

A 3D Model set by Ken Gilliland

Nature's Wonders

Turtles of the World - Volume I: Tortoises

Manual

Introduction	3
Overview and Use	3
Creating a Turtle (in Poser or DAZ Studio)	3
Leg Joint Issues and Species Master Controls	4

Field Guide

About Turtles	5
Russian Tortoise	7
Yellow-footed Tortoise	9
Desert Tortoise	11
Leopard Tortoise	13
Common Tortoise	15
Hermann's Tortoise	18
Kleinmann's Tortoise	20
Resources, Credits and Thanks	22

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Nature's Wonders

Turtles of the World - Volume I: Tortoises

Introduction

Tortoises and turtles are both reptiles from the order of *Testudines*, but in different classification families. The major difference between the two is that tortoises dwell on land, while turtles live in the water some or nearly all of the time.

Tortoises tend to have rounder, bumpier and heavier shells than turtles. Turtles also have webbed feet, while tortoises do not. They also are longer lived; averaging 80-150 years. The longest known living tortoise was 326 years.

The tortoise is a symbol of the Ancient Greek god, Hermes. Tortoise shells were used by ancient Chinese as oracle bones to make predictions. In Hinduism, Vishnu took the form of a half-man, half-tortoise, the lower half being a tortoise. He is normally shown as having four arms. He sat on the bottom of the ocean after the Great Flood. A mountain was placed on his back by the other gods so they could churn the sea and find the ancient treasures of the Vedic peoples.

Overview and Use

This set uses a common model to recreate digitally the Turtle species included in this and future volumes. Each species uses specific morphs from the generic model to single-out its unique features.

- **Models included in this volume:**
 - **Natures Wonders Turtle Base** - This model is used with all Turtles/Tortoises included in this set. There are 3 versions of this model:
 - In the DAZ Studio version, the "Turtle" character will work for 3Delight or Iray renders.
 - In the Poser version, there are two "Turtle" characters. The "Turtle" cr2 is intended for FireFly renders and the "Turtle P11" is intended for SuperFly renders.

Creating a Specific Turtle using Poser

1. For this example, we'll create the Red-eared Slider.
2. Load Poser, select the FIGURES library and go to the Nature's Wonders Reptiles folder.
3. To create a Desert Tortoise, use the "Nature's Wonders Turtle" base model.
4. Go to the POSES library, then to the Nature's Wonders Reptiles/Turtles of the World folder and the Firefly or Superfly sub-folder.

5. Select the Desert Tortoise (or a turtle of your choice) and load/apply it to the Turtle base model by clicking the mouse. This species pose contains both the morph and texture settings to turn the generic model into the selected Turtle.

Creating a Specific Turtle using DAZ Studio

1. For this example, we'll create the Desert Tortoise.
2. Load DAZ Studio and go to the "Animals" "Nature's Wonders" "Reptiles " folder.
3. To create a Desert Tortoise, use the "Nature's Wonders Turtle" base model.
4. Go to the "Turtles of the World" folder and select the folder of which renderer you want to use, 3Delight or Iray.
5. Now select the Desert Tortoise (or a turtle of your choice) by clicking the mouse. This "properties" preset contains both the morph and texture settings to turn the generic model into the selected turtle.

Leg Joint Issues & Species Master Control

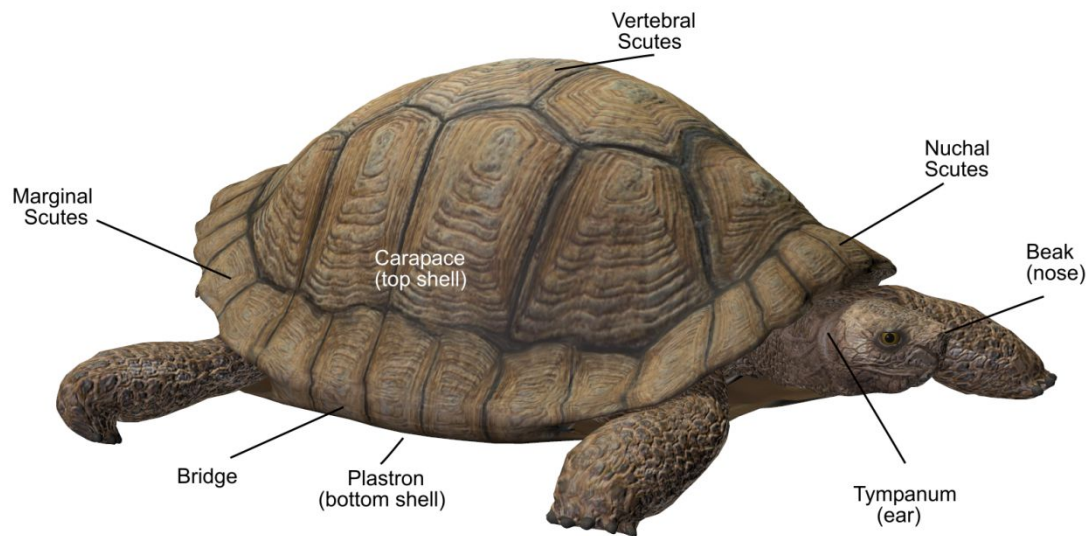
In order to get the legs to tuck into the shell, certain liberties had to be taken with the limits of the leg joints. The limits in these leg areas are very lax to accommodate the bending required to fold the legs. A certain amount of common sense is required in manually posing these areas to avoid poke-through with the legs and shell.

