



Each box turtle is unique in skin coloration and pattern.

COURTESY KATHY ROCHE

Third Toe is a Charm

Captive care for the captivating three-toed box turtle. ✦ BY TESS COOK



An old bookcase can be made into suitable housing once a stronger backing is attached and the wood is made waterproof.

COURTESY SANDY BARNETT



Female three-toed box turtles have brown, or ruby brown eyes.

COURTESY KATHY ROCHE

My first box turtle pet was a three-toed (*Terrapene carolina triunguis*). Naturally curious and intelligent, I consider it to be one of the most endearing box turtle species. With good care, they can live in captivity for 50 or more years.

Triunguis is a Latin term that means three nails or three claws. Three-toed box turtles usually have three back claws, but it is not uncommon to find specimens with a fourth back claw; therefore, a back toe count should not be the only factor used in identifying this species. Shell and body coloring are also commonly used as identifying traits. The carapace or top shell is domed, somewhat elongated and keeled on the vertebral scutes. When full grown, they are typically 4 to 6 inches long. The carapace is brown, yellowish-brown or olive colored, with or without varying amounts of yellow or orange blotches, dots or dashes, which typically form radiating lines on each scute. The plastron is generally tan colored with none to

varying amounts of brown coloration, which follows the scute margins. The head and neck can be particularly attractive, with areas of yellow, orange, black and white on brownish skin, especially in males. The scales on the foreleg are often pigmented yellow or orange. The eyes of mature males can be red or have a pinkish hue. The eyes of females are usually brown and sometimes a deep ruby brown. Of course, as box turtles, they have a distinctive hinge between the pectoral and abdominal scutes that allows them to draw their head and legs into their shell and close up at both ends.

Three-toed box turtles have a broad distribution in the south-central United States. They can be seen in states west of the Mississippi River, including much of Missouri, Arkansas and Louisiana. They occur in parts of southeastern Kansas, eastern Oklahoma and the eastern half of Texas. They are also found further east in south-central Mississippi, Alabama and western Georgia. Although they may be common in some states, it is unwise to collect them from the wild. Their habitat is shrinking due to suburban sprawl, and the proliferation of roadways has resulted in increased road kills, as well as the restriction to potential breeding partners, nesting and hibernation sites. Along with the sprawl come additional sources of predation and pollution that directly harm turtles and their food sources.

Leave Wild Turtles Alone

Box turtle populations are declining, and most states no longer allow for their collection for the pet trade. Even if you live in a state that still permits the collection of box turtles for personal



COURTESY NATALIE DOUGLIE

possession, please refrain from doing so. Most wild box turtles have a difficult time acclimating to captive life because they are accustomed to roaming large home ranges and to eating a certain type of diet. They will often refuse to eat a captive diet. Three-toed box turtles are commonly bred by hobbyists and turtle breeders, and with a little effort spent searching reptile magazines, online resources and turtle organizations, a prospective turtle owner can usually find a three-toed for sale or a turtle that needs re-homing. Unfortunately, this does not always mean the turtle will be healthy. If at all possible, observe the turtle before taking possession of it. A healthy, well-hydrated turtle will feel heavy and solid, not like a hollow box. It will have clear nostrils, and the eyes will be open and free of discharge. Ask the previous owner questions regarding its diet and any past illnesses. The more you know about the turtle, the easier it will be to acclimate it to its new home. Quarantine newly

Three-toeds sometimes have four rear claws, so a "toe count" isn't always a reliable I.D. method.

acquired turtles for six months to lessen the chances of introducing diseases to other turtles.

