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California Turtle & Tortoise Club

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A wild Reeves' turtle, *Mauremys reevesii*, photographed in China. Notice the medial keel and two lateral keels on the turtle's carapace. Photo © 2022 by Mianliang

featured species

Reeves' Turtle, *Mauremys* (= *Chinemys*) *reevesii* (Gray, 1831)

The Chinese Three-keeled Pond Turtle

by M. A. Cohen

Reeves' turtle, also known as the Chinese pond turtle, the Chinese three-keeled pond turtle, the Japanese coin turtle, the Chinese coin turtle, and the golden turtle, is a semi-aquatic turtle native to southeastern Asia. *Mauremys reevesii* belongs to the Geomydidae, the chelonian family of Old World pond turtles.

The genus *Mauremys* comprises two Greek word roots, *maur-*, translating as dark or obscure, and *-emys*, a turtle or tortoise. The *Mauremys* genus contains ten species and several subspecies.

Formally described in 1831, British zoologist John Edward Gray (1800-1875) originally assigned Reeves' turtle to the genus *Emys*. Gray was a prolific author, publishing over 1,200 works throughout his lifetime, including articles on zoology and philately (stamp collecting), and museum exhibition catalogs.

Subsequently, the species underwent a series of changes to its classification. In 1931 taxonomists placed the species in the genus *Chinemys*. In 2004, following the evaluation of various molecular and morphological (structural) studies, taxonomists placed the species in the genus *Mauremys*.

The species name *reevesii* honors John Reeves (1774-1856), an amateur

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English naturalist who worked for the British East India Company in China as an "Inspector of Tea." He created an impressive collection of renderings of Chinese flora and fauna and had several species named in his honor (Beolens, et al., 2011).

Identification

A medium-sized geoemydid species, Reeves' turtle has an oval or oblong, moderately-domed carapace with three keels, one prominent medial keel, and two less pronounced lateral keels, both running the length of the turtle's carapace between its marginal scutes.

Significant sexual dimorphism occurs in Reeves' turtles. Adult females typically grow to 9.3 inches (23.6 centimeters) in carapace length, with some individual turtles growing up to 12 in. (30 cm) in carapace length. Adult males are significantly smaller than females, rarely exceeding 4.3 in. (11 cm), and have much longer, thicker tails (van Dijk, 2011).

The species' carapace color varies from tan to dark brown, often with darker markings adjacent to the keels and lighter seams between the scutes. The plastron may either be tan or yellow with a large, dark brown blotch on each scute or a uniform dark brown. The female plastron is always flat; the male plastron may or may not be concave.

The skin on the head and neck of *M. reevesii* is typically dark brown and often marked with solid or broken yellow stripes. Limbs and tail are usually uniformly olive or brown, but light patterning on the darker background may occur on the forelimbs.

Mauremys reevesii photographed in South Korea. Photo © 2011 by Kim Hyun-Tae

Melanin is a dark brown or black pigment present in the skin, hair, and irises of the eyes. **Melanism** is the unusual darkening of these tissues caused by excess melanin. Melanism is prevalent in male Reeves' turtles six years and older when they often display a pronounced darkening of their shells, skin, and eyes. Melanism is extremely rare in female Reeves' turtles.

While some geographical variations in its appearance exist, currently there are no recognized subspecies of *M. reevesii*.

Reeves' turtle sometimes hybridizes with other *Mauremys* species like the Japanese pond turtle (*M. japonica*) and the Chinese stripe-necked turtle (*M. sinensis*) [Lovich et al., 2011].

Geographical Range and Habitat

Reeves' turtle is native to tropical and subtropical regions of southeastern Asia. The species occurs in central and eastern mainland China. *M. reevesii* is also found in the territory of Hong Kong, and in North Korea and South Korea. Introduced populations occur in Indonesia, Japan, Palau, and Timor-Leste (Lovich et al., 2011).

Reeves' turtle is not an adept swimmer and prefers the quiet, shallow waters in ponds, marshes, canals, reservoirs, rice paddies, streams, and wetlands with sandy or muddy bottoms. It rarely ventures into rivers.

In addition to aquatic habitats, Reeves' turtle utilizes terrestrial habitats approximately 25% of its time. These include abandoned

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farmlands, bamboo forests, and orchards with "low-canopy cover habitats" rather than open fields (Bu et al., 2023).

Natural History

Reeves' turtle is an emydid (basking turtle) that frequently leaves the water to bask on rocks, submerged logs, and other suitable platforms. Courtship and mating activities occur in Spring. Females nest in June and July, laying as many as three clutches of four to nine eggs per season. The incubation term varies with the temperature within the nest during the incubation.

Lower temperatures result in extended incubation periods and larger hatchlings; higher incubation temperatures result in shorter development periods and smaller hatchlings. Hatchlings emerge from nests laid early in the season and begin feeding. Clutches laid later in the season often hatch in the nest, overwinter there, and emerge the following March in the following March or April (Chinemys reevesi, n.d.).

Hatchlings display three pronounced carapacial keels and very long tails upon emerging from their eggs. Their lateral keels tend to flatten somewhat, and its tail becomes proportionally shorter as the turtles mature.

Reeves' turtles are omnivorous and consume numerous foods including algae, aquatic plants, fallen fruits, crayfish, aquatic and terrestrial insects, fish, frogs, shrimp, crabs, snails, worms, and carrion.

Threats and Conservation

Over the past half-century, *M. reevesii* "has disappeared from at least half its original area of occurrence as a result of targeted collection, and collection pressures continue," according to van Dijk.