A certain type of turtle species may use a "Master Control". Master controls can be found in the "Creation Controls/Species Shapes" tree in the BODY section of the model. These master controls turn on (use) numerous creation controls to approximate a certain type of species. For example, the "Slider" master control when set to "1" will morph the model into a Slider species. While this is an easy way to get a species shape (rather than individually dialing each Creation Control), it does have limitations.

A Species Master Control may lock out use of some of the Creation Controls when used on top of the dialed Master Control. The reason for this is the individual controls limits. An individual morph with a MIN=0 and MAX=1 which is set to "1" with a Master Control can't dial back to "0" on the individual control because the limits don't allow negative numbers (MIN=0, not MIN=-1). The best work-around for this is to edit the individual dials parameters and edit the limits accordingly.

About Turtles

Turtle, (order *Testudines*), are any reptile with a body encased in a bony shell. Although numerous animals, from invertebrates to mammals, have evolved shells, none has an architecture like that of turtles. The turtle shell has a top (carapace) and a bottom (plastron). The carapace and plastron are bony structures that usually join one another along each side of the body, creating a rigid skeletal box. This box, composed of bone and cartilage, is retained throughout the turtle's life. Because the shell is an integral part of the body, the turtle cannot exit it, nor is the shell shed like the skin of some other reptiles.



There are approximately 356 species of turtles living on land in all continents except Antarctica and in both salt water and fresh water. Tortoises (family *Testudinidae*) live exclusively on land and have anatomic features distinguishing them from other turtles, but the term tortoise has long been used to refer to other terrestrial *testudines* as well, such as the box turtle and the wood turtle. Similarly, terrapin was sometimes used to describe any aquatic turtle but is now largely restricted to the edible diamondback terrapin (*Malaclemys terrapin*) of the eastern United States.

The turtle's shell is an adaptation that protects it from predators, which compensates for the reptile's slow crawling speed. The carapace and plastron each arose from two types of bone: dermal bones that form in the skin and endochondral bone (bone arising from cartilage) derived from the skeleton. Evolution has intricately linked these two types of bone to produce the shell of modern turtles. The carapace consists of 10 trunk vertebrae and their ribs, which are overlain by and fused to dermal plates. Another series of dermal plates forms the perimeter of the carapace. The plastron usually contains four pairs of large plates and a single one centered near the front (the anteromedial plate); these plates are large dermal bones, although the anterior ones may contain parts of the shoulder girdle. The shell is variously modified and shaped to meet the needs of defense, feeding, and movement.

All the turtle's senses are well-developed, and they are used in avoiding predators and in finding and capturing food. The eyes have the typical anatomy of other vertebrates having good vision. Aquatic turtles have eyes that quickly adjust for aerial or aquatic vision, seeing well in both situations. Tortoises appear to have colour vision, but colour vision is untested for most turtles. Turtles, particularly aquatic ones, do not have strong olfactory senses, but all are capable of smelling. Tortoises instinctively empty their bowels in water to hide their scent. Some aquatic species have protuberances on the chin in the form of tubercles and papillae. These appear to be mainly tactile, although some are chemosensory (the ability to sense particular chemical stimuli). The turtle ear has

an eardrum flush with the surface of the head. A single bone, the stapes, transmits sound to the inner ear.

In the United Kingdom, the word “turtle” is used for water-dwelling species, including ones known in the US as terrapins, but not for terrestrial species, which are known only as tortoises.

It has been reported that wood turtles are better than white rats at learning to navigate mazes. They do, however, have a very low encephalization quotient (relative brain to body mass), and their hard shells enable them to live without fast reflexes or elaborate predator avoidance strategies. In the laboratory, turtles (*Pseudemys nelsoni*) can learn novel operant tasks and have demonstrated a long-term memory of at least 7.5 months. Case studies even exist of turtles playing.

Some turtles, particularly small terrestrial and freshwater turtles, are kept as pets. Among the most popular are Russian tortoises, spur-thighed tortoises, and red-eared sliders.