Housing Must-Haves

When designing your three-toed box turtle's enclosure, keep in mind that they naturally occur in areas with moderately high humidity, open treetop canopy that allows sunlight to fall to the ground, and well-draining, friable soils. If possible, house your turtle outside during warm weather. Position the pen in an area that does not flood. The walls can be made of any water-resistant material. Wooden posts and boards, sheet metal, vinyl sheets, mortared rocks, bricks and cement blocks can all be used for walls. Whatever material you select, sink a barrier that is 10 to 12 inches deep along every perimeter to keep turtles from digging out. The walls should be at least 20 to 24 inches tall. Attach caps at corners to prevent turtles from crawling up a corner and going over the wall.

Large enclosures promote natural behaviors, so outdoor turtle pens should be as large as possible — at least 12 square feet for one or two turtles. Add an extra 9 square feet per additional turtle. Overcrowding causes stress and illness, and should be avoided. Adult males are often aggressive toward each other and lone females; house them in separate pens. The ground surface of the turtle pen should drain well and be made of

Indoor habitats should include proper light and heating, as well as clean water, hides and enrichment items.



COURTESY GLENN HOLLOWELL

quality soil. Very sandy soils should have composted leaves and peat moss added to allow for some moisture retention. Composted leaves, peat moss and sand can be added to soils that contain a lot of clay to make it more friable (soft for digging). Soil augmentation is especially important if you intend to hibernate your turtles in the enclosure. Place shallow water pans in the pen to give the turtle easy access to drinking and soaking water. I had a water spigot installed in the pen for easy cleaning and refilling of these water pans. Another option is to install a rain barrel nearby to provide a handy source of clean water. Shallow in-ground ponds can also be provided. Although box turtles can swim, they are not strong swimmers and can drown in deep water. Box-turtle-safe ponds, such as the one found at boxturtlefacts.org/wading_safely.pdf, provide an option for a little swimming and a larger body of water that won't become dirty or heat up as quickly.

Furnishing the Pen

A well-designed turtle pen must provide sun, shade, shelter, exercise options, water and food. With a little creativity, it can be made to resemble typical landscaping or flower gardens. My turtle pens look natural and include small shrubs and ground cover to provide shade, as well as logs and local rocks to provide hides. Just be sure to keep objects away from the walls, so they cannot be used for escape. Rotting logs



COURTESY KATHY ROCHE

placed in the pen can provide turtles with edible mushrooms and bugs. Place large, flat rocks around the pen to help keep your turtle's claws trimmed. It doesn't matter how you decorate, as long as you provide the basics: areas of sun, shade, water and shelter.

Protection

If your pet turtles are housed outdoors, you will want to provide protection against predators. One of the most common causes of injury and death is an animal attack — mainly raccoons, dogs and rats. Sometimes neighborhood children harm animals. Whatever it takes to protect your turtles, do it! I use a covered pen to confine my turtles at night. These pens have metal mesh tops

This female three-toed box turtle found a new home via a turtle organization.

hinged onto heavy wooden frames. I latch the lids so raccoons cannot pry them open. The boxes are partially buried into the ground (about 10 inches) to prevent digging-out escapes. Turtles adjust to being moved every night if done consistently and gently. Each of these night pens provide them with adequate space and can become another housing option if I must be away for more than a day (I would still arrange for someone to change the water pans and check on the turtles).

Indoor Habitat

If you live within the natural range of three-toed box turtles and have suitable space, please try to provide an outdoor turtle pen. Many owners don't have that option and must use an indoor habitat instead. It is still possible to provide a healthy environment that includes ample space, full-spectrum light, proper temperature range, water and shelter.

A good-sized indoor habitat for one or two adult turtles is about 9 to 12 square feet. Most owners start out with something smaller, which is fine for the short-term or for hatchling turtles, but if you want to see your turtle flourish and behave naturally, you will have to build or buy something larger.

Heat and Light

Turtles are ectothermic, also called cold-blooded. They require external heat sources to increase their body temperature so they can function at



Male three-toed box turtles will puff out their red necks to attract the attention of female turtles.

COURTESY KATHY ROCHE

optimum levels. In nature, turtles get their heat from the sun and surrounding objects that have been heated by the sun. In an indoor setting, they will need an artificial source. A typical house thermostat setting won't be sufficient to adequately warm your turtle.