Collection of the species for Asian food and traditional medicine markets and for the international pet trade have profoundly depleted *M. reevesii* populations in China and other portions of its range. Habitat destruction resulting from urbanization and pollution is also a significant factor in the turtle's decline throughout China. Reeves' turtle populations appear to be stable in Japan and Taiwan.

Reeves' turtle photographed in China. **Photo © 2022 by Winsten Slowswakey**

Asiatic turtle species as a whole are at considerable risk of extinction. According to Lovich and his co-authors, "the greatest threats to the survival of *M. reevesii* populations seem to be intense overexploitation for the food and pet trades, as well as habitat destruction caused by land development and various modifications to inland waters" (Lovich et al., 2011).

In 2000, the Asian Turtle Trade Working Group assessed the status of *M. reevesii* and determined that populations of the species in China were plummeting. Once common throughout its range in China, the species is now rare in the wild.

Reeves' turtle is listed as "endangered" on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. However, this evaluation dates back to 2011 and "needs updating." The IUCN "endangered" listing means the species is "facing a very high risk of extinction in the wild."

Currently the species is being farm-raised in China to supply food and traditional medicine markets (van Dijk, 2011).

Conservation of the remaining wild populations will depend on preserving the aquatic and terrestrial habitats of the species (Lovich et al., 2011)

Few legal protections for Reeves' turtle exist. The Japanese government designated its habitat on Mishima Island to be a National Natural Treasure that is legally protected. Taiwan named Reeves' turtle a "rare and valuable species" in its national Wildlife Conservation Law. The species is also designated as "Vulnerable" in South Korea and protected by a National Law (Lovich et al., 2011).

In 2004 Reeves' turtle was recommended as a candidate for the CITES Appendix II listing. Proposals of support for this listing have been submitted, but the listing is pending. *M. reevesii* has been listed in CITES Appendix III since 2005.

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Portions of this article originally appeared in the *Tortuga Gazette*, 45(2), March/April 2009.

Desert Tortoises Take Next Steps

Desert tortoise hatchlings transition from The Living Desert to an outdoor rearing facility as part of a collaborative program to increase the population of this critically endangered species

By Emily Lou Thomas, Lead Conservation Biologist, The Living Desert Zoo and Gardens

At the end of March, 69 desert tortoise hatchlings, who were housed at The Living Desert for the previous seven months, made the big transition from their indoor rearing home at the Tennity Wildlife Hospital back to their outdoor rearing facility at Edwards Air Force Base (EAFB). As The Living Desert team likes to say, they graduated! The tortoises' transition to EAFB is the intermediate step on their journey back out into their native range. In collaboration with San Diego Zoo Wildlife Alliance (SDZWA), EAFB, and the U.S. Geological Survey, this multi-step headstart program gives the young desert tortoises a better chance for survival by facilitating accelerated growth and hardening their protective shells, leaving the tortoises less vulnerable to predation.

Emily Lou Thomas, Lead Conservation Biologist at The Living Desert, moves the desert tortoises from their home at the Tennity Wildlife Hospital back to their outdoor rearing facility at Edwards Air Force Base (EAFB).

Growth is Key

At The Living Desert, the hatchlings were housed inside within temperature-controlled habitats, provided with burrows in which to retreat, and fed a nutrient-rich diet. During that time, they grew about four times as fast as they would have on their own in the wild. Desert tortoises are ectotherms — animals whose body temperatures depend on external sources like sunlight or windchill — and their growth rates are highly variable due to climate, environment, and genetic factors. However, this growth rate is a key component to the conservation of desert tortoises as research shows a positive correlation between increased body size and post-release survival.

During the indoor phase of the headstart program at The Living Desert, the tortoises quadrupled in size and developed a thicker, more protective carapace (shell) thanks to a nutrient-rich diet and temperature-controlled environment.

To optimize growth and maturity rates, The Living Desert and The San Diego Zoo Wildlife Alliance embarked on a new approach to headstarting, a hybrid of indoor and outdoor rearing. Past studies have shown that tortoise hatchlings have the best chance of survival if they are released with a carapace (the top part of the shell) being 100 millimeters [4 inches] or larger. Tortoises, being long-lived animals who reach ages of over 80 years, take a long time to mature. Accelerating the growth process is paramount to raising multiple clutches of hatchlings in consecutive years, which is necessary to restore dwindling wild populations of desert tortoises.

Prep for Transport

The Living Desert was uniquely equipped to provide the optimal indoor environment for expedited growth during a strategic seven-month period, directly after the tortoises hatched. In preparation for their return to the protected outdoor rearing facility at EAFB, each tortoise was examined by The Living Desert veterinary staff for appropriate growth, weight, signs of injury or ailments, and basic body condition. Incredibly, all 69 hatchlings survived and were cleared for transport to the outdoor facility! Even in optimal settings with extremely knowledgeable and experienced staff, it is rare that all hatchlings would survive their first seven months, let alone mature to the point where all would be cleared to return to an outdoor setting.

In addition to the veterinary checks, the teams needed to complete several other tasks to get the hatchlings ready for transport. These outdoor habitats are equipped with mounted cameras that capture video footage of the hatchlings. To identify individuals, each tortoise was fitted with a white mark in a specific location on their carapace. Each hatchling was also paired with a small temperature logger so that researchers could begin collecting temperatures of the animals immediately upon

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entering the outdoor habitat, giving the science community insights into habitat use and preferences in a setting more akin to one of a wild tortoise.

Strategic Studies

While at The Living Desert, the hatchlings' temperature preferences were studied, coupled with thermal imaging, in a controlled environment. The data collected, though yet to be published, seems to support that most hatchlings had similar temperature preferences and that external temperature might be a reliable alternative to more invasive methods. An exciting implication is that scientists can use less invasive tactics to still obtain accurate thermography data, giving them insights into tortoise habitat use, health, and behavior.