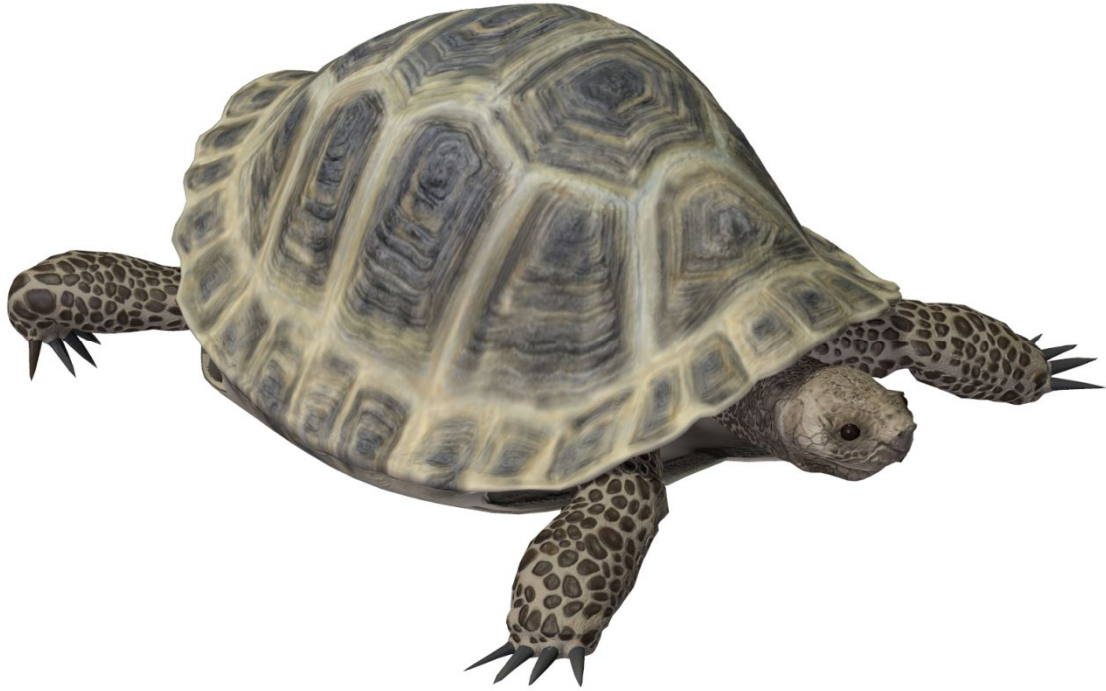
The flesh of turtles, calipash or calipee, was and still is considered a delicacy in a number of cultures. Turtle soup has been a prized dish in Anglo-American cuisine, and still remains so in some parts of Asia. Turtle plastrons are widely used in traditional Chinese medicine.

In February 2011, the Tortoise and Freshwater Turtle Specialist Group published a report about the top 25 species of turtles most likely to become extinct, with a further 40 species at very high risk of becoming extinct. This list excludes sea turtles, however, both the leatherback and the Kemp's ridley would make the top 25 list.

Turtles and tortoises are at a much higher risk of extinction than many other vertebrates. Of the 263 species of freshwater and terrestrial turtles, 117 species are considered Threatened, 73 are either Endangered or Critically Endangered and 1 is Extinct. Of the 58 species belonging to the family Testudinidae, 33 species are Threatened, 18 are either Endangered or Critically Endangered, 1 is Extinct in the wild and 7 species are Extinct. 71% of all tortoise species are either gone or almost gone. Asian species are the most endangered, closely followed by the five endemic species from Madagascar. Turtles face many threats, including habitat destruction, harvesting for consumption, and the pet trade. The high extinction risk for Asian species is primarily due to the long-term unsustainable exploitation of turtles and tortoises for consumption and traditional Chinese medicine, and to a lesser extent for the international pet trade.

Russian Tortoise

Agrionemys horsfieldii



The Russian tortoise is also commonly known as Horsfield's tortoise, Afghan tortoise or the Central Asian tortoise. This species is traditionally placed in *Testudo* but due to distinctly different morphological characteristics it was moved to the monotypic genus *Agrionemys* in 1966. The common name "Horsfield's tortoise" is in honor of the American naturalist, Thomas Horsfield.

In September 1968, two Russian tortoises flew to the Moon, circled it, and returned safely to Earth on the Russian Zond 5 mission. Accompanied by mealworms, plants, and other lifeforms, they were the first Earth creatures to travel to the Moon.

Russian Tortoises are popular within the pet trade.

Habitat: This tortoise is found in Azerbaijan, southern Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, northeastern Iran, Afghanistan, northern Pakistan, northwestern Baluchistan and northwestern China.

Status: Vulnerable. This tortoise, in some portions of its habitat, has been heavily exploited for food by local peoples as well as for exportation by the pet trade. In other areas, habitat destruction due to warfare, farming, livestock grazing and development have all contributed to the decline of this species. The future of the species in the wild is uncertain at best.

Diet: The diet consists entirely of herbaceous and succulent vegetation, including grasses (green and dried), twigs, flowers, fruits and the flesh leaves and stems of native and cultivated plants. During a rainstorm, the tortoise will drink from the puddles which form.

Identification: The Russian tortoise is a small tortoise species, with a size range of 13–25 cm (5–10 in). Females grow slightly larger (15–25 cm [6–10 in]) to accommodate more eggs. Males average 13–20 cm (5–8 in).

Russian tortoises are sexually dimorphic. Males tend to have longer tails generally tucked to the side, and longer claws; females have a short, fat tail, with shorter claws than the males. The male has a slit-shaped vent (cloaca) near the tip of its tail; the female has an asterisk-shaped vent (cloaca). Russian tortoises have four toes. Coloration varies, but the shell is usually a ruddy brown or black, fading to yellow between the scutes, and the body is straw-yellow and brown depending on the subspecies.

Breeding and Behavior: The Russian tortoise is primarily a burrow-dweller. It prefers sandy or loamy ground in which to dig its burrow. The burrow is usually 30-78" (80-200 cm) long, ending in a widened chamber in which the tortoise is able to turn around. Spring rains are necessary to soften the soil sufficiently for the tortoise to dig its burrow. As the ground dries out, the soil hardens into a solid crust, making excavations virtually impossible. The Russian tortoise retires to its burrow during the midday heat, as well as at night during its active period. In favored locations, many burrows exist in close proximity. Tortoises are known to visit adjacent burrows, and sometimes several tortoises spend the night in a single burrow.

