Dedicated to Turtle & Tortoise Conservation, Preservation and Education Since 1964

California Turtle & Tortoise Club

the Tortuga Gazette

Volume 55, Number 1 • January/February 2019

Pearl River map turtle, *Graptemys pearlensis*. Photo by Cris Hagen, United States Geological Survey. Public domain.

featured species

Map turtle species, *Graptemys* spp. Agassiz, 1857

Map Turtles — an Overview

by M. A. Cohen

Endemic to North America, the thirteen map turtle species inhabit freshwater ecosystems throughout the eastern half of the United States as well as southeastern Canada. The genus *Graptemys* was officially described by the Swiss-American biologist/geologist Jean Louis Rodolphe Agassiz in 1857.

The genus name *Graptemys* derives from two Greek root words: *grapt-*, which means inscribed or written, and *-emys*, meaning a turtle or tortoise. Members of the Emydidae family of basking, semiaquatic chelonians, the common name of *Graptemys*—map turtle—denotes the map-like markings, often resembling waterways on old maps, that occur on the species' carapace.

Graptemys species are also commonly known as sawback turtles, referring to the distinctive keel, running the medial length of the carapace, which is typically serrated and spiked. Map turtles are also known for the elaborate striping on their heads, limbs, and tails.

Compared to other North American emydid turtles, map turtles are comparatively small. As a species, map turtles display significant sexual dimorphism (differences related to the sex of the individual) with females being much larger than males. Female map turtles, at 7 to 10 inches (18 to 25 centimeters) in carapace length, are often up to twice the length of males and can possess up to ten times the body mass of males. At 3 to 7 inches (8 to 18 centimeters) in carapace length, male map turtles are much smaller than females.

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Besides the overall size differences between males and females, the tails and front-limb claws of map turtles differ noticeably. Male map turtles typically have longer, thicker tails and longer claws on their front legs than those of the females. Males use their elongated claws as part of their courtship ritual.

Taxonomy, the classification of organisms, is a fluid process and is continually being refined through new research from the scientific community. This article will briefly profile the currently recognized species and subspecies of map turtle.

All *Graptemys* species are found exclusively in freshwater habitats, including lakes, ponds, streams, and wetlands, preferably those with abundant basking spots, such as submerged logs, rocks, and snags.

The particulars of species' habitat will vary with the region in which that species resides. For example, some species are found in multiple waterways in multiple states, while other species are found only in a single river drainage.

Dietary omnivores, map turtles consume a variety of food items, depending on local availability. Some species are more carnivorous than others, and, depending on their particular physical atributes, males and females differ in their abilities to prey on specific food items. In their typical diets are mollusks, soft-bodied invertebrates, aquatic insects, and aquatic plants, among other items.

Graptemys barbouri, Barbour's map turtle

Barbour's map turtle. Photo by Ltshears. Public domain.

Named in honor of the American herpetologist Thomas Barbour (1884–1946), Barbour's map turtle inhabits rivers in southeastern Alabama, the Florida panhandle, and southwestern Georgia.

One of the larger species of *Graptemys*, Barbour's map turtle is rare or threatened in the states it inhabits, and CITES lists the species as Appendix III.

Studies of both the form and the DNA of Barbour's map turtle prove that it is closely related to the Alabama map turtle (*G. pulchra*), the Escambia map turtle (*G. ernsti*), and the Pascagoula map turtle (*G. gibbonsi*); together these four species comprise the *G. pulchra* group. The females of these species are megacephalic, i.e., they have extremely large heads.

Graptemys caglei, Cagle's map turtle

Inhabiting watersheds in south central Texas, Cagle's map turtle is one of the least studied of all *Graptemys* species. Named in honor of American herpetologist Dr. Fred R. Cagle (1915–1968), *G. caglei* is one of two map turtle species native to Texas that each lack an overlapping range with other map turtles, the other being the Texas map turtle, *G. versa*.

Cagle's map turtle hatchling. Photo © 2009 by Mokele. Source: Creative Commons; license: CC-BY-SA-3.0.

Described as mesocephalic, the female Cagle's map turtle has a "moderately enlarged head," making it well-equipped for feeding on mollusks; the species also feeds on insects and plant material.

Through morphological studies—those of the form and structure of organisms— chelonian researchers assigned Cagle's map turtle to the "narrow-headed" group known as the *G. pseudogeographica* map turtles.

Graptemys ernsti, Escambia map turtle

The Escambia map turtle. Public domain.

Endemic to rivers in southern Alabama and western Florida that drain into the Escambia Bay located off the western Florida panhandle, the Escambia map turtle was named in honor of American herpetologist Dr. Carl H. Ernst (1938–2018).

A moderately large species, the Escambia map turtle's carapace is high-domed and medially keeled, while its plastron is quite flat. The large jaws of the females have broad surfaces for crushing the shells of mollusks.

G. ernsti prefers habitats in large, swift rivers and creeks with plentiful basking spots that are separated from the shoreline, as well as protective underwater hiding spots. The habitat must also offer an abundance of freshwater mollusks such as aquatic snails and mussels.

