Nesting Ecology of Spiny Softshell Turtles on the Missouri River in Montana: Zoogeographic and Management Implications

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The nesting ecology of western spiny softshell turtles (*Apolone spinifera hartwegi*) in Montana, where they are at the northern extent of their range and a state Species of Concern, is poorly known. We used telemetry, visual surveys, observation from shore-based blinds, and remote cameras to document nesting behavior, habitat, and timing in a 97-km reach of the Missouri River. We located 25 nests in 2011 and 97 in 2012. Most nests were in mixed-gravel substrates; only 3 percent were in pure sand. Vegetative cover at nest sites was sparse. Mean distance of nests to the water's edge was 13.7 m and mean height above the water surface elevation was 0.7 m. Proportion of nests found on island and mainland habitats were similar in 2011, but 90 percent of nests were on islands in 2012. Predation occurred on 46 nests; mainland nests incurred higher predation rates than island nests. Nesting followed annual peak river stage, and mostly occurred in the afternoon. Durations of nesting, incubation, and emergence periods were similar in both years, but nesting and emergence occurred about three weeks later in 2011 than in 2012. Only 36 percent of nests were successful in 2011, but 60 percent were successful in 2012. Flooding in 2011 probably decreased nesting effort and success by reducing habitat availability and delaying the onset of nesting, which thereby prematurely ended incubation. However, flood events maintain and create nesting habitats by clearing vegetation and depositing substrates. Premature termination of incubation suggests that the northern range of this species is probably limited by successful incubation.