Supplemental heating can be obtained with incandescent light bulbs, infrared heat lamps, ceramic heat fixtures, undertank heating tapes, and mercury vapor bulbs. Depending on the size of the enclosure, you will need to adjust the height of the bulbs and wattage strength to provide the proper temperature(s) at the turtle level. Provide your box turtles with a temperature gradient that has a warm spot of 85 degrees Fahrenheit at one end and a cool end about 10 to 15 degrees cooler. A good digital thermometer is required and should be used to test both the warm and cool ends of the habitat regularly. A healthy turtle will periodically move between the warm spot and the cool end as it regulates its core body temperature.

Research has found that turtles are most active when their core body temperature is around 80 degrees. Why not keep the whole enclosure at 80 degrees? Because inducing a constant state of heightened activity may be a health risk, and having a temperature gradient and regular cool-down periods is more natural.

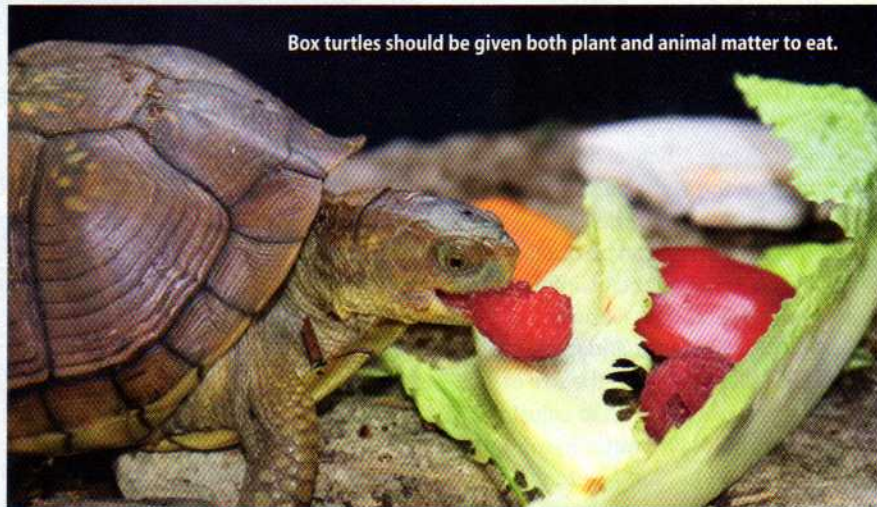
Mercury vapor bulbs provide both heat and ultraviolet B-wavelength radiation, a component of sunlight which is used by box turtles to synthesize vitamin D₃, which in turn helps them utilize calcium. Because a turtle's body consists of a large mass of bone that makes up its shell, it has a great need for calcium. A vitamin D₃/calcium deficiency can lead to metabolic bone disease, which presents as soft and/or deformed bones that can affect the turtle's appearance or gait. Full-spectrum light tubes and compact fluorescent bulbs also produce UVB radiation, but without heat. Light from UVB emitters must be able to fall directly on the skin unimpeded by glass, plastic or dense screens. When using any UVB-emitting light, comply with the manufacturer's recommended usage distance. Provide hide boxes to give turtles a place to escape from the light. Photo-kerato-conjunctivitis is inflammation of eyes and eyelids that may occur if turtles are subjected to

long and intense exposure to UVB radiation. A light cycle of 12 hours on and 12 hours off is recommended, but the light might need to be increased to 14 hours on during the winter to simulate summer light conditions.

Water and Moisture

Artificial heating can cause indoor habitats to dry out quickly. Shallow plant saucers large enough to allow the turtle to climb into for soaking and drinking will prevent it from becoming dehydrated. Turtles often defecate while soaking; check the water several times a day and change it as needed. If you have several turtles in the same habitat, provide multiple water dishes.