Graptemys flavimaculata, yellow-blotched map turtle or yellow-blotched sawback

One of the "narrow-headed" group of *Graptemys*, the yellow-blotched map turtle is found in the Pascagoula River and its tributaries in Mississippi, having a range that overlaps with that of the Pascagoula map turtle.

The species name *flavimaculata* derives from two Latin root words: *flav-,* meaning yellow, and *macula-*, meaning a spot or a blotch. This descriptive name refers to the species' carapacial markings, which feature yellow blotches on the scutes.

As opportunistic feeders, yellow-blotched map turtles consume insects as a dietary staple as well as preying on crustaceans and small fish, and they also eat plant matter.

Yellow-blotched map turtle. Photo by Eekhoorntje. Public domain.

Because of its comparatively low reproductive output coupled with the deterioration of its habitat, the yellow-blotched map turtle is listed as threatened under the US Endangered Species Act.

Graptemys geographica, northern or common map turtle

The most widely distributed of the map turtle species, the range of northern or common map turtle extends from southern Canada southward to northwestern Georgia and westward to the Great Lakes. The northern map turtle is the only *Graptemys* species that inhabits watersheds draining into the Atlantic Ocean.

A sizable species with a broad, oval to rounded, low-keeled carapace, the northern map turtle prefers large, slow-moving rivers but is also found in swiftly-flowing streams.

Northern map turtle photographed in Gatineau, Quebec, Canada. Photo © 2008 by D. Gordon E. Robertson. Source: Creative Commons; license: CC-BY-3.0.

Carnivorous in its dietary preferences, northern map turtles consume mollusks, crustaceans, insects, fish carrion, and other aquatic animals.

Graptemys gibbonsi, Pascagoula or Gibbons's map turtle

The Pascagoula map turtle is found only in the Pascagoula and Pearl Rivers, and their tributaries, in Mississippi and Louisiana. The species is sympatric (overlapping in range) with the yellow-blotched map turtle and the Pearl River map turtle.

Pascagoula map turtle. Photo by Eekhoorntje. Public domain.

Named in honor of the American herpetologist J. Whitfield 'Whit' Gibbons, *G. gibbonsi* is listed as endangered on the IUCN Red List because of its declining population numbers. Like many other *Graptemys* species, the Pascagoula map turtle has suffered significant habitat destruction within its range.

Formerly researchers considered the Pascagoula map turtle to be a variant of the Alabama map turtle, but DNA data now confirms that *G. gibbonsi* is a distinct species within

the *G. pulchra* clade (a group of organisms having a common ancestor), which includes two additional species, Barbour's map turtle, and the Escambia map turtle.

Graptemys nigrinoda, black-knobbed map turtle

Occurring in the Mobile Bay drainage of the Tombigbee and Black Warrior Rivers in Alabama and in several river systems in Mississippi, the black-knobbed map turtle is a small to medium-sized species with distinguishing black-tipped projections on several of its vertebral scutes.

Black-knobbed map turtle hatchlings. Photo © 2005 by M. Noth. Source: Creative Commons; license: CC BY 1.0.

Basking is an important activity for the species, for purposes of thermoregulation, as well as removal of parasites and algae from the shell. Because of this, the habitats in which the black-knobbed map turtle lives must have abundant basking spots in the rivers.

While its foraging behavior is not well-studied, *G. nigrinoda* is known to consume beetles and dragonflies that fall into the water, as well as freshwater sponges, bryozoans (aquatic invertebrates commonly called moss animals), mollusks, and freshwater algae.

As with many other freshwater turtle species, black-knobbed map turtle populations are declining because of habitat degradation and human intrusion such as removal of logs from rivers.

Graptemys oculifera, ringed map turtle

The ringed map turtle is one of the least studied of all *Graptemys* species. Found in the Pearl River and its tributaries in Louisiana and Mississippi, this turtle gets its species name from the circular markings on the scutes of its carapace that are particularly noticeable in hatchlings and juveniles.

Ringed map turtles. Photo © 2017 by Greg Hume. Source: Creative Commons; license: CC-BY-SA-4.0.

The species name *oculifera* derives from two Latin root words: *ocul* –, which means an eye, and *ferus* –, which means bearing (in the sense of carrying).

The ringed map turtle is one of the microcephalic (i.e., narrow-headed) map turtles. The species primarily feeds on aquatic insects such as beetles, mayflies, and damselflies, as well as snails and occasionally algae.

Graptemys ouachitesis, Ouachita map turtle (two subspecies)

Once regarded as a subspecies of the false map turtle, *G. pseudogeographica,* the Ouachita map turtle is currently recognized as a separate species with subspecies.

A Ouachita map turtle hatchling (subspecies unknown). Photo by Aaron Bishop. Public domain.

In portions of its range, the Ouachita map turtle is sympatric with the false map turtle, and the behavior of the two species is similar, which may account for their original classification as a single species.

Described as a riverine species, the Ouachita map turtle inhabits rivers, lakes, dams, and river bottom swamps, preferably with a sand or silt bottom. Basking on logs and mats of plant material is a common activity.