A behavioral study in which hatchlings were exposed to novel objects will give insights into individual behavior traits such as boldness. The video footage captured by researchers of the hatchlings interacting, or not interacting, with varying objects will be used to analyze individual tortoises' behaviors. Recordings can be compared to those of the hatchlings' mothers, who completed the same trials, to better understand the heritability of behavior traits. Footage analyses can also provide correlations to the hatchlings' responses to predators, once they begin predator avoidance trials at EAFB, and survival success after they are released back into the wild.

Having matured in an indoor setting, these hatchlings are naive to the predators that plague wild tortoises. As the hatchlings acclimate to life outdoors, the SDZWA staff will take the tortoises through a series of trials, teaching them a healthy fear of predators, especially ravens and coyotes. These two predator populations have increased drastically in response to extra resources provided — often unknowingly — by humans. Shockingly, only about 2-3% of wild desert tortoises live to adulthood, with higher mortality rates at young ages. As hatchlings, they have soft shells that make them easy prey to ravens and coyotes, who have learned to break through tortoises' shells. By pairing the scent and model of a coyote or the sound and replica of a raven to an unpleasant experience, researchers can teach headstarted tortoises to fear their top predators without having the actual life-threatening experience. In this way, the hatchlings will gain the experience of a wild tortoise while being kept in a safe environment where they can continue to mature and form harder, thicker shells for better protection. Once training is complete at the outdoor rearing facility, the hatchlings will be released back into the desert at Edwards Air Force Base and fitted with radio trackers to allow further monitoring and research.

Teams from The Living Desert, the San Diego Zoo Wildlife Alliance, and Edwards Air Force Base in the protected outdoor rearing facility. Netting will help to keep the growing desert tortoises safe from raven predation.

The desert tortoises were each fitted with a black temperature logger (at the rear of the carapace) to study temperature preferences, as well as a white marker for easy identification while the team views mounted video footage for further research.

A Critical Desert Species

Desert tortoises roamed the Earth long before humans and have evolved to thrive in a harsh desert environment. They are a unique desert species in that they provide homes for myriad other desert species such as rabbits, snakes, foxes, and even burrowing owls. Well adapted at digging deep, well-constructed burrows, tortoises often create safe havens for other animals in the desert that require refuge from the summer heat and safety from predators. Desert tortoises play a critical role within their ecosystems, however in recent years,

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One of the head-started tortoises grazing on the greenery growing in their protected outdoor pen at Edwards Air Force Base.

scientists have stopped seeing young and juvenile tortoises on the landscape. Likely in part due to increasing predator populations, few hatchlings survive to adulthood.

To help save this species — and in turn support the ecosystems in which they live — The Living Desert and San Diego Zoo Wildlife Alliance took this unique rearing opportunity to learn more about the youngest age class of desert tortoises. The knowledge gleaned from these studies will help better inform conservation practices in the future and give tortoise hatchlings a higher chance of survival. As the headstart hatchlings demonstrated, safe and climate-controlled habitats, ample food, and expert care create the perfect combination for dramatic growth. The 69 hatchlings are now acclimatizing to life back in the desert and learning to keep themselves safe. Having grown drastically in the last seven months, The Living Desert wishes them a happy graduation as they embark on the next chapter of their story.

With the success of these desert tortoise hatchlings, The Living Desert is eager to participate in this collaborative conservation program once again. A new cohort of headstart hatchlings are expected to arrive at The Living Desert this fall!

Originally published in *FoxPaws* Summer 2023 and reprinted with the kind permission of the author and The Living Desert staff.

CTTC congratulates all the individuals and entities involved in the success of this head-starting project.

Scrubbing the GPS Data from Digital Photographs by M. A. Cohen

There is growing awareness among wildlife biologists, conservationists, researchers, and photographers of the necessity to protect sensitive ecosystems by removing the global positioning system (GPS) data embedded in their digital photographs, a process commonly called "scrubbing the GPS data."

What is EXIF Metadata?

A contraction of Exchangeable Image File, EXIF is the format for the metadata that is automatically embedded in any JPEG, RAW, or TIFF image captured using a current camera phone or digital camera with GPS capabilities. In addition to the date and time, plus technical data such as aperture, shutter speed, and focal length, photographs geotagged using GPS data include the exact location (longitude and latitude) at which the image was captured.

The implications of public access to such information are chilling. A tech-savvy wildlife poacher having the EXIF metadata from a digital photograph could decimate a study site or a pristine habitat. The necessity of removing the GPS data about ecologically sensitive locations and species from any publicly available image is obvious.

The prevailing view is that major social media sites remove the EXIF metadata before posting users' images to protect their privacy. However, given the lack of transparency with many of these sites, taking responsibility for removing the EXIF files before submitting images for posting is a sensible precaution. Images intended for posting on personal, educational, and other types of websites should always be scrubbed of EXIF files.

How to Access the GPS Data of Your Photos

If the GPS data (location services) settings on a smartphone or camera are enabled, the device automatically adds the EXIF metadata of a photograph.

The procedure one uses to access the EXIF data varies relative to several factors, including the device used to capture the photograph, and the hardware and software used to process the image.

Depending on your platform, operating system, and software, EXIF data embedded in images is accessible through both free and paid applications. Search for EXIF tag "cleaners" and "removers" to facilitate deletion of such metadata.

Some software programs like Adobe Photoshop and GIMP enable one to save or discard EXIF data by checking or unchecking a box.