The Russian tortoise has a short period of peak activity, only three months out of the year. The tortoises emerge from hibernation in early spring (March-May) and immediately begin seeking mates. Their courtship and mating ritual is somewhat unusual. The male approaches and repeatedly circles the female, then stops to face her head-on. He extends his neck and stares directly into her face while rapidly jerking his head up and down. This ritual may include occasional biting and ramming of the female by the male. Copulation is accompanied by a series of high-pitched "clucking" or "squeaking" sounds.

In May or June, the female lays 2-6 eggs, and may lay two (possibly three) additional clutches during the same season. The eggs usually incubate for 80 to 110 days in the wild. Hatchlings emerge in August or September, but sometimes the hatchlings overwinter in the nest and do not emerge until the following spring. In an incubator in captivity, where eggs are kept at a relatively constant temperature of 87° F (30.5° C), an incubation period of 60 to 75 days is typical. Hatchlings normally measure 1.25-1.33 inches (32-34 mm) in length. Growth is slow in this tortoise. Although they reach sexual maturity at 10 years, they are only considered full-grown at 20 to 30 years of age.

The Russian tortoise remains active until June or July when activity slows. Summer temperatures exceeding 85° F (29° C) can be problematic; so, the tortoise generally emerges from its burrow only at dawn or at dusk in order to forage when temperatures are lower. Their ephemeral food plants are gone by this time as well. Many tortoises spend the summer in a dormant state, emerging briefly at the end of summer to feed on dried grasses and twigs prior to hibernation.

Winters in their arid highland habitat can be very harsh and cold. The temperature in much of the tortoise's range is well below freezing. Scientists speculate that the body fluids of the Russian tortoise contain a substance like antifreeze to help it survive frigid temperatures.

Yellow-footed Tortoise

Chelonoidis denticulatus



It is also called the yellow-foot or yellow-legged tortoise, the Brazilian giant tortoise, or South American forest tortoise, as well as local names such as morrocoy, woyamou or wayamo, or some variation of jabuta. Many of the local names are shared with the similar red-footed tortoise. (*C. carbonaria*).

Habitat: This tortoise is found in the Amazon Basin of South America.

There is some disagreement as to which habitat is the preferred type for yellow-footed tortoises. Some feel they prefer grasslands and dry forest areas, and that rain-forest habitat is most likely marginal. Others suggest humid forest is the preferred habitat. Regardless, they are found in drier forest areas, grasslands, and the savanna, or rainforest belts adjoining more open habitats. The red-footed tortoise shares some of its range with the yellow-footed tortoise. In ranges shared in Surinam, the red-footed tortoise has moved out of the forests into grasslands (created as a result of slash and burn agriculture), while the yellow-footed tortoise has remained in the forest.

Status: Vulnerable. The major populations located in South America are protected under the Convention on International Trade in Endangered Species, Appendix II. As with most environmental laws, the consequences of breaking offer little deterrent. As with many species of turtles and tortoises, many yellow-footed tortoises end up as food items in local markets and are poached for the pet trade.

Diet: This tortoises diet consists of grasses, fallen fruit, carrion, plants, bones, mushrooms, excrement, and slow-moving invertebrates such as snails, worms, and others they are able to capture.

Identification: Yellow-footed tortoises are a large species – fifth-largest overall and third-largest mainland species, after the Aldabra giant tortoise (*Aldabrachelys gigantea*), Galapagos giant tortoise (*Chelonoidis nigra*), African spurred tortoise, and Asian forest tortoise. Typical sizes average 15.75 inches (40 cm), but much larger specimens are common. The largest know specimen is a female that was 37 inches (94 cm) long. They closely resemble the red-footed tortoise, and can sometimes be

difficult to tell apart, especially as a preserved specimen, which led to quite a bit of confusion over the names and ranges.

The carapace is a long oval with parallel sides and a high-domed back that is generally flat along the vertebrals (scutes or shell scales along the top of the carapace) with a slight peak near the hind end. It is yellowish brown to dark brown or even black at the edges of the scutes. The areola in each scute are pale yellow, orange or light brown and blend into the darker carapace.

The plastron is thick around the edges, and the gulars (front pair of palstron scutes) do not project past the carapace. The plastron is yellow-brown turning nearly black near the seams.

The tortoise head is relatively small and longer than wide. The upper jaw has three tooth-like points. They have large black eyes. The skin of the head and limbs is black with yellow to orange scales on top and around the eye and ear. The forelimbs have five claws, are long and slightly flattened. They are covered with fine, dark scales and slightly overlapping larger scales on front in the same color as the head. The hind limbs are elephant-like with four claws, and are covered in small scales colored like the forelimbs. The tail varies in length by gender and has a row of colored scales on the sides.

Males are slightly larger and have longer tails.

Breeding and Behavior: These tortoises make a sound like a baby cooing with a raspy voice. Tortoises also identify each other using body language. Males elicit a characteristic head movement, a series of jerks away from and back to mid-position. Another male will make the same head movements.. No head movement in response is the first indication that the other tortoise is a female. Male tortoises also swing their heads back and forth in a continuous rhythm as a mating ritual.

Mating occurs year round for the yellow-footed tortoise. But there is a general increase in activity noted with the onset of the rainy season (from July to September). Scientific experimentation and observation has also indicated head coloration has to be correct. The male will then sniff the cloacal region of the other tortoise. Copulation usually follows, though sometimes there is a period of biting at the legs. During courtship and copulation, the male makes clucking sounds very much like those of a chicken, with a set pattern in the pitches of the clucking sounds. Rival males will battle, attempting to overturn each other, but neither the males nor females will defend a territory. They are considered nomadic in their movements. In almost every tortoise species where male combat occurs, the males are always larger than the females. This is in comparison to aquatic species, where the males are usually smaller than the females and do not engage in male-to-male combat. Species with male combat are thought to have evolved larger males because they have a better chance of winning a bout and mating with a female, thus passing on their larger size to their offspring. Species with smaller males evolved because smaller males are more mobile and can mate with a large number of females, thus passing on their genes.