Omnivorous in its diet, the Ouachita map turtle consumes a variety of food items, including freshwater sponges, aquatic invertebrates, leeches, snails, small crustaceans, aquatic insects, carrion, and both aquatic and vascular plant matter,

***G. o. ouachitensis,* Ouachita map turtle |** Native to the midwestern and southern United States, the range of this subspecies includes the Ouachita River system in northern Louisiana, westward into Oklahoma, and northward to Kansas, Nebraska, Minnesota, Indiana, Iowa, Wisconsin, and West Virginia.

***G. o. sabinensis,* Sabine map turtle |** The Sabine map turtle occurs only in the Sabine and Neches River systems of Louisiana and eastern Texas.

Graptemys pearlensis, Pearl River map turtle

Page 1 of this issue features an image of the Pearl River map turtle.

Inhabiting the Pearl and Bogue Chitto Rivers in Louisiana and Mississippi, the medium-sized Pearl River map turtle is sympatric with the ringed map turtle and the Pascagoula map turtle.

Before 1992, the Pearl River map turtle was regarded as a variant of the Alabama map turtle, *G. pulchra*, following which it was categorized as a variant of the Pascagoula map turtle, *G. gibbonsi*, until 2010 when it was officially described as a separate species, *G. pearlensis*.

Primarily carnivorous, the Pearl River map turtle favors habitats with an abundance food items such as bivalves (mollusks such as

clams and mussels) and gastropods (snails and slugs). The species favors habitats with ample basking spots and sand bars for nesting.

Graptemys pseudogeographica, false map turtle (two subspecies)

False map turtle (subspecies unknown). Photo 2013 by Dawson. Source: Creative Commons; license: CC-BY-SA 2.0.

Widely distributed from the Mississippi and Missouri river systems in Illinois, Indiana, Minnesota, Wisconsin, and the Dakotas in the northern United States, the false map turtle ranges southward into Alabama, Mississippi, Louisiana, and Texas.
This large map turtle species prefers large rivers and creeks with moderately swift currents, but avoids lakes, ponds and smaller streams. Abundant basking spots are important to this species which is devoted to both solitary and communal basking.

***G. p. kohnii,* Mississippi map turtle |** The name "Mississippi" in its name refers to the presence of this map turtle in the Mississippi River and its tributaries instead of in the state of Mississippi.
The subspecies trinomial *kohnii* was given in honor of amateur naturalist Joseph Gustave Kohn (1837–1906), who collected the type specimen.

***G. p. pseudogeographica*, false map turtle |** This map turtle is known as a nominotypical subspecies. In zoology and botany, nominotypical is defined as the repetition of the species name as the subspecies, indicating that it is the originally described species.

Graptemys pulchra, Alabama map turtle

Alabama map turtle. Photo by LordNatonstan. Public domain.

Found in the Mobile Bay drainage system, and Alabama, Florida, and Georgia, the Alabama map turtle prefers swiftly-flowing waterways in secluded habitats.

Its species name derives from the Latin root word *pulchr -,* meaning beautiful.

The male Alabama map turtles are much smaller overall than the females, as is typical in *Graptemys* species. Females have large, powerful jaws capable of crushing the shells of mollusks, and prefer the introduced Asian clam, *Corbicula manilensis* to other local food items. Males, with their much smaller heads and jaws, feed primarily on insects.

The Alabama map turtle is sympatric with two other *Graptemys* species, the black-knobbed map turtle, *G. nigrinoda,* and the northern map turtle, G. *geographica.*

Graptemys versa, Texas map turtle

Texas map turtle. Photo © Carl J. Franklin. Source: texasturtles.com. Reprinted with permission.

Having one of the smallest ranges of all *Graptemys* species, the Texas map turtle is endemic to the Edwards Plateau in central Texas, where it occurs only in the Colorado River drainage.

A small, mesocephalic (i.e., a medium-sized head) map turtle species, the adult male Texas map turtle may be only 4.5 inches (11.5 centimeters) in carapace length. DNA research places the Texas map turtle in the false map turtle clade.

Feeding on mollusks, insects, carrion, and aquatic vegetation, the male *G. versa* primarily consumes insects, snails, and other soft-bodied aquatic invertebrates, while the female Texas map turtle ingests hard-shelled mollusks, crushing the prey with their larger, stronger jaws.

G. versa is listed as CITES Appendix III because of the threat of exploitation by the pet trade, among other threats. Fortunately, Texas map turtles occur more frequently on privately-held land than on public land, offering some protection from widespread collection for the pet trade.

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Arkansas Curtails Commercial Trapping of Wild Turtles, Orders Study

Protections Limit Some Killing, But Stronger Rules Needed—*Center for Biological Diversity press release*

Little Rock, Arkansas—15 November 2018—In response to a petition from the Center for Biological Diversity and Arkansas-based environmental organizations, the Arkansas Game and Fish Commission today unanimously adopted regulations to restrict commercial trapping of wild freshwater turtles and study the effect of commercial trapping on wild populations.
The new regulations ban commercial harvest of all turtles in the Gulf Coastal Plain and the St. Francis River in Greene and Clay counties. They also ban the harvest of razorback musk turtles statewide.

Razorback musk turtle. Photo by Grover Brown. Reprinted with permission.

The regulations also create new reporting requirements for commercial dealers and trappers, which are intended to ensure more accurate self-reporting of the number and size of turtles trapped.