For more information on this important issue, click on the following links:

Hoffman, C. (2017). How to See Exactly Where a Photo Was Taken (and Keep Your Location Private). **https://www.howtogeek.com/211427/how-to-see-exactly-where-a-photo-was-taken-and-keep-your-location-private/**

Murphy, A. (2017). How to Scrub GPS Data from Your Photos. **https://www.vice.com/en/article/59ygkd/how-to-remove-gps-data-location-information-from-photos**

Portions of this article were originally published in the *Tortuga Gazette* 54(1): January/February 2018.

Lawsuit Challenges Denial of Endangered Species Protection to Gopher Tortoise

Tortoise Threatened by Habitat Destruction, Fragmentation Across Southeast

—Center for Biological Diversity press release

St. Petersburg, Florida — 9 August 2023 — The Center for Biological Diversity and Nokuse Education, Inc. sued the U.S. Fish and Wildlife Service today for denying Endangered Species Act protections to gopher tortoises [*Gopherus polyphemus*] across most of their range. The decision left the imperiled reptiles without lifesaving federal safeguards in Florida, Georgia, South Carolina and most of Alabama.

"Gopher tortoises will stay on a collision course with extinction until they get the strong Endangered Species Act protections that they're entitled to," said Elise Bennett, Florida director and an attorney at the Center for Biological Diversity. "The Service got it wrong when it denied these gentle creatures protection. We're bringing this case because gopher tortoises and the hundreds of other species that rely on them for survival are worthy of our care and concern."

The Service denied protections in late 2022 despite originally finding in 2011 that the tortoise warranted protections — and despite its own projections that nearly three-quarters of remaining gopher tortoise populations will be lost over the next 80 years. Even this projection fails to account for the full effect of habitat destruction on this highly vulnerable species.

"Our organization has been committed to saving the gopher tortoise for over 20 years and during that time we have witnessed a steep decline in gopher tortoise populations and habitat," said Matthew Aresco, board member at Nokuse Education, Inc. "There is no question that if we fail to increase the protection of this long-lived, iconic species, it will fade away and face extinction. The Service's own analysis predicts a dire outlook for the survival of the gopher tortoise, yet they failed to follow the best available science in their decision and list the species under the Endangered Species Act."

Gopher tortoise (*Gopherus polyphemus*). Photo © 2021 by Evan Grimes

Gopher tortoises have shovel-like front legs and strong, thick back legs that help them dig deep, and intricate burrows, which more than 360 other species use. Gopher tortoise burrows are considered key features in the large, unfragmented upland ecosystems these communities of wild animals need to survive.

Gopher tortoises have already lost 97% of the longleaf pine savannas they historically inhabited and continue to be severely threatened by habitat loss and fragmentation driven by urbanization. This limits food availability and options for burrow sites, which exposes them to being crushed in their burrows during construction, run over by cars or senselessly attacked by people. Tortoises are also threatened by disease, invasive species like fire ants, and climate change.

Characteristics such as delayed sexual maturity, dependence on high adult survival rates and high levels of nest and hatchling mortality make gopher tortoises especially vulnerable to human-driven threats. The presence of long-lived adult tortoises can also mask serious population problems like reproduction declines or failure.

Some states have implemented limited protections for gopher tortoises, but they have not stopped or reversed the species' ongoing decline. For example, Florida requires that most tortoises be relocated away from development, but the state does not equally protect tortoise habitat. This means that the creatures are being squeezed into increasingly smaller areas. Combined with booming development this has led to shortages of suitable places to put relocated tortoises.

Moving tortoises, rather than protecting their habitat, also harms hundreds of other species that rely on them to thrive, disrupting entire natural systems.

Gopher tortoises in limited parts of Louisiana, Mississippi and western Alabama are protected under the federal Endangered Species Act. Those in eastern Alabama, Florida, Georgia and South Carolina have been waiting for federal protection since 1982.

The Gopher Tortoise Council (GTC) is a not-for-profit organization based in Tampa, Florida that strives to achieve "effective protection of the gopher tortoise and other upland species throughout the southeastern United States."

To learn more about the GTC and the gopher tortoise, pay a visit to the organization's website: Gopher Tortoise Council

CTTC Kern County Has a New Meeting Place

Kern County chapter has been meeting at a new facility. The meetings are still on the second Monday of the month at 6:30 PM.

Hart Park Nature Center
8000 River Road
Hart Park Adobe Peacock House
Bakersfield, CA 93308

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October Chapter Officer Elections

October is the month during which most chapters hold their chapter officer elections. When your chapter holds officer elections, if there are changes to your slate of officers, please let the Gazette know promptly in order to keep the CTTC Directory up-to-date.

Please send your updates to editor@tortoise.org

Thank you!

> "It's not that the world hasn't had more carbon dioxide, it's not that the world hasn't been warmer. The problem is the **speed** at which things are changing. We are inducing a sixth mass extinction event kind of by accident and we don't want to be the 'extinctee.'"
>
> *—Bill Nye (b. 1955), American science educator*

Classified Advertisements

Classified advertisements run for one issue at 5^{00} for up to four lines. Ads are accepted at the discretion of the Editor. Classified ads are available to members and subscribers only and are run as a service to our members. California Turtle & Tortoise Club is not responsible for merchandise placed for sale in the *Tortuga Gazette*.

Please make your check payable to the California Turtle & Tortoise Club.

Please send ad fee to: CTTC Tortuga Gazette, attn Treasurer, P. O. Box 7300, Van Nuys, CA 91409-7300. Mail fee with ad copy to the *Tortuga Gazette* mailing address; OR, mail fee to the postal address above, and email the ad copy to the Gazette Editor.

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Mike's Turtle Net Picks by Michael J. Connor, Ph.D.