Desert Tortoise

Gopherus agassizii/Gopherus morafkai



Desert tortoises can live in areas with ground temperatures exceeding 140 °F (60 °C) because of their ability to dig underground burrows and escape the heat. At least 95% of their lives are spent in burrows. There, they are also protected from freezing winter weather while dormant, from November through February or March. Within their burrows, these tortoises create a subterranean environment that can be beneficial to other reptiles, mammals, birds, and invertebrates. Desert tortoises can live well over 50 years, with estimates of lifespan varying from 50 to 80 years. Causes of mortality include predation, disease, human-related factors, and environmental factors such as drought, flooding, and fire. The desert tortoise is the state reptile of California and Nevada in the United States.

Habitat: Scientists have divided the desert tortoise into two types: Agassiz's and Morafka's desert tortoises, with a possible third type in northern Sinaloa and southern Sonora, Mexico. An isolated population of Agassiz's desert tortoise occurs in the Black Mountains of northwestern Arizona. The subspecies look the same and are determined by location.

They can live in different types of habitats, from sandy flats to rocky foothills. Tortoises in the Mojave Desert are generally found in alluvial fans, washes, and canyons where more suitable soils for den construction might be found. They range from near sea level to around 3,500 feet (1,100 m) in elevation. Tortoises show very strong site fidelity, and have well-established home ranges where they know the location of their food, water, and mineral resources. Desert tortoises inhabit elevations from below mean sea level in Death Valley to 5,300 feet (1,600 m) in Arizona, though they are most common from around 1,000 to 3,500 feet (300 to 1,070 m).

Status: Vulnerable. Ravens, Gila monsters, kit foxes, badgers, roadrunners, coyotes, and fire ants are all natural predators of the desert tortoise. They prey on eggs, juveniles, which are 2–3 inches long with a thin, delicate shell, or, in some cases, adults. Ravens are thought to cause significant levels of juvenile tortoise predation in some areas of the Mojave Desert – frequently near urbanized areas. The most significant threats to tortoises include urbanization, disease, habitat destruction and fragmentation, illegal collection and vandalism by humans, and habitat conversion from invasive plant species (*Brassica tournefortii*, *Bromus rubens* and *Erodium spp.*).

Desert tortoise populations in some areas have declined by as much as 90% since the 1980s, and the Mojave population is listed as threatened. It is unlawful to touch, harm, harass, or collect wild desert tortoises. It is, however, possible to adopt captive tortoises through the Tortoise Adoption Program in

Arizona, Utah Division of Wildlife Resources Desert Tortoise Adoption Program in Utah, Joshua Tree Tortoise Rescue Project in California, or through Bureau of Land Management in Nevada. When adopted in Nevada, they will have a computer chip embedded on their backs for reference. According to Arizona Game and Fish Commission Rule R12-4-407 A.1, they may be possessed if the tortoises are obtained from a captive source which is properly documented (Commission Order 43: Reptile Notes 3: one tortoise per family member).

The Fort Irwin National Training Center of the US Army expanded into an area that was habitat for about 2,000 desert tortoises, and contained critical desert tortoise habitat (a designation by the US Fish and Wildlife Service). In March 2008, about 650 tortoises were moved by helicopter and vehicle, up to 35 km away.

Another potential threat to the desert tortoise's habitat is a series of proposed wind and solar farms. As a result of legislation, solar energy companies have been making plans for huge projects in the desert regions of Arizona, California, Colorado, New Mexico, Nevada, and Utah. The requests submitted to the Bureau of Land Management total nearly 1,800,000 acres (7,300 km²).

Diet: Tortoises are omnivores. Grasses form the bulk of its diet, but it also eats herbs, annual wildflowers, and new growth of cacti, as well as their fruit and flowers. Rocks and soil are also ingested, perhaps as a means of maintaining intestinal digestive bacteria as a source of supplementary calcium or other minerals. As with birds, stones may also function as gastroliths, enabling more efficient digestion of plant material in the stomach.

Much of the tortoise's water intake comes from moisture in the grasses and wildflowers they consume in the spring.

Identification: Desert tortoises may attain a length of 10 to 14 in (25 to 36 cm), with males being slightly larger than females. A male tortoise has a longer gular horn, that extends from the front of the plastron and is used to overturn an opponent, and his plastron is also more concave in comparison to the female. Males have larger tails than females do. Their shells are high-domed, and greenish-tan to dark brown in color. Desert tortoises can grow to 4–6 in (10–15 cm) in height.

Breeding and Behavior: The home range generally consists of 10 to 100 acres (4.0 to 40.5 ha). In general, males have larger home ranges than females, and home range size increases with increasing resources and rainfall.

Tortoises mate in the spring and autumn. Male desert tortoises grow two large white glands around the chin area, called chin glands, that signify mating season. A male circles around the female, biting her shell in the process. He then climbs upon the female. The male may make grunting noises once atop a female, and may move his front legs up and down in a constant motion, as if playing a drum.