The commission will conduct a three-year study from 2019 to 2021 to determine the effect of commercial trapping on wild turtle populations in the Delta region, where the majority of trapping occurs. During the study period, the sale of commercial turtle harvest and dealer permits will be capped at 150 permits per year.

"Arkansas is making progress by limiting unsustainable commercial turtle trapping and looking at impacts on wild populations, but stronger protections are badly needed," said Elise Bennett, a Center attorney dedicated to protecting rare reptiles and amphibians. "A ban on trapping is vital for ensuring a future for Arkansas's wild turtles. The new regulations are a step in the right direction."

Before the new regulations, trappers could legally collect unlimited numbers of 14 types of turtles from roughly half the state to sell domestically or export to foreign food, pet and medicinal markets. The new regulations would still allow commercial collection of 13 types of turtles, but with additional geographic limitations.

"It's great that our native turtle species will have more protections from the dangers of commercial harvesting and that Arkansas will soon have a study of our own native populations," said Debbie Doss, director of the Arkansas Watertrails Partnership. "Studies from surrounding states have shown how sensitive these animals are to any reduction in numbers. It is my hope that this study will lead to better and more informed protections in the future. I am grateful to all who commented in favor of the new rules. Arkansans clearly love their turtles!"

"Turtle harvesting has proven to be a universally unsustainable practice, and Arkansas is no exception," said John Kelly, a biologist and teacher who completed his masters' study on Arkansas's turtle populations. "The Natural State has the choice to reverse the harmful and permanent impacts harvesting has had on freshwater turtles and the beautiful rivers and wetlands they live in, but it needs to do so quickly and decisively. The new regulations get us moving in the right direction."

Scientists have repeatedly documented that freshwater turtles cannot sustain any significant level of wild collection without population-level impacts and declines. One study of common snapping turtles demonstrated that a modest harvest of 10 percent per year for 15 years could result in a 50 percent reduction in population size. And an Arkansas study found that turtles from populations in heavily harvested areas were significantly smaller than those from areas where harvesting is not permitted.

Conservative records show that more than 1.3 million wild turtles have been harvested from Arkansas's waters over the past 13 years. Most of these were large, reproductively mature turtles important to the survival of wild populations.

A growing number of states have already dedicated themselves to protecting wild turtles. In February Missouri banned commercial turtle trapping, and in August Texas followed suit. In 2017 New York ended commercial trapping of diamondback turtles, Nevada halted commercial reptile collection, and Iowa reined in trapping with new harvest limits. In the past decade, Florida and Alabama have completely banned commercial turtle trapping, and Georgia and Mississippi have approved stronger regulations on the industry.

The petition to end unlimited wild turtle trapping in Arkansas was submitted by the Center for Biological Diversity, Arkansas Sierra Club, Arkansas Watertrails Partnership, Audubon Society of Central Arkansas, Environmental Resources Center, Kory Roberts and John Kelly, a biologist who recently studied Arkansas's turtle harvest. In October the commission voted to deny the petition to ban commercial turtle trapping but proposed the regulations that were adopted today.

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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**

Carl Ernst RIP
Renowned turtle biologist and author Carl Ernst passed away on Saturday, November 3, 2018 at the age of 80.

Tortoise Tombstones
Why some ancient Chinese gravestones are tortoise shaped.

Learning From Lonesome George's Genes
Giant tortoise DNA tell us new things about cancer and aging.

Indian Ocean Tortoise Alliance
New Seychelles-anchored non-profit organization dedicated to the conservation of the Aldabra giant tortoise.

Climate Change and Nevada's Desert Tortoises
The Department of Defense is funding a study of climate change impacts to Nevada's desert tortoises.

Perth Zoo's Stolen Radiated Tortoises Returned
The last two of the three radiated tortoises stolen from the Perth Zoo in 2011 have been recovered.

Canberra's Turtles Could Help Solve Invasive Carp Problem
Australian scientists hope that eastern long-neck turtles will help clean up carp carcasses as they endeavor to eliminate the invasive fish.

Indian Government Seeks to Close Kachhua Wildlife Sanctuary on the Ganges River
The Kachhua Wildlife Sanctuary was established in part to conserve the Indian softshell turtle, *Nilssonia gangetica* which scavenges on half burnt human corpses that are dumped in the river and help keep the river clean. Now, the President of India wants to dredge the sanctuary.

Giant Amazon River Turtle Recovering
Local Brazilian action and a team from the University of East Anglia are successfully conserving giant South American river turtles.

***Rafetus swinhoei* Recovery Plan**
Hanoi City has released a plan to conserve the two known critically endangered Hoan Kiem (Sword Lake) turtles.

USA Drags Its Feet Over Pearl River and Pascagoula Map Turtles
Conservationists have filed a notice of intent to sue the administration over its failure to complete the required "12 month" status review triggered by a petition submitted 7 years ago to list sawbacks as endangered species.

Cold-stunned Olive Ridley Sea Turtles Washing Up in Oregon
At least two female olive ridley sea turtles washed ashore along the Oregon coast in early December, according to the Oregon Coast Aquarium.