A varied selection of recent articles, stories and sites on the Web that some of you may find as interesting as I did.
This list is also posted at tortoise.org/turtlenetpicks/turtlenetpicks.html

Desert Tortoise 101
Joshua Tree National Park's Michael Vamstad and others talk about desert tortoises in this 12-minute video.

Lawsuit Seeks Increased Federal Protections for Gopher Tortoises
The Center for Biological Diversity and Nokuse Education are suing the U.S. Fish and Wildlife Service to reverse its October 2022 claim that increased protections were not warranted for gopher tortoises in Florida, Georgia, South Carolina and parts of Alabama.

Impacts of Introduced Giant Tortoises on Island Ecosystems
Research from the Galapagos demonstrates that the restoration of giant tortoises has profound consequences for plant communities and wildlife at both local and landscape scales.

Saving Taiwan's Chinese Box Turtles
About 1,296 hectares of the Feitsui Reservoir in New Taipei City are designated conservation areas for possibly the largest and most stable population of Cuora flavomarginata in Asia.

Wood Turtles in Western Quebec
Surveying turtles along the Coulonge River in western Quebec's Pontiac region.

European Pond Turtle Could "Return" to Britain
Reintroduction of the European pond turtle to British rivers and lakes could contribute to restoring ancient biodiverse wetlands.

Hatchling Red-eared Slider Peddler Turns Nasty
A man being questioned for peddling hatchling sliders in Cincinnati, Ohio allegedly hit a wildlife investi-gator with his car.

Leatherback Visits Labrador
Leatherbacks are the world's most widespread sea turtle and are known to occasionally visit northern climes. Unusually, this one seen off the coast of Canada got photo-graphed!

Record Numbers of Sea Turtle Nests at Cape Canaveral...
Canaveral National Seashore reports a record number of sea turtle nests this season.

...Not So Good News From Western Africa
Sadly sea turtle nestings are down and a well-organized illegal market for turtle meat controlled by local poachers is thriving.

Red Sea Turtles
An overview of hawksbill and green turtle conservation needs in the Red Sea.

SoCal Sea Turtles
SoCal Sea Turtles is a San Diego based organization working on conservation and education regarding Southern California's sea turtles.

Loggerhead STRETCH
Loggerhead STRETCH is not a new exercise routine but a loggerhead "Sea Turtle Research Experiment on the Thermal Corridor Hypothesis". This cool website shows the move-ment of 25 juvenile loggerheads in the North Pacific Ocean.

Sea Turtles Have 3000-year-old Routines
Mediterranean green turtles have visited the same foraging grounds, millennium after millennium.

Estimating Green Sea Turtle Fatness
Australian scientists used bioelectrical impedance analysis to estimate adipose tissue levels in green sea turtles.

Important New Turtle Fossil from Lower Bavaria
A new well-preserved specimen of *Solnhofia parsonsi* yields important clues about the species and the habitat it lived in 150 million years ago.

Chelonian Shells Record Our Nuclear History
Scientists measured uranium in turtle and tortoise shells collected by museums at known times and conclude that chelonian shells can be used as environmental monitors. **The paper is open access and can be read here.**

CTTC's Turtle and Tortoise Listserve
To engage with other turtle and tortoise fans in a friendly atmosphere join CTTC's Turtle and Tortoise list or send an email to: <CTTC-TurtleAndTortoise-list+subscribe@groups.io>.

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For breaking news updates follow CTTC on Facebook!

Critical Habitat Protection Proposed for Green Sea Turtles

— Including Florida & Hawai'i Nesting Beaches and Offshore Habitat

By Deborah Dilard, Turtle Island Restoration Network News Release

Petersburg, Florida—25 July 2023— In response to a legal agreement with environmental groups, the U.S. Fish and Wildlife Service and NOAA Fisheries today proposed to designate roughly 8,850 acres of beaches and nearly 428,000 square miles of coastal waters as protected critical habitat for six distinct populations of green sea turtles [*Chelonia mydas*].

"I'm relieved that green sea turtles are on their way to getting the habitat protection they need. These graceful marine turtles have come a long way. Still, healthy habitats will be key to their survival," said Stelise Bennett, Florida and Caribbean director at the Center for Biological Diversity. "The global climate crisis and sea-level rise are already harming these turtles' nesting and feeding areas, and we can expect those threats to get worse. These ancient reptiles are legally entitled to our help, and the federal government needs to give it to them."

For Atlantic green sea turtles, the proposed critical habitat on land includes approximately 5,725 acres of nesting beaches in Florida, where green sea turtle nesting activity in the U.S. is greatest, 250 acres in Puerto Rico, and 117 acres in Vieques and the U.S. Virgin Islands. The proposed marine critical habitat includes nearshore waters up to 20 meters deep around all of Florida, parts of Puerto Rico, and parts of the U.S. Virgin Islands, areas the turtles use for reproduction, migration, foraging, and resting. It also includes sargassum habitat in the Gulf of Mexico and the Atlantic Ocean.

For Pacific green sea turtles, the proposed terrestrial habitat includes approximately 2,233 acres of nesting and basking beaches in the main Hawai'ian Islands, 95 acres in the northwestern Hawai'ian Islands, 242 acres in American Samoa, 125 acres in Guam, and 179 acres in the Northern Mariana Islands. The proposed marine habitat includes nearshore waters off Hawai'i, American Samoa, Guam, and the Mariana Islands.

Green turtle photographed in the coastal waters off southern Mexico. **Photo © 2018 by Selene E. Jacobo Cabral**

"I'm hopeful protected habitat will help give green sea turtles a bright future," said Maxx Phillips, Hawai'i director, and staff attorney at the Center. "The turtle's fragile nesting grounds need to be treated with care if the species is going to survive. In a warming climate, we don't have any time to lose. Federal habitat protection for the turtle is overdue, but I'm glad it's coming soon."

