

# Box Turtle

## Natural History

Box turtles (*Terrapene* spp.) are commonly kept reptiles native to North America. There are 6 species of box turtles, but it is subspecies of the common (*Terrapene carolina*) and western (*Terrapene ornata*) that are most often kept in captivity. The eastern (*T. c. carolina*), three-toed (*T. c. triungius*), Gulf Coast (*T. c. major*), and ornate (*T. o. ornata*) are some of the most commonly kept subspecies. Box turtles are found in a wide range of habitats including woodlands, grasslands, marshes, and semi deserts (depending on the subspecies). They are a very highly distributed species, occupying habitats throughout most of the United States and into Mexico. Box turtle species spend most of their time buried in the mud or under rocks during the day. Box turtles are terrestrial, but may soak in puddles.

## Characteristics and Behavior

One unique characteristic of box turtles is that they possess a hinged plastron (bottom shell) that allows full withdrawal of the head and limbs into their shell for defense. Box turtles are considered curious and fairly active compared to other commonly kept turtle species. They tend to be tolerant of handling. Captive bred individuals are always preferred over wild caught for health and temperament reasons. Like other turtles, box turtles aren't well suited for the beginner keeper. They are long lived, require quite a bit of space, and can be difficult to care for compared to other reptiles. Box turtles should be considered intermediate level reptiles.

## Lifespan

30-40 years.

## Adult Size

4.5-8 inches.

## Housing

For adult terrestrial turtles and tortoises, the length of an enclosure should be 10x the size of the animal, the width should be 5x, and the height 3x. For an adult box turtle, that means approximately a 4'x2'x1'-6.5'x3'x2' enclosure depending on size. Bigger is always better! Enclosures can be made of wood, plastic, or sometimes rubbermaid tubs. Glass terrariums may be suitable for smaller turtles but more difficult to find appropriate sizes for larger ones, and some turtles may be stressed by non-covered sides. As long

as the height is sufficient to keep the turtle from escaping, tops are unnecessary. Outdoor pens can also be constructed for the summer months.

Cover, such as ground clutter, half logs, plants (live or fake), and rocks should be provided to help your box turtle feel more secure and provide enrichment. Box turtles given a choice between barren and enriched enclosures showed clear preferences for the enriched enclosures. For substrate, newspaper or paper towels are easy to keep clean and present no risk of impaction, but do not provide burrowing opportunities. If these substrates are used, a dig box should be provided. For a more naturalistic substrate, a mixture of cypress mulch and ReptiSoil at least 4 inches deep provides burrowing opportunities. A hide, which can be a wooden box, tupperware, commercial shelter, or cardboard with a hole cut out should be provided. If not providing natural substrate, this hide should be filled with ReptiSoil or EcoEarth to allow digging opportunities. Rocks are also useful for helping turtles file down their nails.

When temperatures are above 60F, box turtles can be housed outside. They should be in an escape proof and predator proof enclosure. A shallow pool of water, hidebox, and burrowing opportunities should be provided. Partial shade should also be available to allow the turtle to escape direct heat. It is necessary to bury a barrier at least 8 inches underground to prevent your box turtle from escaping.

## Lighting

Like all chelonians, box turtles require UVB light to synthesize vitamin D3 in their skin. Vitamin D3 is needed for proper metabolism of calcium and prevention of metabolic bone disease. The ReptiSun T5 5.0 HO, Arcadia T5 12% Desert, or Arcadia T5 6% Forest are all acceptable choices, depending on where you set up your turtle's basking spot. Arcadia provides a guide as to where to place your UVB fixture in relation to your chelonian's basking spot. It is important to note that UVB cannot penetrate glass, so natural sunlight through a window will not be sufficient for a chelonian to synthesize vitamin D3. Allowing safe outdoor time is also an excellent source of UVB and visible light.

Sunlight is made of ultraviolet, near infrared (IR), mid IR, far IR, and visible light. It is our job as keepers to provide full spectrum lighting, which means as close to sunlight as possible. Unfortunately there is not one source for all of these components, so we must provide multiple types of lighting. For visible light, LED or halide bulbs should be provided.

UVB is NOT optional for chelonians. Lack of proper UVB can lead to impaired skeletal, muscle, and immune function. Replace UVB bulbs every 6 months, as they can continue to give off light even when not producing UVB. Lights should be turned off at night to maintain normal day/night cycles. For this reason, red or black nightlights should not be used as they can disrupt normal day/night cycles.

Arcadia UVB guide: <https://www.arcadiareptile.com/lighting/guide/>

## Heat

Unlike mammals, reptiles cannot internally regulate their temperature and rely on their environment to heat and cool themselves. Therefore, it is important that we provide captive reptiles with a temperature gradient so they can warm up or cool down as needed. Reptiles have three temperatures to measure: basking spot, warm ambient, and cool ambient. The basking spot is the hottest area in the enclosure where they bask, the warm ambient is the air temperature on the warm side of the enclosure, and the cool ambient is the air temperature on the cool side of the enclosure. Ambient temperatures are best measured with digital thermometers (one on the warm end and one on the cool end), as analog thermometers are often inaccurate. Basking temperatures can be measured with a digital infrared thermometer.