Months later, usually in June or July, the female lays a clutch of four to eight hard-shelled eggs, which have the size and shape of ping-pong balls. The eggs hatch in August or September. Wild female tortoises produce up to three clutches a year depending on the climate. Their eggs incubate from 90 to 135 days; some eggs may overwinter and hatch the following spring. In a laboratory experiment, temperature influenced hatching rates and hatchling gender. Incubation temperatures from 81 to 88 °F (27 to 31 °C) resulted in hatching rates exceeding 83%, while incubation at 77 °F (25 °C) resulted in a 53% hatching rate. Incubation temperatures of less than 88 °F (31 °C) resulted in all-male clutches. Average incubation time decreased from 124.7 days at 77 °F to 78.2 days at 88 °F (31 °C).

Leopard Tortoise

Stigmochelys pardalis



It is the only member of the genus *Stigmochelys*. *Stigmochelys* is a combination of Greek words: “stigma” meaning “mark” or “point” and “chelone” meaning “tortoise”. The specific name *pardalis* is from the Latin word “pardus” meaning “leopard” and refers to the leopard-like spots on the tortoise's shell.

Habitat: Widely distributed across the arid and savanna regions of eastern and southern Africa, extending from South Sudan and Somalia, across East Africa to South Africa and Namibia.

The species is generally absent from the humid forest regions of Central Africa. Over this range, the leopard tortoise occupies the most varied habitats of any African tortoise including grasslands, thorn-scrub, brush-land, and savannas. They can be found at altitudes ranging from sea level to 9,500 feet (2,900 m).

Status: Not threatened. The leopard tortoise is a widespread species and remains common throughout most of its range. Human activities, including agricultural burning, consumption, and especially commercial exploitation in the pet trade, are potential threats but have not yet caused significant population declines. They are increasingly being bred in captivity for the pet trade. For example, most tortoises exported from Kenya and Tanzania originate in captive breeding programs, alleviating collection from the wild.

The leopard tortoise has been listed in Appendix II of CITES since 1975 and in 2000, the United States banned their import because of the risk posed by heartwater, an infectious disease carried by tortoise ticks that could seriously impact the US livestock industry.

Diet: Leopard Tortoises are herbivorous; their diet consists of a wide variety of plants including forbs, thistles, grasses, and succulents. They will sometimes gnaw on bones or even hyena feces to obtain

calcium, necessary for bone development and their egg shells. Seeds will pass undigested through the gut, so the leopard tortoise plays a significant role in seed dispersal. Normally active during the day, they are less active during hot weather or during the dry season.

Identification: The leopard tortoise is the fourth largest species of tortoise in the world, with typical adults reaching 16 inches (40 cm) and weighing 29 pounds (13 kg). Adults tend to be larger in the northern and southern ends of their range, where typical specimens weigh up to 44 pounds (20 kg) and an exceptionally large tortoise may reach 28 inches (70 cm) and weigh 88 pounds (40 kg).

The carapace is high and domed with steep, almost vertical sides. Juveniles and young adults are attractively marked with black blotches, spots or even dashes and stripes on a yellow background. In mature adults the markings tend to fade to a dull brown or gray. The head and limbs are uniformly colored yellow, tan, or brown.

Breeding and Behavior: During the mating season, males will fight over females, ramming and butting their competitors. They will trail after females for quite some distance, often ramming them into submission. When mating, the male makes grunting vocalizations. Nesting occurs between May and October when the female digs a hole and lays a clutch of 5 to 30 eggs. As many as 5–7 clutches may be laid in a single season. Incubation will take 8–15 months depending on temperature.

Common Tortoise

Testudo graeca



The Common tortoise is also known as “Greek tortoise” or “Spur-thighed tortoise” and is one of the 5 species of Mediterranean tortoise. It is a very long lived animal, achieving a lifespan of upwards of 125 years, with some unverified reports of up to 200 years.

Habitat: This tortoise is found in North Africa, southern Europe, and southwest Asia. It is prevalent in the Black Sea coast of the Caucasus (from Russia Anapa to Abkhazia Sukhumi to the South), as well as in Georgia, Armenia, and Azerbaijan.

Status: Vulnerable. Common tortoises are commonly traded as pets and their habitat degraded. Both factors significantly hurt the wild populations.

Diet: The diet consists of a wide variety of fibrous plants, especially their flowers.

Identification: A medium-sized tortoise ranging from 7-8 inches (18-21 cm) in length. The nominate species, *Testudo graeca graeca* is relatively small 5-6 inches (13-16 cm) average length. This species can measure up to 12 inches (30 cm) in length (or more) with a maximum weight of approximately 13 pounds (6 kg). The Common tortoise has large symmetrical markings on the top of the head, large scales on the front legs and an undivided carapace over the tail. It has notable spurs on each thigh and the shell is somewhat rectangular.

Males differ from females in six main points. Firstly, they are generally smaller. Their tails are longer than females and taper to a point evenly, and the cloacal opening is farther from the base of the tail. The underside is somewhat curved, while females have a flat shell on the underside. The rear portion of a male's carapace is wider than it is long. Finally, the posterior plates of the carapace often flange outward.