Warming Beaches Threaten Hawksbill Turtles
Florida scientists warn that climate change will cause sand temperatures to rise enough to damage eggs, increased rainfall could suffocate the embryos, and cause nests to cave in.

Marine Turtle Newsletter
The latest issue covers the gamut from sleeping loggerheads to Brazilian hybrids.

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Lawsuit Launched Over Federal Failure to Protect Turtles in Louisiana, Mississippi

New Orleans, Louisiana—13 November 2018—The Center for Biological Diversity today filed a formal notice of intent to sue the Trump administration for failing to protect two species of map turtles under the Endangered Species Act.

The Pascagoula and Pearl River map turtles (*Graptemys gibbonsi* and *G. pearlensis*) are found only in Louisiana and Mississippi. The Center and other groups petitioned to protect them in 2010.

"We could lose these ancient species to extinction if the Fish and Wildlife Service doesn't act quickly to protect them," said Jason Totoiu, a senior attorney at the Center. "Turtles are so important to the health of local rivers. The Trump administration has a duty to save these animals."

These turtles are threatened by habitat loss and degradation from dams, floodplain clearing and river channelization. A proposed dam in Rankin and Hinds counties, Mississippi threatens the Pearl River map turtle because it would transform the natural river ecosystem into a large lake. The dam would destroy important habitats and possibly drive the species extinct in the area.

Map turtles serve as indicators of river health since they are sensitive to poor water quality, which can devastate their populations. Other threats include harvest of turtles for sale in Asian food and medicinal markets and collection for the pet trade.

At the time of the petition, the Pearl River and Pascagoula River populations of the Pascagoula map turtle were considered to be a single species, but a scientific study determined the two populations are distinct.

The Fish and Wildlife Service should have issued the decision in 2011. At least 46 species of plants and animals having gone extinct waiting for protection since the Endangered Species Act was passed in 1973.

"Protecting and recovering these turtles under the Endangered Species Act will save them from extinction and help preserve two rivers tied to this region's rich culture and heritage," Totoiu said.

—Center for Biological Diversity press release

Introducing the Eastern Santa Cruz Tortoise, *Chelonoidis donfaustoi*

Eastern Santa Cruz Tortoise, *Chelonoidis donfaustoi*. Photo © 2014 by aposematic herpetologist. Source: Creative Commons; license CC-BY-SA-2.0.

- Formerly the entire population of tortoises on Santa Cruz Island was classified as a single species, *Chelonoidis porteri*; now two species are recognized on Santa Cruz Island, the Western population, *C. porteri*, and the Eastern population, *C. donfaustoi*.
- *C. donfaustoi* inhabits a relatively arid portion of eastern Santa Cruz Island known as Cerro Fatal (rough translation: "fatal hill"), estimated to be at least 15.4 miles^2 (40 kilometers^2) in size.
- The Eastern Santa Cruz Tortoise evolved less than 500,000 years ago, as compared with the Western Santa Cruz Tortoise, which inhabits an area known as La Reserva, that evolved some 1.74 million years ago.
- DNA analysis revealed that the Eastern population is more closely related to Galápagos tortoise populations on other islands (specifically Española, Pinta, and San Cristobal Islands) than to the Western Santa Cruz population.
- The Eastern Santa Cruz Tortoise was named in honor of Galápagos National Park ranger Fausto Llerena Sánchez, known as "Don Fausto," who spent over 40 years caring for endangered tortoises in captivity.

Galápagos Islands News

Results from the First-Ever Census of the Eastern Santa Cruz Tortoise

– Galápagos National Park Directorate press release

1 December 2018—The Galápagos National Park Directorate and Galápagos Conservancy recently carried out the first comprehensive census of the Eastern Santa Cruz Giant Tortoise (*Chelonoidis donfaustoi*) as part of the Giant Tortoise Restoration Initiative (GTRI) in order to determine the status and range of this species and identify any threats. These activities will inform the development of management actions to ensure the conservation of this species.

In October and November of this year, 40 Galápagos National Park rangers, scientists from Galapagos Conservancy, and technicians from the Tortoise Movement Ecology Program completed the census over 18 days total. They covered an area of 80 sq kilometers (19,768 acres), both within the Galápagos National Park and on private property adjacent to the Park.

The Eastern Santa Cruz Giant Tortoise was listed as a new species in October 2015. This census resulted in a population estimate of 500 tortoises, with many juveniles, based on a preliminary analysis. This is about 100 more than the previous estimate (used for the recent listing of the species on the IUCN Red List of Threatened Species). Galápagos Conservancy's Washington (Wacho) Tapia, Director of the GTRI, indicated that two nesting zones were located within the range of this species. The primary nesting area is located at Cerro El Fatal.

"This census included locating all individuals and marking them with a microchip, analyzing the population structure (number of males, females, and juveniles), defining the geographic range, threats facing the population, reproductive success, and other aspects of the population. This will aid the Galápagos National Park in adopting management measures to conserve the species," said Tapia.

A total of 403 tortoises were located during the census. The survey teams also collected scat samples as part of a broader tortoise diet study throughout Galápagos. A gratifying aspect for park rangers and scientists was finding many juvenile tortoises between two and ten years old, all in very good condition despite the extreme drought currently in the area where the juveniles live.