The proposed habitat protections fulfill a court-ordered agreement secured by the Center for Biological Diversity, Sea Turtle Oversight Protection (STOP), and Turtle Island Restoration Network as a result of a federal lawsuit filed in 2020. The Fish and Wildlife Service and NOAA Fisheries had previously determined that growing climate change and threats from sea level rise meant the turtles still needed Endangered Species Act protection. Despite recognizing those threats — particularly to low-lying nesting beaches — the agencies failed to protect the turtle's critical habitat under the Act.

A 2019 peer-reviewed study by Center scientists found that most marine species listed under the Endangered Species Act are recovering. Listed species with critical habitat protections, and those listed for more than 20 years, are most likely to be rebounding. The Endangered Species Act prohibits federal agencies from authorizing activities that will destroy or harm a listed species' critical habitat.

"Today's action gives green sea turtles a fighting chance at surviving rising seas caused by climate disruption and devastating pollution from plastics and offshore oil drilling," said Joanie Steinhaus, Turtle Island Restoration Network's director of oceans. "It is unfortunate it took a lawsuit to get this life raft for endangered sea turtles — beginning with our lawsuit challenging the lack of action under the former Trump administration."

Federal experts have found that green sea turtles should be considered 11 distinct populations or distinct population segments. Although some sea turtle populations, like those in Florida, are improving significantly due to the Endangered Species Act's protections, several populations continue to struggle. The Mediterranean, Central South Pacific, and Central West Pacific populations remain in danger of extinction and remain listed as endangered.

The Fish and Wildlife Service and NOAA Fisheries are holding public hearings and informational meetings. The agencies are accepting comments on the critical habitat proposals at **www.regulations.gov** through October 17, 2023.

Eastern Pacific Green Sea Turtle, *Chelonia mydas*

United States Fish & Wildlife Service

Facts About Eastern Pacific Green Sea Turtle
Weight: 300-350 lbs
Length: 3 feet
Lifespan: unknown; sexual maturity occurs between 20-50 years
Diet: seagrasses and algae
Behavior: females return to same beaches where they were born, every 2-4 summers to lay eggs

The Eastern Pacific green turtle is listed as endangered throughout its range. This regionally important population of the green turtle has exhibited an extreme decline over the last 30 years. This population decline is attributed to severe overharvest of wintering turtles in the Sea of Cortez between 1950 and 1970, the intense collection of eggs between 1960 and early 1980 on mainland beaches of Mexico, nesting habitat destruction, and incidental capture in commercial fisheries. Primary threats to the species in U.S. waters are from entanglement in debris, boat collisions, fisheries bycatch, and entrainment in coastal power plants.

The East Pacific green turtle is distinguished from the green turtle mainly by size, coloration and carapace shape. The carapace of the adult East Pacific green turtle is narrower, more strongly vaulted and more indented over the rear flippers than that of the green turtle. The East Pacific green turtle is also conspicuously smaller and lighter than the green turtle. The East Pacific green turtle has a heart-shaped shell, small head, and single-clawed flippers. The adult carapace is smooth, keelless, and light to dark brown with dark mottling, with whitish to light yellow plastron. Adults feed almost exclusively on sea grasses, including eelgrass, and marine algae.

East Pacific green turtle on the shore at the Seal Beach National Wildlife Refuge located in the Seal Beach Naval Weapons Station in Orange County, CA. Photo by the US Fish & Wildlife Service. Public domain.

Although they do not nest as far north as the California coast, Pacific green turtles are often found during the summer months in waters off the coast of California, Oregon, and sometimes as far north as Alaska. Sea turtle sighting records from northern Baja California to Alaska and determined that the East Pacific green turtle was the most commonly observed hard-shelled sea turtle on the U.S. Pacific coast. Most of the sightings (62.0%) were reported from northern Baja California and southern California. The northernmost reported resident population of East Pacific green turtles occurs in San Diego Bay.

On the Seal Beach National Wildlife Refuge, East Pacific green turtles have been observed in the 7th Street Pond, as well as the channel that extends from Anaheim Bay into the 7th Street Pond. Between 2006 and 2008, turtles were often observed in groups of two to four individuals.

The main nesting sites for the East Pacific green turtle are located in the state of Michoacán, Mexico and in the Galapagos Islands, Ecuador. There is *no known* nesting by this species in the United States.

Article courtesy of the US Fish & Wildlife government website.

The **Seal Beach National Wildlife Refuge** was established in 1972 to "protect and preserve a salt marsh and estuarine habitat valuable for migratory waterfowl and other wildlife in the State of California." The Refuge harbors federally and State-listed endangered and threatened species.

Eastern Pacific green turtle photographed at the bayfront site of the Old Power Plant in San Diego Bay, CA, the former South Bay Power Plant that was decommissioned in 2010 and subsequently demolished. Photo courtesy of NOAA Fisheries. Public domain.