The division of common tortoises into subspecies is difficult and confusing. Given the huge range of over three continents, the various terrains, climates, and bio-regions have produced a huge number

of varieties, with new subspecies constantly being discovered. Currently, at least 20 subspecies are published:

- *T. g. anamurensis*. *Anamur Tortoise* (southern Turkey)
- *T. g. antakyensis*. (southern coastal region of Turkey). Yellowish colored.
- *T. g. armeniaca*. *Armenian tortoise* (Armenia)
- *T. g. buxtoni*. *Buxton's Tortoise* (Caspian Sea)
- *T. g. cyrenaica* (Libya)
- *T. g. floweri*. (Levantine coastal plain and inland lowland areas in Israel and Lebanon). Yellow to golden with a single black spot on each carapace scale.
- *T. g. graeca*. *Greek or Moorish Tortoise* (North Africa and South Spain)
- *T. g. iberica*. *Asia Minor Tortoise* (Turkey)
- *T. g. marokkensis*. *Morocco Tortoise* (North Morocco)
- *T. g. nabeulensis*. *Tunisian Greek tortoise* (Tunisia). The smallest of the subspecies. It has a particularly bright and striking coloration.
- *T. g. nikolskii*. (northern Black Sea coast)
- *T. g. pallasi*. (northern and eastern Caucasus)
- *T. g. perses*. (southeastern Turkey and much of Iran)
- *T. g. sousensis*. (South Morocco)
- *T. g. terrestris*. *Mesopotamian Tortoise* (Israel/Lebanon)
- *T. g. zarudnyi*. (Iran/Azerbaijan)

This incomplete listing shows the problems in the division into subspecies. The differences in form are primarily in size and weight, as well as coloration, which ranges from dark brown to bright yellow, and the types of flecks, ranging from solid colors to many spots. Also, the bending-up of the edges of the carapace ranges from minimal to pronounced. So as not to become lost in the number of subspecies, recently a few tortoises previously classified as *Testudo graeca* have been assigned to different species, or even different genera. In addition, subspecies are often being added and delisted (such as *T.g. Lamberti* and *T.g. Whitei*) as biologists explore the DNA of this species. For more information on [Common Tortoise subspecies](#) click the link.

The genetic richness of *Testudo graeca* is also shown in their crossbreeding. Tortoises of different form groups often mate, producing offspring with widely differing shapes and color. Perhaps the best means of identification for the future is simply the place of origin.

Testudo graeca is also closely related to the Marginated tortoise (*Testudo marginata*). The two species can interbreed, producing offspring capable of reproduction.

Breeding and Behavior: Immediately after waking from hibernation, the mating instinct starts up. The males follow the females with great interest, encircling them, biting them in the limbs, ramming them, and trying to mount them. During copulation, the male opens his mouth, showing his red tongue and making squeaking sounds.

During mating, the female stands still, bracing herself with her front legs, moving the front part of her body to the left and right in the same rhythm as the male's cries. One successful mating will allow the female to lay eggs multiple times. When breeding in captivity, the pairs of females and males must be kept separate. If multiple males are in a pen, one takes on a dominant role and will try to mate with the other males in the pen. If more males than females are in a pen, the males might kill each other to mate with the female.

One or two weeks before egg-laying, the animals become notably agitated, moving around to smell and dig in the soil, even tasting it, before choosing the ideal spot to lay the eggs. One or two days before egg-laying, the female takes on an aggressive, dominant behavior, mounting another animal as for copulation and making the same squeaking sound the male produces during copulation. The purpose of this behavior is to produce respect in the tortoise community so that the female will not be disturbed by the others during egg laying.

Hermann's Tortoise

Testudo hermanni



The species name *hermanni* honors the French naturalist Johann Hermann who discovered it in the late eighteenth century.

Habitat: It is found in several areas of mainland Italy along with the islands Sicily and Sardinia. In Spain it occurs in Catalonia and on the Balearic islands, Majorca and Menorca. In France it is restricted to the south (Varoise) and the island of Corsica.

These tortoises are found in areas comprised of low lying shrubs and grasses which become quite dense. Sun drenched “warm spots” on well drained ground that is rich in calcium make up a classic habitat for Western Hermann's tortoises. Coastal areas and even Mediterranean forest are also occupied depending on the region in which they are found. Occasionally they will cool off in a very shallow stream and may become active during or after rain.

Status: Near threatened. Several tortoise sanctuaries are located in Europe, such as Carapax in southern Tuscany, and Le Village Des Tortues in the south of France (near Gonfaron). These sanctuaries rescue injured tortoises whilst also taking in unwanted pets, and specialize in Hermann's tortoises.

The UK, with its large captive population, also has many specialist centers providing rescue facilities.

Diet: They graze on edible weeds and plants that make up their habitat. They do not consume any animal matter and require a diet low in protein. Reports of tortoises eating snails have surfaced but this may be attributed to the need for calcium from the snail's shell and nothing more. They also do not eat fruit unless they accidentally stumble upon it.

Identification: The eastern subspecies *T. h. boettgeri* is much larger than the western *T. h. hermanni*, reaching sizes up to 11 inches (28 cm) in length. A specimen of this size may weigh 6.6–8.8 pounds (3–4 kg). *T. h. hermanni* rarely grows larger than 7.1 inches (18 cm). Some adult specimens are as small as 2.8 inches (7 cm). The carapace is rounded or oval in shape with minimal flaring of the

marginal scutes except in males and some specific localities. The ground color is a vibrant yellow or gold, sometimes with an orange or greenish hue. Bold, well defined black markings accompany the ground color which create a striking contrast. The plastron is lacking any hinge and features the same ground color as the carapace. Along the mid-line, two, longitudinal black stripes run downward forming distinct “bands”. The bands are continuous and may or may not be slightly broken at certain points. They span from the humeral scutes to the anal scutes. Disjoint black spots or small patches may be found on the gular scutes in some specimens.