Jorge Carrión, Director of the Galápagos National Park, added that "we are collecting and incubating eggs and raising young tortoises of this species in the Fausto Llerena Tortoise Center, which will ensure the entry of even more juveniles into the population."

The park rangers and scientists who participated in the census also conducted control of fire ants (*Solenopsis geminata*) in the area. This invasive species is a voracious predator of tortoise eggs and hatchlings.

The technicians estimate that the information collected will help them develop management measures to protect the species and help increase its population. This includes improving interactions with farmers, as the tortoises represent an important resource for nature tourism in the area. The goal is to ensure that the tortoises maintain their normal behavior in the most natural conditions possible, even when in farmland.

Content based on a press release from the GNPD, translated with their permission.

the Turtle's Garden
planting for chelonians
by M A Cohen

Carnation (*Dianthus caryophyllus*)

A bicolored, double-flowering cultivar of carnation. Photo © 2012 by Kenraiz. Source: Creative Commons; license: CC-BY-SA-3.0.

The genus *Dianthus* comprises some 300 species and numerous hybrids, including many species of pinks and sweet William. The carnation, *Dianthus caryophyllus*, is a perennial that originated in Asia and Europe; it is also known by the common name 'clove pink' because of its distinctive sweet fragrance that is reminiscent of the spice clove. Another common name, border carnation, refers to its usefulness in bedding and border plantings.

Carnations belong to the Caryophyllaceae family, commonly called the pink family or the carnation family, which contains over 2,000 species and 88 genera, and includes annual, biennial, and perennial species, as well as hundreds of hybrid varieties.

The genus name, *Dianthus*, derives from two Greek root words: *dio-*, meaning divine or noble, and *-anthus*, meaning a flower.

Cultivated by humans for at least 2,000 years, carnations are used for landscaping and cut flowers, as well as for their culinary and medicinal qualities. The carnation attracts beneficial insects to the garden, and is pollinated by butterflies and moths.

Description

D. caryophyllus is an herbaceous, evergreen, flowering perennial that ranges from 10 inches to 30+ inches (25 centimeters to 1 meter) inches in height, with most modern plants ranging from 10 to 20 inches (25 to 51 centimeters).

Forming grass-like mats or tufts, the carnation has narrow leaves that are typically blue-green to gray-green in color and 4 to 6 inches (10 to 15 centimeters) in length. Stems of the mature plant become woody at the base with herbaceous branches.

The species ("original") carnation blossom has five petals with serrated edges and is pink in color. Cultivar blossom colors include white as well as shades of yellow, pink, orange, red, and purple, and many bicolor combinations. Flower forms include single, semi-double, and double-flowering varieties. The diameter of the flowers ranges from 3.5 to 6 inches (9 to 15 centimeters).

Cultivation

Thriving in full sun in all but the hottest areas, carnations require a minimum of five hours of sun daily. Well-drained soil and abundant air circulation are both important for best plant growth and health.

Ideally, soil should have ample organic matter, which adds to the soil's fertility as the soil microorganisms break down the organic matter. A neutral to slightly alkaline soil pH encourages successful growth and flowering.

Moderate but regular watering is needed for best growth. Overwatering promotes the development of fungal diseases. To avoid airborne (mildew and rust) and soil-borne (fusarium wilt) fungal diseases, these techniques are recommended: (1) water carnations only at the base of the plant to keep the foliage dry, and (2) water early in the day so the plants dry off before nightfall.

At the time of planting, position the plant at the same height it grew in the container. Enrich the soil with a balanced granular fertilizer (one that has the same proportions of nitrogen, phosphorus, and potassium). Replenish the fertilizer at intervals during the growing season. For an abundance of large flowers, choose a fertilizer with a high percentage of phosphorus, to promote the development of flower buds.

Carnation bloom is most prolific throughout late spring and summer. Deadheading, the removal of spent flowers, prolongs flower production. Cut back the entire plant in late winter or early spring to encourage fresh growth.

Propagation methods for carnations include seeds, tip cuttings, division, and layering.

Edibility and Medicinal Uses

Carnation blossoms are generally used for culinary purposes and in traditional medicines. As with any new plant, it is wise to introduce a *small* quantity when first preparing food for people or pets. Offer a small serving and watch carefully for any reaction.

When preparing foods for people, the petals of the carnation blossom are commonly used. Removal of

the white base of the petal is recommended, as most people find its bitterness unpleasant.

Petals can garnish a plate, and are often added to salads, especially fruit salads. Carnation petals can be candied or substituted for rose petals in syrups. These petals can also be used to flavor beverages such as wine and beer.

Because many tortoises appear to enjoy the flavor humans perceive as bitter, there is no necessity to remove the base of the petals before offering them to tortoises. Use caution when introducing any new food—offer a few petals and observe the reaction.

Medicinally, the carnation has many traditional and homeopathic uses in teas, tonics, oils, infusions, and so on. It is beyond the scope of this column to describe such uses in detail.

With their sweet and spicy aromatic qualities, the dried flowers of the carnation can be distilled to make essential oils, and added to potpourri and scented sachets.

Carnation buds and blossoms. Public domain.

