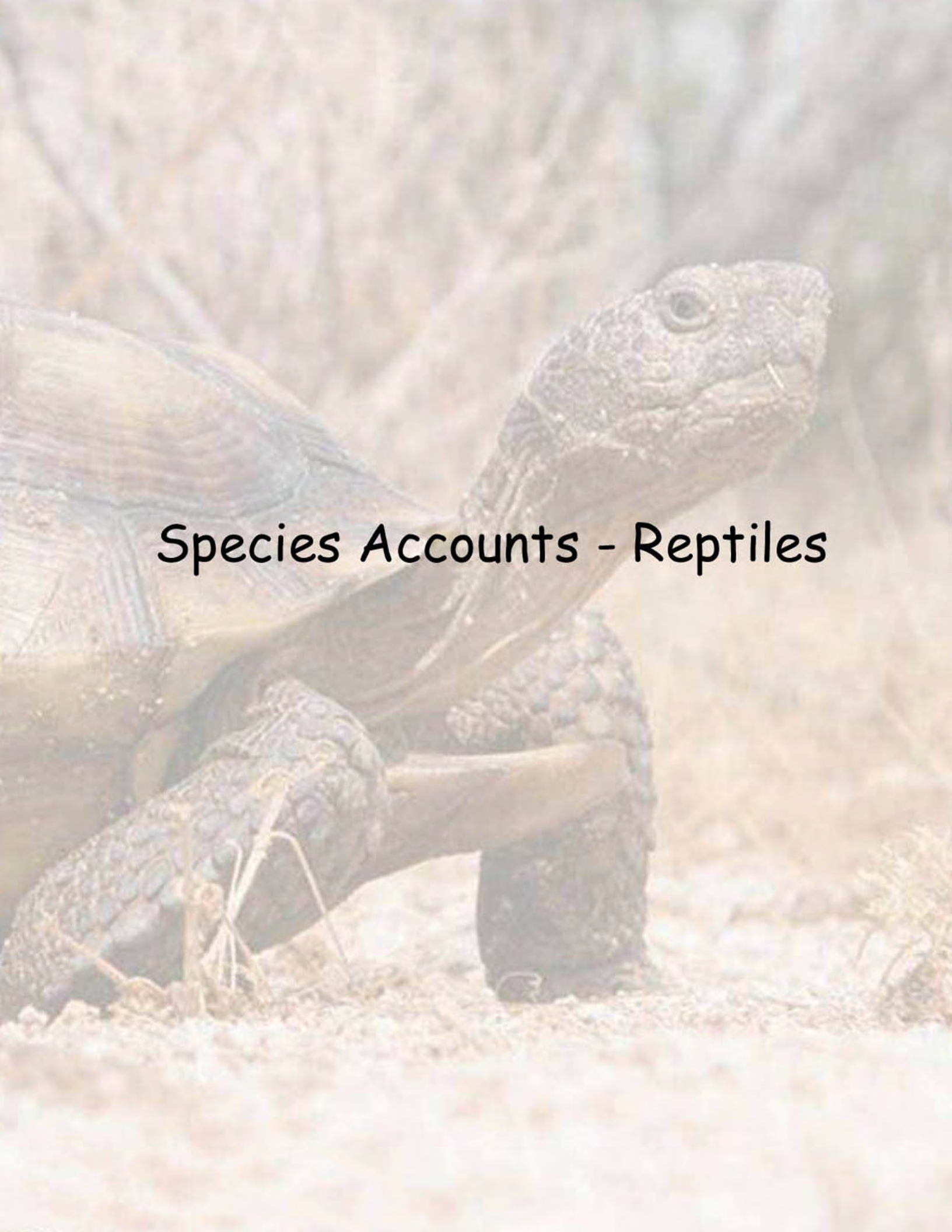
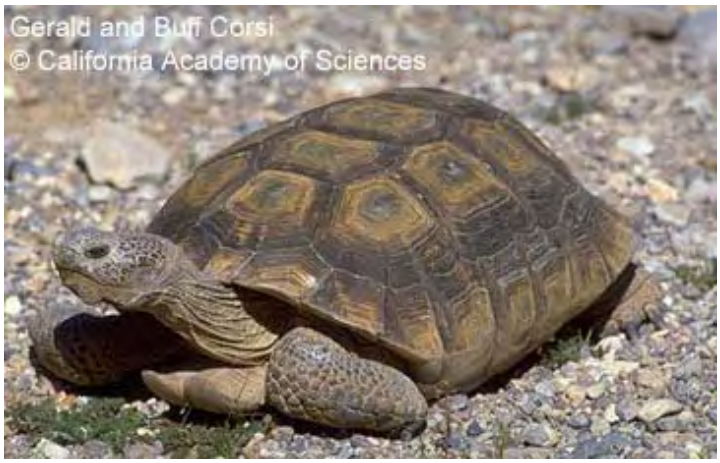


