

## Western Ecological Research Center

# Publication Brief for Resource Managers

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## Desert Tortoise Hibernation: Temperatures, Timing, and Environment

The federally listed Mojave population of the desert tortoise receives much attention from scientists and land managers alike. The cryptic behavior of desert tortoises and propensity to live in subterranean burrows can occlude our ability to fully understand their activity patterns and to evaluate their population status. Little has been published on their hibernation patterns, and yet land management decisions are made to allow more invasive activities while tortoises are thought to be in hibernation. In a recent study published in the journal *Copeia*, scientists at the USGS and University of Nevada, Reno, explored the timing of hibernation in tortoises and the possible mechanisms that influence the timing of hibernation in this species.

The study examined the onset, duration, and termination of hibernation in desert tortoises over several years at multiple sites in the northeastern part of their geographic range, and recorded the temperatures experienced by tortoises during winter hibernation. Tortoises avoid cold temperatures in winter by using underground cover sites or hibernacula, burrows excavated in soil or natural rocky caves. Hibernacula generally have higher temperatures than the open environment during winter, providing buffering from daily temperature fluctuations and protection from potentially lethal cold temperatures.

The timing of hibernation by desert tortoises differed among sites and years. Environmental cues acting over the short-term did not appear to influence the timing of the hibernation period. Such potential cues for hibernation onset include reduced day length and photoperiod, cooler temperatures, reduced forage availability, and timing of precipitation events. Different individual tortoises entered hibernation over as many as 44 days in the fall and emerged from hibernation over as many as 49 days in the spring.

### Management Implications:

- Desert tortoises at a given site enter and terminate hibernation over much longer time periods than was previously thought, and the timing of hibernation appears to be uncoupled from acute environmental cues.
- Tortoises at different study sites appear to select different types of hibernacula so as to stabilize their winter temperature exposures.
- Management decisions allowing activities to occur in winter months should account for the variability in the timing of hibernation.

This range of variation in the timing of hibernation indicates a weak influence at best of external cues hypothesized to trigger and terminate hibernation. However, there do appear to be regional trends in hibernation behavior as hibernation tended to begin earlier and continue longer at sites that were higher in elevation and generally cooler. The emergence date was generally more similar among study sites than the date of onset.

While the climate and the subsequent timing of hibernation differed among sites, the average temperatures experienced by tortoises while hibernating differed by only about five degrees from the coldest site to the warmest site.

*Nussear, K.E., T.C. Esque, D.F. Haines, and C.R. Tracy. 2007. Desert tortoise hibernation: temperatures, timing, and environment. Copeia:378–386.*