of humeral scute at mid-seam; PeL: length of pectoral scute at mid-seam; AbdL: length of abdominal scute at mid-seam; FemL: length of femoral scute at mid-seam; AnaL: length of anal scute at mid-seam.

Results. — A total of 9 tortoises were examined from Ephesus (Table 1). A combination of features led us to