Species Accounts - Reptiles

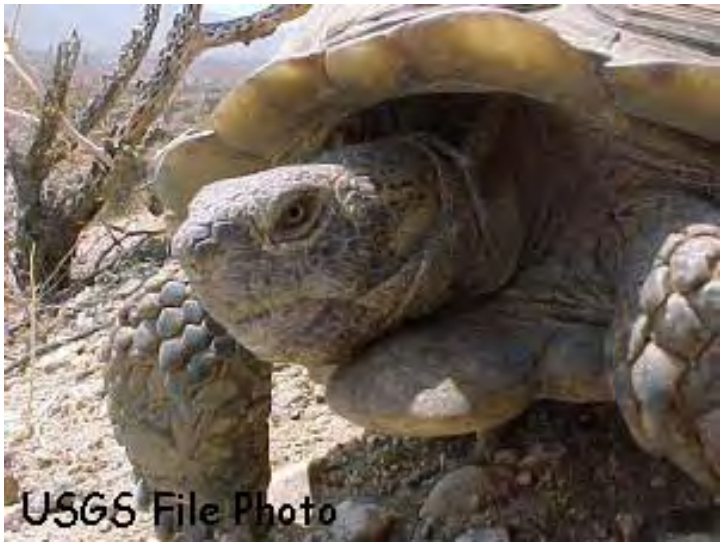
Desert tortoise *Gopherus agassizii*

State:	Threatened	1989
Federal:	Threatened	1990



General Habitat:

The desert tortoise inhabits river washes, rocky hillsides, and flat desert having sandy or gravelly soil. Creosote bush, burrobush, saltbush, Joshua tree, Mojave yucca and cacti are often present in the habitat along with other shrubs, grasses, and wildflowers. The desert tortoise ranges from southern Nevada and extreme southwestern Utah south through southeastern California and southwestern Arizona into northern Mexico. In California, desert tortoises occur in northeastern Los Angeles, eastern Kern, and southeastern Inyo counties, and over most of San Bernardino, Riverside, and Imperial counties.



Description:

The desert tortoise is a medium-sized tortoise with an adult shell (carapace) length of about eight to 14 inches. Males, on average, are larger than females and are distinguished by having a concave lower shell, longer shell segments under the chin, larger chin glands on each side of the lower jaw, and a longer tail. Shell color varies from light yellow-brown (horn color) to dark grey-brown. A composite of features often is necessary to distinguish the desert tortoise from the other species of gopher tortoises, but its most unique feature is its very large hind feet.

Status:

The desert tortoise is severely threatened by population losses due to disease, human-caused impacts, and the cumulative effects of habitat loss, degradation, and fragmentation from construction, urbanization, and development. An upper respiratory tract disease (URTD) has appeared in many parts of the desert tortoise's range; the most severe outbreaks have occurred in California's west Mojave Desert where long-term study plots have found population declines of up to 90 percent. URTD is of the greatest immediate concern because of its potential to harm tortoise populations on a global scale. The DFG, DOD, USFWS, BRD, and BLM are coordinating research on this disease. Veterinarians from the DFG, UCD, the University of Florida, and private practitioners

are also involved in the effort. People who release sick captive tortoises back into the wild may actually facilitate the spread of this disease. Other tortoise diseases have shown up in several parts of the Southern California deserts. Shell diseases, first found in tortoise populations in the Chuckwalla Bench area of the Colorado Desert, have been found in tortoise populations in other parts of the desert. The specific causes have not been identified but appear to have resulted in population declines of more than 50 percent.

Habitat degradation has occurred, due to a combination of human-related activities including livestock grazing, introduction of exotic plant species, energy and mineral development, and OHV use. In addition, illegal shooting and collecting has further reduced the tortoise population. Desert tortoise populations are extremely low in some areas and may no longer be viable. When population size is low, inbreeding becomes a potential problem. Smaller populations also are at an increased risk of extinction from catastrophic events such as fire and flooding, as well as from random variation in population parameters, for example, sex ratio and age class structure. Populations can also reach non-recoverable levels through fragmentation into smaller populations and increased mortality within these fragmented populations.