Box turtles need a basking spot of 85-90F, a warm ambient of 80F-85F, and a cool ambient of 75-80F. Any light emitting sources should be turned off at night. Sunlight is made of UV, near IR, mid IR, far IR, and visible light. Flood tungsten-halogen bulbs are the most efficient at producing near IR, which is the most abundant IR in sunlight, and they also produce significant mid IR and some far IR. Far IR is the least abundant in sunlight, but is most often produced in large amounts by sources like ceramic heat emitters, heat pads, and radiant heat panels. Tungsten-halogen bulbs should be the flood type to ensure a wide enough basking site. These heat producing bulbs can be found as reptile specific bulbs or at hardware stores. Avoid hot rocks as these can easily burn reptiles. Box turtles will brumate (hibernate) over the winter when temperatures start to drop below 65F. Ill or young box turtles should not be brumated.

## Humidity

Box turtles need an ambient humidity of 50-60%, which should be measured with a digital hygrometer. A hide box with moist substrate can be provided to create a humid microclimate that the turtle can enter at will. Daily heavy misting can also help maintain humidity.

## Feeding

Box turtles are omnivores that eat a variety of animals and plants in the wild including berries, eggs, other reptiles, slugs, insects, worms, mushrooms, roots, grubs, carrion, and flowers. In captivity, 50% of an adult box turtle's diet should be animal protein. Juvenile box turtles consume more animal protein than adults. Malnutrition is an extremely common problem in box turtles, which is why dietary variety is important to help prevent dietary deficiencies. 40% should be vegetables and greens, and 10% should be fruits and flowers. A multivitamin with vitamin A should be provided 2x/month. Box turtles should be fed daily until they reach sexual maturity around 4 years, and then they can be fed every other day. Very young hatchlings likely won't consume plant matter, but it should still be offered to encourage consumption of a variety of foods.

Insects are naturally deficient in calcium and low in nutritional value. In order to make them nutritious for reptiles, all insects should be gutloaded (fed a highly nutritious meal 24-48 hours before feeding). Repashy BugBurger or Arcadia InsectFuel are good choices for feeding feeder insects. Insects should also be dusted with calcium powder 2-3x/week. Calcium powders should be calcium carbonate based and should not have any phosphorus. If you are providing adequate UVB, calcium powder does not need to contain D3. Arcadia, Repashy, and ZooMed all have good products. Follow your brand's recommendations to avoid overdosing. Acceptable animal proteins include: earthworms, crickets, slugs, snails, locusts, dubia roaches, silkworms, and the occasional mealworms and waxworms. Pinky mice can be given as the occasional treat. Pellets designed for box turtles or aquatic turtles can also be provided on occasion.

Leafy greens: Dandelion greens, turnip greens, spring mix, escarole, bok choy, mustard greens, radicchio, endive, carrot greens, collard greens, radish greens, alfalfa (plant, not sprouts), cabbage, romaine lettuce. Spinach should be fed in moderation as it contains oxalates, which can disrupt calcium absorption. It is a common mistake to feed only lettuce, or only one type of green. Be sure to provide a variety for your turtle.

Veggies and herbs: Squash, sweet potatoes, broccoli, asparagus, cactus pad, basil, bell pepper, cucumber, zucchini, rosemary, celery, cilantro, prickly pear (with spines shaved off), okra. Carrots are high in sugar and should not be overfed. Avoid garlic, onion, rhubarb.

Fruit and flowers: Blueberries, mango, raspberries, grapes, pomegranate, grapes, melon, strawberries, apples without seeds, blackberries. Flowers like hibiscus, dandelions, and rose petals can also be offered. Avoid avocado.

## Water

A clean dish large enough to soak in should always be available.

## Sexing

Sexual maturity is reached around 4-7 years. Males tend to have longer tails and may also have red eyes and concave plastrons depending on the species.

## Zoonosis

Like other reptiles, box turtles can carry *Salmonella*. Always wash your hands after handling reptiles or items from their enclosure.

## Health

Box turtles may be prone to malnutrition (especially vitamin A deficiency), beak overgrowth, nutritional-secondary hyperparathyroidism (metabolic bone disease), reproductive problems, and aural (ear) abscesses. Your box turtle should be examined by your veterinarian every 6-12 months. Signs of illness in box turtles include shell abnormalities, beak overgrowth, bubbling from the nose, loss of appetite, discoloration, and puffy eyes.

### Sources and Further Reading:

- Case, B. C., Lewbart, G. A., & Doerr, P. D. (2005). The physiological and behavioural impacts of and preference for an enriched environment in the eastern box turtle (*Terrapene carolina carolina*). *Applied Animal Behaviour Science*, 92(4), 353-365.
- De Vosjoli, P., & Klingenberg, R. J. (2012). *The Box Turtle Manual*. Fox Chapel Publishing.
- EVERSOLE, C. B., HENKE, S. E., & JANIK, S. (2013). TERRAPENE CAROLINA (Eastern Box Turtle). DIET. *Terra. Herpetological Review*, 44, 4.
- <https://lafeber.com/vet/wp-content/uploads/Box-Turtle-black-white.pdf>
- <https://vcahospitals.com/know-your-pet/turtles-box-feeding>
- <https://azeah.com/tortoises-turtles/basic-care-box-turtles>
- <http://www.exoticpetvet.com/box-turtle-care.html>
- <http://www.reptilesmagazine.com/Care-Sheets/Ornate-Box-Turtle/>
- <http://www.anapsid.org/box.html>
- <https://www.seavs.com/pet-care-information/tortoise-care/>
- <https://srelherp.uga.edu/turtles/tercar>
- [https://animaldiversity.org/accounts/Terrapene\\_carolina/](https://animaldiversity.org/accounts/Terrapene_carolina/)
- *Mader's Reptile and Amphibian Medicine and Surgery*
- *The Arcadia Guide to Reptile and Amphibian Nutrition*
- Facebook: Advancing Herpetological Husbandry