Moderately high humidity in the enclosure will promote good shell growth and healthy skin, eyes and nasal passages. Humidity is greatly affected by the substrate you use. In outdoor pens, the soil, air and plants contain or release moisture to keep the turtle comfortable, but outdoor pens will need to be watered in dry weather. For indoor turtles, use a moisture-retaining substrate, such as sphagnum moss or terrarium moss, milled peat moss, coconut coir, cypress mulch, hardwood bark mulch, and top soil. Each has their pros and cons. Some, such as sphagnum moss, are expensive to replace regularly. Others, including coconut coir and peat moss, can become a breeding ground for mold when kept moist. Hardwood bark mulch and cypress mulch dry out quickly, and top soil can get muddy. If a combination of several products is used, the good features often cancel out the bad characteristics.



Box turtles should be given both plant and animal matter to eat.

COURTESY SHARA KRONMAL

Therefore, a combination of coconut coir and pine bark or cypress mulch will retain moisture better. Or a mixture of sphagnum moss and top soil or peat moss will make a more cost-effective substrate that is less prone to mold. Try different mixtures and use what works best for you. The goal is to use a substrate that will slowly release moisture and keep the relative humidity in the habitat between 70 and 80 percent. Add water to the substrate as needed. Avoid using play sand, pine and cedar wood shavings, and paper- or clay-based bedding.

Indoor Furnishings

Depending on the size of the indoor habitat, there are a number of items that can be added to enhance the well-being of the turtle. Real and artificial plants, along with hide boxes, can provide sight breaks and shelter. Box turtles living indoors often suffer from long claws. Place flat pavers or rocks along one side of the habitat, so turtles can walk over them to

help keep claws trimmed. This area can also be used for feeding and will make after-meal clean-up a snap. Adding small logs can provide exercise. However, don't include climbing structures for turtles that have difficulty righting themselves. Also, keep cuttlebone in both indoor and outdoor habitats at all times so your turtle can freely eat as much calcium as it wants.

Nutritional Needs

An adult box turtle can be fed two or three times a week, whereas hatchlings or young turtles can be fed every other day. Three-toed box turtles are opportunistic omnivores, and plant and insect or animal matter should be provided at each meal: 50-percent animal matter, 25-percent vegetable and 25-percent fruit. Animal matter can include nightcrawlers, crickets, earthworms, superworms (*Zophobas morio*), mealworms (*Tenebrio*) in moderation, bee moth larvae, and lean cooked beef and poultry. Insects should be well-hydrated and gut-loaded before



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Learn More

Like most animals, box turtles will not flourish without proper care. A good resource, *North American Box Turtles: A Natural History* (2001) by C. K. Dodd, will enlighten owners about three-toed box turtles in their natural habitat. Learning about natural history can provide you with valuable clues as to the turtle's specific needs. Always try to mimic their wild habitat whenever possible.

An outdoor pen should be made as large as possible and provide box turtles with water, shade and sunny areas.



An attractive female three-toed box turtle takes shelter under plantings.

use. Soaked dry dog or cat food and canned varieties may be used occasionally. High-quality, commercial turtle or tortoise food can be a good source of nutrition and should be moistened before being offered. When combined with dark leafy greens, vegetables, fruits, fungi and occasional live insects, it will provide a nutritious meal.