Cattle have been observed to step on burrows and cause their collapse, including burrows occupied by tortoises or used as nest sites. Certain key tortoise food plants may comprise over 40% of the cattle diet, and since cattle are larger and more mobile than tortoises, these plants may be severely depleted with heavy grazing. Research conducted by the USGS in the Whitewater Grazing Allotment in the Coachella Valley demonstrates that cattle can outcompete tortoises for key forage species. Cattle grazing in the Whitewater Hills tortoise habitat has also led to visible increases in soil destruction and increased erosion in some areas.

Urbanization and development of desert habitat poses a significant and increasing threat to the desert tortoise. The increase in housing, industrial, and commercial developments and corresponding transportation corridors has altered the quality of desert tortoise habitat and led to its fragmentation. Many tortoises fall victim to road kills. One survey found 115 tortoise carcasses along 18 miles of highway in the west Mojave Desert. This figure represented a conservative estimate of tortoise mortality per mile per year and could not be applied to all roads and highways due to variation in traffic volume, speed, and sizes of tortoise populations near roads. An increase in the number of roads exposes a larger portion of the desert tortoise population to routine traffic and illegal OHV activity. The numbers of common raven, which prey on juvenile tortoises, have increased with expanding human development and the proliferation of roads in the region. According to the USGS, the common raven has increased in numbers by 1,500 percent in the western Mojave Desert over the last several decades. However, a long-term assessment of raven predation throughout the entire range of the desert tortoise has not been conducted.

Another threat related to human development in the desert is the proliferation of non-native grasses, such as red brome, cheatgrass, and Mediterranean grass. Grazing, OHV use, and other types of ground disturbance facilitate the spread of these grasses, which are adapted to disturbance and outcompete the native grasses and forbs that constitute food plants of the desert tortoise. Non-native plants often do not provide the levels of protein and nutrients needed by the desert tortoise, thereby adversely affecting tortoise health and reproduction. The decrease in the availability of nutritionally-important and preferred foods for the tortoise has likely decreased its ability to combat diseases and, very possibly, its immune responses to disease pathogens. The increase in grass cover between desert shrubs has been linked to increased fire frequency and fire intensity in the desert. Fires cause direct mortality when tortoises are burned or inhale lethal amounts of smoke, which can occur both in and out of burrows. Fire changes the composition of vegetation by facilitating the establishment of non-native grasses and removing forage plants. Fires also fragment tortoise habitat by creating patches of unsuitable habitat.

Desert tortoise populations are also threatened by military activities in the desert. Four major, active military installations occur within the West Mojave and comprise a total of 4,165 square miles: the Naval Air Weapons Station at China Lake, the Fort Irwin National Training Center, Edwards Air Force Base, and Marine Corp Air

Ground Combat Center near Twentynine Palms. Tank maneuvers damage vegetation, compact soil, create fugitive dust, and run over tortoise burrows and tortoises. The results are largely denuded habitat, and altered vegetation composition, abundance, and distribution. One study reported a significant reduction in tortoise densities (62-81 percent over six years) in active training areas of Fort Irwin and no change or increases in tortoise densities in areas with light and no military activity. The greatest adverse impact from military maneuvers at Fort Irwin was found in valley bottoms. A 250-square mile expansion of Fort Irwin has been proposed; 182 square miles of this proposed expansion are designated by the USFWS as desert tortoise critical habitat and could be subject to military field maneuvers.

A federal Recovery Plan, which is currently being updated, was completed in 1994, and USFWS has designated about six million acres as critical habitat, most of which is in California. The Recovery Plan will be implemented in California by a series of large-scale ecosystem management plans such as the Northern and Eastern Colorado Desert Coordinated Management Plan. The DFG is participating in multi-agency teams that are drafting these plans. The desert tortoise is addressed in several NCCPs and HCPs in California and other states, including the West Mojave Plan, the Coachella Valley MSHCP, and the California Energy Commission's Habitat and Species Protection Research Project.