Males have enormous long tails with a larger horny tip at the end. The plastron is also slightly concave and when viewed from above, the carapace may sport a more trapezoidal shape. Females (the larger of the sexes) exhibit much shorter tails with a puckered vent and smaller tail spur and a flat or level plastron.

Breeding and Behavior: In many parts of their range, *T. h. hermanni* may hibernate from November to March or April. In some areas (Sicily & Majorca, for example) the hibernation period may be much, much shorter. During the active season, the tortoises will venture out of their overnight hiding areas to warm up under the bright European sun in early morning. They will then graze until the temperatures begin to soar to a dangerous level and retreat under brush or nearby foliage. They may resume grazing later in the day before sunset. The tortoises have an incredible sense of direction and “know” their home range. They will use the same paths and tunnels every day that they have created through the undergrowth and dense vegetation. While they are designed to thrive in the sunlit Mediterranean, they become quite stressed and vulnerable when out in the open. They can sense their vulnerability and will scurry quickly to jam themselves under a shrub to avoid being seen. The intricate black and yellow patterns of their carapaces enable them to remain hidden under the brush. Once still, it can be nearly impossible to see them.

Peak breeding activity normally takes place in late summer-early fall and again in spring. The male will relentlessly pursue the female until she submits to his advances. He will chase, ram, bite, scratch and even overturn her. During copulation, the male emits high pitched squeaks while sticking his tongue out of his gaping mouth. Females will seek out suitable nesting areas in May and June. They nervously and continuously pace and search for the right spot. Once oviposition takes place, the mother tortoise uses her back legs to dig a well formed, flask shaped nesting chamber roughly 3-4” deep. She then deposits 1 to 3 eggs (sometimes 4) and covers them. She may lay 1 to 2 more clutches in a given season. Between 70 and 120 days (53-70 in captivity at between 86 and 91F) the tiny neonates emerge from their underground fortresses and begin their fragile lives. Many are picked off by predators immediately and few survive to adulthood.



Kleinmann's Tortoise

Testudo kleinmanni



Often called the Egyptian tortoise, and occasionally Leith's tortoise, this is a critically endangered species of neck-hiding tortoise. Once more widespread, its numbers are now dwindling. The species is nearly extinct in Egypt, and complete extinction in the wild is a looming threat unless more actions are taken to protect this species.

Habitat: Populations in northern Egypt are historically associated with desert and semi-desert habitats characterized or dominated by compact sand and gravel plains with scattered rocks and shallow sandy wadis, although populations were also known to occur in or adjacent to coastal salt marsh habitats. The majority of the species' primary habitats in Egypt are currently severely degraded, or already completely destroyed.

In Cyrenaica, northeastern Libya, the species occurs in shrubby sand and stone desert coastal habitats and semi-desert habitats with *Artemisia* association (further inland). In this region, the species appears to occupy the margins of sandy, or dry stony, habitats. It can apparently also be found (together with the *Testudo graeca* species) in more vegetated Mediterranean subtropical shrub evergreen forests.

In Tripolitania, the habitat degradation due to human expansion has moved populations to better habitat in more southerly areas towards the inland near Gharyan. The coastline between Al Khums and the Tunisian border features occasional spots of undisturbed habitat.

Status: Critically Endangered. Both habitat degradation through urbanization and farming and the pet trade have caused this species to become endangered in the wild.

In 2003, it was estimated that the population had been reduced by over 85% from around 55,600 to 7,470 individuals, of which approximately 5,000 are mature individuals. This figure is less than the number of animals recorded from the illegal pet trade in the 1990s alone. Fairly good habitat patches of population still exist in Libya, the global population of *T. kleinmanni* could realistically face extinction in less than 10 years or around one generation if degradation of landscape and trade cannot be stopped.

Diet: This tortoise eats a wide variety of vegetation ranging from grasses to broadleaf plants and their blooms. It prefers saltwort and sea lavender. This species also occasionally eats insect and carrion in the wild, although captive specimens are best offered a strictly herbivorous diet.

Identification: It is the smallest tortoise in the Northern Hemisphere. The length of the adult male is typically 3-4 inches (8-10 cm); adult females are somewhat larger at 4 – 5 inches (10-12 cm) . Males are more slender and have a longer tail.

Their shells have high domes, and range in color from ivory to pale gold to dark brown to pink or dull yellow. This coloring helps to regulate the impact of sunlight. This allows the paler tortoise to stay in the desert heat for longer. It is also an effective camouflage in the desert. The bottom of the shell is light yellow, often with two dark triangles on each abdominal scute. The tortoise's scutes have dark sidings that fade with age.

The head and limbs are a very pale ivory-yellow to yellowish-brown color.

Breeding and Behavior: It becomes sexually mature when about 5 years old. In the wild, mating has only been observed in March, but in captivity, they mate in April and August to November. During courtship, the male will ram the female, sometimes chasing after her. Unlike any other Mediterranean tortoise, it may make a mating call similar to the call of the mourning dove.

Eggs are laid in shallow bowls beneath bushes, or in vacant burrows. Each clutch contains one to five eggs, which hatch in the summer or early autumn.

Special Thanks to:

... to my beta tester, FlintHawk

Sources:

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