Green Turtle Research and Conservation in Southern California

Research and conservation work in our backyard

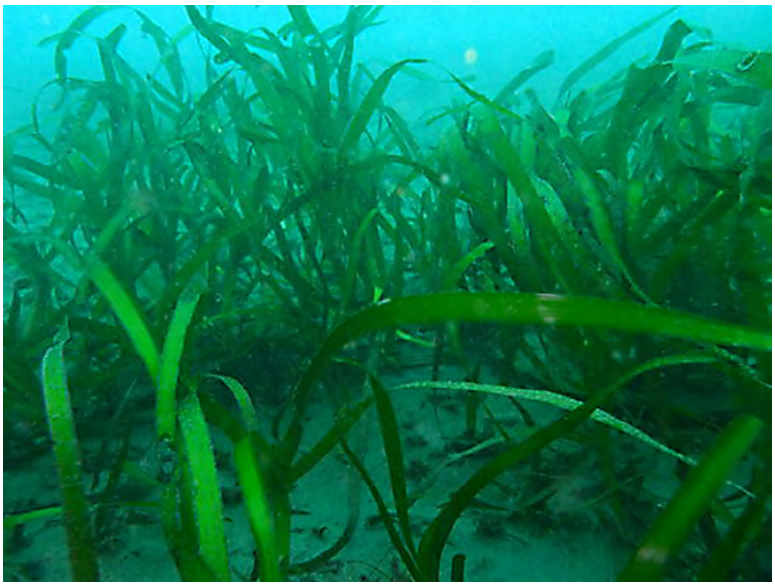
National Oceanic and Atmospheric Administration Fisheries Service

East Pacific green turtles (*Chelonia mydas*) are listed as threatened under the Endangered Species Act. Along the coast of Southern California, juvenile and adult green turtles are present in many of the bays, lagoons, and coastal inlets. Originating from nesting beaches in Mexico, these turtles come to California to take advantage of the productive coastal ecosystems, which are rich in seagrass, algae, and invertebrates. Green turtles in the eastern Pacific are one of the best conservation success stories!

From the beginning of the 1900s through the early 1990s they were legally harvested in many areas of the eastern Pacific. Their eggs and meat were prized food items for generations. However, with the onset of nesting beach protections in the late 1970s, coupled with protection in foraging areas starting in the mid-1990s, green turtles have made a remarkable comeback. For example, at Playa Colola, Mexico, the largest green turtle beach in the eastern Pacific, annual nesting in the mid-1980s was close to 250 females per year. Fast forward to 2015 and on that same 5-km stretch of beach, more than 1,000 females nested in a single night! Naturally, this has resulted in a major increase in green turtles throughout the region. So much so that we can expect green turtles to become a more and more common visitor to our waters for years to come.

In collaboration with other local and federal agencies and universities in the area (Unified Port of San Diego, U.S. Navy, U.S. Fish and Wildlife Service, San Diego State University, Scripps Institution of Oceanography, Long Beach State University), researchers at SWFSC have been studying green turtles in San Diego Bay for over 20 years; these studies have focused on genetics, movements, growth, toxicology, foraging ecology, and demography. We've also conducted fieldwork in Seal Beach National Wildlife Refuge and the San Gabriel River, both in Orange County. Most recently, we launched a citizen science project aimed at studying the green turtles living near La Jolla Cove, just down the street from the Southwest Fisheries Science Center in La Jolla, CA.

- They eat eelgrass and invertebrates that are found within eelgrass beds.
- While a power plant was in operation (1960-2009), these turtles grew very fast – among the fastest growth rates ever recorded for green turtles.
- The largest recorded east Pacific green turtle is from San Diego Bay and weighed 540 pounds (245 kilograms).



Eelgrass (*Zostera marina*), a favorite food of green turtles, photographed in the coastal ecosystem near La Jolla, San Diego County, CA. **Photo © 2022 by Darrell K. Moore**

Here are some things we have found about green turtles in southern California:

- They come from Mexican nesting beaches.
- They are long-term residents of San Diego Bay, returning to the bay after nesting.
- They often stay in south San Diego Bay unless they are traveling to their nesting beach.
- There are approximately 60 turtles in San Diego Bay, although the number fluctuates from year to year.
- High concentrations of heavy metals and organic pollutants have been found in their scutes and blood, yet negative effects have not been found.
- Incidents of boat strikes are increasing in recent years in southern California.

Article courtesy of NOAA Fisheries Services. Government information presented on government websites is in the public domain, meaning it can be freely used for non-commercial, scientific, and educational purposes.

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A CRITICALLY ENDANGERED TORTOISE ENJOYS ZOO MED GRASSLAND TORTOISE FOOD

The Radiated Tortoise *(Astrochelys radiata)* is the 6th rarest tortoise in the world, and the heroes at Turtle Survival Alliance (TSA) are fighting for its future. As a non-profit, the TSA relies on support from the community. Zoo Med has pledged to donate pallets of their Natural Grassland Tortoise Food to TSA's Madagascar location 3 times a year. This food prevents shell and spinal growth deformities by matching the nutrient profile and high fiber content of a wild tortoise diet.

Join Zoo Med in supporting the TSA's conservation efforts; visit their website to learn more and how to contribute: turtlesurvival.org

TSA
turtle survival alliance

California Legislature Passes Joshua Tree Protection Law

Statute Is First in State to Protect Species From Climate Threats—Center for Biological Diversity press release

Sacramento, California—27 June 2023—California lawmakers today passed the Western Joshua Tree Conservation Act, permanently protecting the iconic and imperiled species.

The new law cleared the Assembly 54-15 and the Senate 31-8 as part of the state budget agreement. It's expected to be signed by Gov. Gavin Newsom this week and take effect July 1.

Western Joshua trees have been protected on an interim basis, as a candidate species under the California Endangered Species Act, since September 2020. Under the new law, they will remain a candidate species, receiving the protections of both statutes.

"I'm grateful the Newsom administration and lawmakers agree that western Joshua trees are an irreplaceable part of California's natural heritage that has to be protected," said Brendan Cummings, the Center for Biological Diversity's conservation director and a Joshua Tree resident. "This groundbreaking law will help ensure these wonderful trees remain part of California's Mojave Desert landscape forever."

