

Turtle and Tortoise Hibernation

WHAT IS HIBERNATION?

Turtles and tortoises inhabiting areas with a significant decline in temperature during the fall and winter months may be subject to freezing and lack of resources (food and water). Tortoises can avoid cold/freezing temperatures by using underground cover sites (hibernacula), which are most commonly either burrows (sites excavated in soil), or dens (natural rocky caves)³. Hibernation likely results in a decrease in metabolism, which likely allows the tortoise to conserve energy during a time of year with little food available³. Water loss can be minimized by choosing a hibernation site with a high relative humidity, positioning in substrate to cover sites of water loss through the integument (skin), and by decreasing respiration⁵.

We are still not completely sure of the cues that cause a tortoise to decide when it is time to hibernate between the months of October to April/May. Reduced day length, cooler day and night temperatures, less available food in the environment, and timing of rainfall have all been considered possible causes for timing of hibernation. Recent studies on wild populations of Mohave Desert Tortoises (*Gopherus agassizii*) have shown that the above events do not appear to be the only cues responsible for the onset of hibernation, with tortoises also generally seeking the warmest microclimates in their environment, which reduces the likelihood this is only an energy conservation strategy³. There may be endogenous cues of hibernation, which may mean there is more to hibernation than protection from cold and lack of resources, and hibernation should be allowed in healthy animals when possible to promote natural behavior.

WHICH SPECIES HIBERNATE?

Many species of turtles and tortoises are maintained in captivity, and it is important to know if your species is one that hibernates. If you attempt to hibernate a species that does not normally do so, you will undoubtedly cause health problems. Species that **DO** frequently hibernate in the wild are the Desert Tortoise (*Gopherus agassizii*), Marginated Tortoise (*Testudo marginata*), Hermann's Tortoise (*Testudo hermanni*), Russian Tortoise (*Agrionemys horsfieldii*), most Greek Tortoises (*Testudo graeca*), Gopher Tortoises (*Gopherus polyphemus*), Berlandier's Tortoise (*Gopherus berlandieri*), some species of Box Turtle (*Terrapene carolina carolina*, *Terrapene c. trianguis*, and *Terrapene ornata ornata*), and many aquatic turtles. Commonly kept species that **DO NOT** hibernate include the Sulcata Tortoise (*Geochelone sulcata*), Leopard Tortoise (*Stigmochelys pardalis*), Red Footed Tortoise (*Chelonoidis carbonaria*), Yellow Footed Tortoise (*Chelonoidis denticulata*), Radiated Tortoises (*Astrochelys radiata*), and numerous other tropical and African species.

HOW TO PREPARE FOR HIBERNATION

Hibernation can be a dangerous event for an unhealthy tortoise, and it is very important that only healthy animals are allowed to hibernate. In captivity, turtles and tortoises under 3-4 are frequently not allowed to hibernate regardless of health status, except by the most experienced of keepers. Any turtle or tortoise showing signs of nasal discharge, oral discharge, weight loss, diarrhea, anorexia, soft shell, regurgitation, swollen or sunken eyes, external wounds, or general signs of illness should be evaluated by a veterinarian comfortable with reptiles prior to hibernation. A yearly pre-hibernation examination is a great time to discuss your plan for hibernation, perform blood work to ensure healthy kidneys and liver, evaluate a fecal sample for internal parasites, obtain a current weight, and ensure your tortoise is ready to be cooled down. If your tortoise is sick it can be treated with the necessary medications, will likely be warmed throughout the winter, and will hopefully be ready to hibernate once again the coming year. **If you are in doubt as to whether your tortoise should be hibernated or not, do not hibernate the animal, and have your animal evaluated by a qualified professional.**

As hibernation nears in early October it is common for turtles and tortoises to decrease their food intake. Early October is usually a good time to withhold food items for 1-2 weeks in smaller turtles and

tortoises, and 3 weeks in larger tortoises¹. Keep the temperature elevated during this time (75-80°F) to ensure that adequate digestion of intestinal contents continues. This ensures the gastrointestinal tract will be clear of food, which may otherwise ferment during hibernation. It is very important to ensure fresh water is available while food is being withheld, and leading up to hibernation. It is a good idea to soak your turtle/tortoise in a warm water bath (70-75°F) at least 3 times weekly prior to hibernation, as this will also promote drinking and hydration. After these 1-3 weeks have been completed, cool the turtle/tortoise to room temperature for one week (60-70°F) prior to placement into the hibernaculum.

It is best to have your hibernaculum ready while you are starting to cool down your turtle or tortoise. This will allow you to check the temperatures in the hibernaculum prior to addition of the tortoise. An electronic thermometer that monitors high and low temperatures should be placed in the hibernaculum weeks prior to hibernation to ensure temperatures are safe for your tortoise. If the temperatures are too high or too cool, it is better to find out before the tortoise has entered the hibernaculum. The thermometer should be left in the hibernaculum throughout hibernation, and monitored frequently. The hibernaculum can be either outdoors or indoors, depending on your available space.