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Meetings and Programs

Click on your Chapter's website link for the latest program information. Programs may be scheduled after newsletter publication.

Chino Valley
18 January; 15 February

Foothill
25 January; 22 February

High Desert
14 January; 11 February

Inland Empire
4 January; 1 February

Kern County
No regular meeting in January; 11 February

Low Desert
4 February

Orange County
11 January; 8 February

Ridgecrest
14 January; 11 February

Santa Barbara-Ventura
Contact the chapter for meeting information.

Santa Clarita
19 January: Dr. Michael Tuma, Desert Tortoise Council

TOOSLO (San Luis Obispo)
9 January; 13 February

TTCS (Long Beach)
18 January; 15 February

Valley
18 January; 15 February

Executive Board
12 January. Meetings take place at the Los Angeles County Arboretum in Arcadia, CA.

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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2019 California Turtle & Tortoise Club Directory

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General Information:
CTTCEBOfficers@tortoise.org
Chair: **Don Williams**
Vice-chair: **Robyn Kohr**
Secretary: **Richard Roosman**
Treasurer: **Javier Gonzalez**
Meeting: quarterly (January, April, July and October) at 10 AM at the Los Angeles County Arboretum, 301 No. Baldwin Avenue, Arcadia, CA 91007

Chino Valley Chapter
President: **Jim Misiak**
Vice president: **David Bowman**
Secretary/treasurer/adoptions:
Lynda Misiak
Meeting: Third Friday, 7:30 PM at Chino Girl Scout House, 5007 Center Street, Chino, CA 91710

Foothill Chapter
President: **Robin Robb**
Vice president: **Joanna Bolt**
Secretary: **Mardy Graves**
Treasurer/membership:
Jeanette Lea
Meeting: Fourth Friday, 7:30 PM at Los Angeles County Arboretum, 301 No. Baldwin Avenue, Arcadia, CA 91007

High Desert Chapter
President/adoptions: **Dave Zantiny**
Secretary/adoptions: **Mary Dutro**
Meeting: Second Monday, 7:00 PM at Sterling Inn Regency Room, 17738 Francesca Road, Victorville, CA 92395

Inland Empire Chapter
President: **Monica Dirac**
Vice president: **Richard Roosman**
Corresponding Secretary:
Amy Taylor
Treasurer: **Robyn Kohr**
Meeting: First Friday, 7:30 PM at "The Ark" Church of the Nazarenes in the Fellowship Hall in Young Hall, 1307 East Citrus Avenue, Redlands, CA 92374

Kern County Chapter
General Information:
TurtleTortoiseClubKern@gmail.com
President/membership:
Heather Ponek
Vice president: **Tim Brennan**
Secretary: **Lisa Marriott-Smith**
Treasurer: **Kathy Studer**
Adoptions:
Richard Marriott-Smith
Meeting: Second Monday, 6:30 PM at St. Philip of the Apostle Church, St. Ann's Room (east side of church), 7100 Stockdale Hwy (on the north side, between Ashe and Gosford), Bakersfield, CA 93309

Low Desert Chapter
General Information:
Tony Vaninetti
Secretary: **Marlies Dietrich**
Adoptions: **Bill Powers**
Meeting: First Monday of every even-numbered month 7:00 PM at The Living Desert Reserve, 47–900 Portola, Palm Desert, CA 92260–6156

Orange County Chapter
General Information:
orangecounty@tortoise.org
President/membership:
Stephanie Roberts
Vice president: **Richard Montagna**
Secretary: **Joyce Keyak**
Treasurer: **Marian Bronston**
Meeting: Second Friday, 7:30 PM at Grand Street Center (First Presbyterian Church), 146 N. Grand Street, Orange, CA 92866

Ridgecrest Chapter
President: **Robert Parker**
Vice president: **Sue Parker**
Adoptions: **Montynne Yates**
Meeting: Second Monday, 7:30 PM at Maturango Museum, 100 East Las Flores Ave., Ridgecrest, CA 93555

Santa Barbara-Ventura Chapter
President: **Don Williams**
Adoptions: **Wes Shipway**
Meeting: Contact the Chapter for meeting information.

Santa Clarita Chapter
President: **George Ordway**
Secretary: **Jennifer Fields**
Treasurer/membership/adoptions:
Abigail DeSesa
Meeting: Third Saturday of odd-numbered months at 6:30 PM at Valencia United Methodist Church, 25718 McBean Pkwy, Valencia, California 91355

TOOSLO (San Luis Obispo) Chapter
President: **Brandon Froelicher**
Vice president: **Brian Kusko**
Treasurer/membership/adoptions:
Lola McAulay
Meeting: Second Wednesday, 7:00 PM at PG&E Community Center, 6588 Ontario Road, San Luis Obispo, CA 94505

Turtle & Tortoise Care Society (Long Beach) Chapter
President: **Richard Roosman**
Vice president: **John Kim**
Secretary/Membership:
Anita De Leon
Treasurer: **John Wong**
Meeting: Third Friday, 7:30 PM at University Baptist Church, 3434 Chatwin, Long Beach, CA 90808–2613

Valley Chapter
President: **Bob Hazard**
Treasurer: **Karen Berry**
Adoptions: **Valley Adoption Team**
Meeting: Third Friday, 7:30 PM at Woodland Hills Christian Church, 5920 Shoup Ave., Woodland Hills, CA 91367–3327

NOTE: The postal mailing addresses for each Chapter are listed on the last page of this newsletter.

