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**Abstract**

Ectotherms have various means of dealing with low environmental temperatures, but relatively few species have been rigorously investigated. Consequently, we have little information to predict how ectotherm populations might respond to global temperature changes. Tortoises from temperate and subtropical regions often overcome periodically cool conditions by hibernation, but speckled dwarf tortoises (*Chersobius signatus*) need to remain active to exploit ephemeral resources in their arid winter-rainfall habitat. This study investigated how dwarf tortoises cope with low temperatures in winter and spring, by measuring thermal habitat quality and thermoregulation based on differently-sized operative temperature models in sun, shade, and in deep crevices. Investigations continued in summer and autumn to obtain a year-round picture of thermoregulatory challenges. Although large models (i.e., larger than dwarf tortoises) were expected to have lower operative temperatures than smaller models, due to the former's larger thermal inertia, all model sizes had similar temperatures. Hence, the species' small body size does not appear constrained by obtainable body temperatures in cool seasons. Nevertheless, low operative temperatures in winter posed a challenge for the tortoises, which reached their field-