OUTDOOR HIBERNATION

Outdoor hibernation is possible in certain climates. It is very important to ensure that the hibernation site is not accessible to predators, extreme temperatures, or flooding (rain or irrigation systems). Box Turtles will frequently burrow into loose soil if left outside to hibernate. Box turtles in the wild are commonly found buried in loose soil less than 20cm deep covered with up to 8cm of leaf litter, and will move shallower or deeper depending on the temperature⁵. To mimic natural conditions one would provide a protected area of loose soil at least 2 feet deep, 1-2 feet of leaves over the top, with temperatures between 35-55°F. Box Turtles do show some freeze tolerance, but if prolonged exposure to temperatures below freezing are expected it may be better to hibernate your turtle inside.

Desert Tortoises may hibernate outdoors if the correct environment can be provided. An outdoor hibernaculum can be constructed using concrete blocks and 3/4" plywood, or half of a metal trash can. The concrete blocks can be buried or partially buried, and the plywood creates the roof of the hibernaculum. Both of these structures can then be buried with 8-12 inches of soil for insulation. The entrance to the hibernaculum should generally have a southern exposure², and it is important to ensure a raised area at the entrance to ensure the grade leads water away from the hibernaculum. The hibernaculum can be filled with loose soil and hay, and the entrance covered with a tarp or opaque plastic that is loose at the base. Previous reports have shown common hibernaculum temperatures between 33.8-59°F for wild Desert Tortoises³, and general recommendations are to maintain hibernaculum temperatures between 40-55°F. Wild female Sonoran Desert Tortoises are commonly seen basking on warmer days, both sexes commonly emerge post rains to hydrate, and juveniles have been noted to bask and forage on nice days³. Females also frequently appear to exit hibernation approximately one month earlier than males^{4,5}. If your tortoise exits the hibernaculum on the occasional nice day to drink and bask that is likely normal, but if it is frequently observed exiting the hibernaculum it may be ill, or there may be a problem with placement or construction of the hibernaculum. If this occurs it is best to consult a veterinarian or your local Turtle and Tortoise Society.

INDOOR HIBERNATION

Indoor hibernation can be achieved with careful planning. It is important to ensure when hibernating turtles and tortoises indoors they are protected from rodents and extreme temperature fluctuations. Areas indoors that can be maintained between 35-55°F such as basements, wine cellars, garages, sheds, crawl spaces, or even potentially east-facing closets can be acceptable sites for hibernation¹. Large insulated boxes, coolers, and Styrofoam ice chests can be used as an artificial hibernaculum. The hibernaculum should be filled with 1-2 feet of humid peat-based potting soil, and 6 inches of shredded newspaper or dried leaves should be placed on top¹. Holes should be drilled into the hibernaculum, and a protective covering should be present to prevent predators from harming your tortoise. Tortoises hibernated indoors are more susceptible to dehydration, and should be removed from the hibernaculum once every 2-4 weeks to soak in warm water. The turtle or tortoise should be warmed to room temperature, and soaked in warm water for 1-2 hours. The tortoise must be allowed to dry completely prior to reentering the hibernaculum. At this time the tortoise can also be evaluated for signs of disease, and you can stop hibernation if necessary.

MONITORING YOUR TORTOISE DURING HIBERNATION

It is very important to understand that hibernation should be discontinued if any signs of disease arise. It is much safer for your tortoise to skip a year of hibernation if it is ill, than to try to push through hibernation. Waking the tortoise every 2-4 weeks to soak/hydrate provides an excellent time to weigh and evaluate the tortoise for signs of nasal or oral discharge, excessive weight loss, sunken eyes, rodent trauma, etc. When you wake the tortoise you should also look to see if there are signs of urination in the hibernaculum (urates or excessive moisture), or signs of frequent movement in the enclosure. If the tortoise urinates in the hibernaculum it is generally recommended hibernation be discontinued for the year, and the animal be warmed. Frequent movement may indicate inappropriate temperatures or disease, and is a sign that further evaluation is necessary. It is generally expected that a tortoise should not lose more than 1% of its body weight per month of hibernation, and studies in the wild have shown very little change in the body mass of healthy Desert Tortoises during hibernation⁵. If you notice excessive weight loss, or any of the above signs it is very important to contact your reptile veterinarian or local Turtle and Tortoise Society for further instructions.

YOUR AWAKENING TORTOISE

Once you start noticing signs of waking, the turtle/tortoise should be soaked in warm water for 2 hours, 2-3 times per week, and it should be eating well within 1-2 weeks. It should have access to a shallow water dish at all times as it is waking up. If the temperatures outdoors are not yet warm enough, it is generally a good idea to provide supplemental heat (75-85°F) at this time to stimulate the appetite and normal activity. If your tortoise is not eating normally within 1-2 weeks, has lost significant body weight, is not urinating normally, or is showing any other signs of illness it is important to have your tortoise evaluated by a reptile veterinarian immediately.

DON'T BE EMBARRASSED TO ASK FOR HELP

Hibernation is a very complex process, and can be very intimidating to the general keeper. No one handout can explain all of the complexities of hibernation, nor does it describe the perfect way to mimic this natural phenomenon. If the correct precautions are taken your turtle or tortoise will benefit from this natural behavior. If you have any questions or concerns regarding the above species, or others not discussed here, there are many people who are around to help. I can always be contacted at DrZSteffes@DVM.com, or Ohana Animal Hospital (925-394-4990). Your local Turtle and Tortoise Society generally can provide you with a wealth of knowledge as well. Happy Hibernating!

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