Critical Habitat Proposed for Endangered Arizona Mud Turtle

Tucson, Arizona—4 December 2018— The U.S. Fish and Wildlife Service today proposed critical habitat for the endangered Sonoyta mud turtle (*Kinosternon sonoriense longifemorale*). These highly aquatic turtles are found only in Pima County, Ariz. and Sonora, Mexico.

"These turtles have been pushed to the brink as their aquatic habitats were degraded and destroyed, so this is a crucial step," said Jenny Loda, a Center for Biological Diversity biologist and attorney who focuses on protecting rare amphibians and reptiles. "I'm so happy to see the Fish and Wildlife Service moving forward with protections for these little guys."

Sonoyta mud turtle (*Kinosternon sonoriense longifemorale*). Photo by the National Park Service. Reprinted with permission.

The proposed critical habitat consists of 12.3 acres in the Rio Sonoyta watershed of Organ Pipe Cactus National Monument in Pima County. This area is currently occupied by the only known population of Sonoyta mud turtles in the United States.

With webbed feet and an innate ability to swim, the Sonoyta mud turtle has evolved to be highly aquatic in one of the driest parts of the Sonoran Desert. Diversion of surface water and pumping of groundwater have led to the loss of much of the watery habitat the turtle needs to survive.

The turtle's habitat loss has been worsened by drought conditions that have persisted for the past 20 years. Long stretches of dry streams have isolated populations of the turtles, limiting opportunities for migration.

Legal action by the Center forced the Fish and Wildlife Service to protect the Sonoyta mud turtle under the Endangered Species Act, which led to today's habitat proposal.

"With only one population in the U.S., the Sonoyta mud turtle is extremely vulnerable, especially as dry conditions worsen with climate change," said Loda. "Protection under the Endangered Species Act are our best hope to save them. The Act has a nearly perfect record of preventing plants and animals from going extinct."

Four populations are also currently known in Mexico, but the loss of the turtle has already been reported from an additional site. At all of these sites, the number of turtles has declined as aquatic habitat has been reduced.

The public has 60 days to comment on today's proposed critical habitat.

—Center for Biological Diversity press release

What is Critical Habitat?

"When a species is proposed for listing as endangered or threatened under the Endangered Species Act, the U.S. Fish and Wildlife Service must consider whether there are areas of habitat believed to be essential the species' conservation. Those areas may be proposed for designation as "critical habitat." Critical habitat is a term defined and used in the Act. It is a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection."
Source: **https://ecos.fws.gov/ecp/report/table/critical-habitat.html**

Ciénega Creek, in the Ciénega Creek Natural Preserve (CCNP), is located in the Sonoran Desert in eastern Pima County, Arizona. The CCNP includes some 4,000 acres (1,619 hectares), and Ciénega Creek is one of the few riparian habitats in which the Sonoyta mud turtle resides. In the United States, this turtle species is found only in Pima County.

Found only in the American Southwest, a ciénega is a wetland area in an otherwise arid region. In a ciénega, geomorphological forces propel ground water to the surface of the land over a wide area. A ciénega provides conditions that promote exceptional biodiversity within an ecosystem.

Additional information about the CCNP is available on the Northern Arizona University's **Arizona Heritage Waters website**.

Photo © 2014 by $1LENCE D00600D. Source: Creative Commons; license CC-BY-SA-3.0.

Turtle Park (aka Turtle Playground)

In St. Louis, Missouri there is a sculpture park located in southern Forest Park (near the Tamm Avenue overpass of I-64/US 40) that is dedicated to the seven species of turtle native to Missouri. There are three giant concrete turtles and four large concrete turtles, sculptures ranging from seven to 40 feet in length, and all are suitable for climbing.

According to the **Forest Park Statues and Monuments website**, "represented in concrete are a snapping turtle, a soft-shelled turtle, a red-eared slider, a Mississippi map [turtle], three box turtles and a stinkpot turtle. In addition to the turtles, there are seven oversized turtle eggs, three of which include hatching baby turtles, and a long sinuous snake that appears to be taking a bite out of the [Tamm Avenue] overpass."

The giant sculptures are truly enormous! For example, the largest of the sculptures, a snapping turtle, is 40 feet long, and it was built with 120,000 pounds of concrete.

The soft-shelled turtle sculpture in Turtle Park. Photo © 2013 by Paul Sableman. Source: Creative Commons; license: CC-BY-2.0.

St. Louis philanthropist Sonya "Sunny" Glassberg donated the funds to develop the sculpture park. The playground was designed by Richard Claybour and St. Louis sculptor Robert Cassilly created the turtle sculptures. The three giant turtle sculptures represent Ms. Glassberg's children, and the four large turtle sculptures, her grandchildren. ◈

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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 below).

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**

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

Inland Empire Chapter: P.O. Box 2371, San Bernardino, CA 92406-2371

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 14222, San Luis Obispo, CA 93406

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

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