The new law will be the first in California specifically focused on ensuring protection of a climate-threatened species. The statute provides the trees with protections comparable to those they would receive under the California Endangered Species Act, but with additional permitting mechanisms to address renewable energy and housing projects in their range. It also requires the state Department of Fish and Wildlife to prepare a conservation plan for the trees by the end of 2024.

Earlier this year the state Fish and Game Commission postponed a decision on whether to permanently protect western Joshua trees under the state endangered species act, waiting to see whether the bill proposed by Newsom's administration became law. In June 2022 the commission deadlocked 2-2 on whether to make that protection permanent and agreed to reconsider the listing decision after seeking more input from California Tribes. Tribal input has strongly supported protecting western Joshua trees.

"The California Endangered Species Act is our most important biodiversity protection law, and western Joshua trees clearly qualify as threatened," Cummings said. "As the first species in the state to be protected because of climate change, they deserve the special measures contained in the new conservation act."

The provisions of the Western Joshua Tree Conservation Act include:

- Prohibiting unpermitted killing or removal of the trees.
- Requiring a conservation plan for the species.
- Creating a fund to acquire and manage lands to protect the species.
- Creating a permitting regime expected to be faster and cheaper than the state endangered species act.
- Requiring regular reviews of the species' status and the effectiveness of the permitting regime and conservation plan.
- Requiring consultation with California Native American Tribes on the law's implementation.

Background

In 2019 the Center filed a petition to list Joshua trees under the state's Endangered Species Act. In September 2020 the state's Department of Fish and Wildlife recommended that Joshua trees be temporarily protected during a yearlong study, and the commission agreed. In April 2022 the department recommended against permanent protection of the species, shrugging off concerns from independent scientific peer reviewers.

Without legal protection, climate change could wipe out western Joshua trees, which already are failing to reproduce at drier, lower elevations. Recent studies show the trees are already dying off because of hotter, drier conditions, with very few younger trees becoming established. Even greater changes are projected over the coming decades.

Scientists in 2019 projected that Joshua trees will be largely gone from their namesake national park by the end of the century. An earlier study projected the species will be lost from virtually its entire range in California.

Prolonged droughts are expected to be more frequent and intense over the coming decades, shrinking the species' range and leading to more tree deaths. Higher elevations, where some Joshua trees might survive increasing temperatures and drying conditions, are at risk of fire because of invasive nonnative grasses.

Western Joshua trees are also threatened by habitat loss and degradation. Outside of Joshua Tree National Park, off-road vehicle use, cattle grazing, powerlines and pipelines, housing projects and large-scale energy projects are destroying habitat. Approximately half of the western Joshua tree's range in California is on private land, and only a tiny fraction of that habitat is protected from development. Projections show that virtually all those trees will be lost without increased legal protection.

Joshua trees come in two distinct species: the western Joshua tree (*Yucca brevifolia*) and the eastern Joshua tree (*Y. jaegeriana*). The two species occupy different areas of the desert, are genetically and morphologically distinguishable, and have different pollinating moths. Only the western species is covered under the new law.

Meeting Schedule: September/October 2023

Click on your Chapter's website link for the latest program information which is posted as it becomes available.

Chino Valley
September 15; October 20

Foothill
September 22; October 27

High Desert
September 11; October 9

Inland Empire
September 1; October 6

Kern County
September 11; October 9

Low Desert
Meeting information to be announced.

Orange County
September 1; October 6

Ridgecrest
September 11; October 9

Santa Barbara-Ventura
Meeting information to be announced.

Santa Clarita
Meeting information to be announced.

TOOSLO (San Luis Obispo)
Contact the chapter for meeting information.

TTCS (Long Beach)
September 16; October 21

Valley
September 15; October 20

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Membership in the CTTC and subscriptions to the *Tortuga Gazette* are handled through the CTTC Chapters. The Chapters also manage membership renewals (see postal addresses to the right).

Many members choose to join a nearby Chapter to participate in Chapter meetings and other activities. Print membership forms from the CTTC website.

Your Chapter and your renewal date (month/year) are displayed on your newsletter notification. Mail your new or renewal membership/subscription to the Chapter of your choice.

Membership fees

- Student membership $15.00
- Individual membership $25.00
- Family membership $35.00
- Life membership $500.00

CTTC Mailing Addresses

Chino Valley Chapter: P.O. Box 1753, Chino, CA 91708-1753

Foothill Chapter: P.O. Box 51002, Pasadena, CA 91115-1002

High Desert Chapter: P.O. Box 163, Victorville, CA 92393

Inland Empire Chapter: P.O. Box 7205, Redlands, CA 92375

Kern County Chapter: P.O. Box 81772, Bakersfield, CA 93380-1772

Low Desert Chapter: P.O. Box 4156, Palm Desert, CA 92261

Orange County Chapter: P.O. Box 11124, Santa Ana, CA 92711

Ridgecrest Chapter: P.O. Box 1272, Ridgecrest, CA 93555

Santa Barbara-Ventura Chapter: P.O. Box 3086, Camarillo, CA 93011-3086

Santa Clarita Chapter: P.O. Box 4012, Castaic, CA 91310

TOOSLO Chapter: P.O. Box 763, Grover Beach, CA 93483

Turtle & Tortoise Care Society Chapter: PO Box 15952, Long Beach, CA 90815

Valley Chapter: P.O. Box 7364, Van Nuys, CA 91409-7364

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Memberships and Renewals

Each chapter handles its own memberships and renewals.

There are three options for membership renewal:

1. Send a check to the mailing address of your chapter. In the panel below, you will find the current membership fees and the mailing addresses for each chapter.
2. Renew your membership in person at your chapter's meeting.
3. Some chapters have PayPal accounts that enable their members to renew memberships online.