Turtles can be fed most types of fruits and vegetables so long as a variety is offered over time. Good fruit choices include apples, grapes, cantaloupe, kiwis, bananas, persimmons, cherries, blueberries, strawberries and mulberries. Unlike tortoises, box turtles are able to eat fruit without concern for parasitic bloom; however, they can get diarrhea if only fruit is fed, therefore fruit should be limited to 25 percent of the meal. For vegetables, many turtles will accept lightly steamed and grated sweet potatoes and winter squashes, spine-free *Opuntia* cactus pads and fruit, chopped zucchini, carrots, tomatoes, corn, green beans and peas. Mushrooms should also be a part of the diet, and both wild and store-bought can be used. Include leafy greens at every meal. I use the outer leaves of romaine lettuce, as well as red leaf and Bibb lettuce, kale and arugula. Even the much-maligned spinach, with its high oxalic acid content, can be used occasionally. Spinach is high in vitamins A, C, E and K, and other vitamins and minerals that are essential for turtle health. As long as calcium — in the form of cuttlebone or as a powder supplement (with vitamin D₃ for indoor turtles) — is supplied to your turtle, the occasional loss of calcium due to its binding with oxalic acid is not harmful. Avoid offering only one or two foods exclusively. Rotating a

meal's protein with a different vegetable, fruit, fungi and a dark leafy green will ensure your box turtle receives the nutrition it needs. Feeding the turtle on a hard, flat surface will help to keep its beak trimmed. Remove uneaten food quickly to reduce the occurrence of ants and other pests. Finally, sprinkle a reptile vitamin and mineral supplement on food at the recommended dosage twice a week.

Health

Proper housing and diet, and the elimination of stress factors, such as overcrowding and fighting, will generally keep your turtle in good health. Unfortunately, injuries and infections can occur even with diligent care. Therefore, it is important to be acquainted with a veterinarian who treats reptiles. There are certain health concerns that can be treated by the owner after a veterinarian has demonstrated the proper technique, such as clipping long claws or filing overgrown beaks. However, most problems should be treated by a veterinarian. Common maladies that affect box turtles are internal and external parasites, shell rot, mouth rot, eye infections, inner ear abscesses and upper respiratory illness. Injuries caused by animal attacks should be treated by a veterinarian as soon as possible because systemic blood infections and shell rot are frequent outcomes of these wounds. Any deviation from normal behaviors could be a sign of illness and should motivate the owner to seek veterinary advice, especially if they occur after the introduction of a new turtle to the herd. Ranavirus, a deadly virus that has recently been found in box turtles, can decimate a collection of turtles within weeks of the

initial outbreak. One way to protect against the spread of this virus is to quarantine all newly acquired turtles.

Three-toed box turtles hibernate throughout their natural range. If a pet box turtle is housed outdoors within their normal range, they can be allowed to hibernate in their pens in well-prepared hibernacula. However, hibernating box turtles is not without dangers. Be aware of the hazards and educate yourself on the proper procedure for safe hibernation. For example, a turtle may freeze to death if the ground is not suitably prepared. Predators digging your turtle up and devouring it is another issue to guard against. It is not necessary at all to hibernate box turtles that are kept indoors. If peak summer-like conditions are maintained throughout the winter months, the turtle will usually remain active and continue to eat. Keeping lights on for 14 hours a day and increasing nighttime temperatures a few degrees will often break them of their desire to hibernate. Visit ReptileChannel.com/BoxHibernation for more information about outdoor and artificial hibernation.

Three-Toed Treasures

Three-toed box turtles, especially captive-bred specimens, seem to relish the attention of their owners and may become beloved family pets lasting several generations. However, they need proper housing, diet and veterinary care to flourish. Information about their captive husbandry is currently expanding, and good owners make an effort to always increase their knowledge base. We also need to become advocates for box turtles in the wild and protect their habitat and native populations. Our voiceless friends depend on us. **REPTILES**

TESS COOK has been active in the conservation and rehabilitation of North American box turtles for more than 20 years. She created the Box Turtle Care and Conservation Webpage (boxturtlesite.info) in 1997, and in 2008 she wrote the book, *Box Turtles*, about the care of both *Terrapene* and *Cuora* box turtles. In 2000, she started the YahooGroups boxturtlelist, where she and other long-time box turtle owners share information about the proper care of pet box turtles.



**Hibernation
Know-How**

Prepare your box turtle for hibernation the safe way. Visit ReptileChannel.com/BoxHibernation