The loss of habitat, mortality from increased traffic, reduced quality of habitat altered by human presence and activity, and fragmentation of populations pose a significant and increasing problem for the viability of tortoise populations within the Western Mojave Plan Area. For example, there are 13 county solid-waste landfills in the West Mojave Desert in addition to numerous unauthorized dumpsites. The greatest potential impact from landfills is their probable role in facilitating the increase in populations of predators such as common ravens, and perhaps coyotes. Ravens make extensive use of landfills for food and landfills probably support raven populations during the summer and winter when natural resources are low in abundance. As a result, large numbers of ravens are present during the tortoise breeding season from February to June. Predation on tortoises by ravens may increase as ravens disperse to nesting sites farther from landfills.

The Coachella Valley MSHCP Plan area supports a small, but significant population of desert tortoise. They are found along the northern, eastern and western rim of the Coachella Valley in the foothills of the Little San Bernardino Mountains, the Painted and Whitewater Hills, and in the San Jacinto and northern Santa Rosa Mountains. Tortoises in the foothills of the southeastern San Bernardino Mountains represent the westernmost reproductively active population of tortoises in the Colorado Desert ecosystem. Except for the northeastern most portion of the Plan area, the Coachella Valley was not included in the recovery plan for the desert tortoise. The MSHCP includes, however, all federally-designated critical habitat within the plan area as part of the Desert Tortoise and Linkage Conservation Area. Almost 500,000 acres of habitat (97%) will be conserved under the MSHCP. Threats to the desert tortoise in the Coachella Valley are similar to those found in the Mojave Desert: urbanization, OHV activity, road construction, and grazing. Cattle grazing in the Whitewater Hills has resulted in visible increases in soil destruction and erosion in some areas. A proliferation of non-native plants, including Saharan mustard, as a result of development and overgrazing could increase fire frequency and intensity. Respiratory and shell diseases have not been observed in tortoises in the Whitewater Hills or Painted Hills.

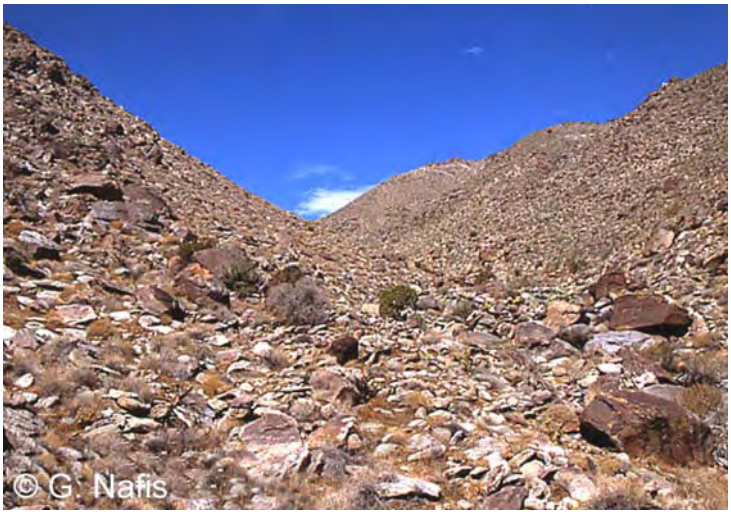
DFG is a member of the Desert Tortoise Management Oversight Group, which provides management guidance related to tortoise recovery throughout the Southwest and the Desert Managers Group (DMG). The DMG includes representatives of all of the major state and federal land management and wildlife regulatory agencies in the California Desert. It serves as a forum for these agencies to address and discuss issues of common concern. Through cooperative management each participating agency is contributing to the protection and recovery of the desert tortoise. The DFG also works closely with the Desert Tortoise Preserve Committee, a non-profit organization whose activities include acquisition of habitat for the desert tortoise and Mohave ground squirrel, creation and management of desert tortoise preserves, and education and outreach. DFG law enforcement activities continue to result in the seizure of tortoises possessed illegally and the removal of feral dogs from desert tortoise habitat.

The DFG acquired over 22,000 acres of desert tortoise habitat in 1986. Additional lands have subsequently been acquired through mitigation for projects within desert tortoise habitat. The DPR has also provided OHV Green Sticker funds to the DFG to solve the raven problem and provide public education.

The current status of the desert tortoise is *Declining*.

Barefoot banded gecko *Coleonyx switaki*

State Threatened 1980
Federal None



General Habitat:

The barefoot banded gecko is known only from eastern San Diego County and western Imperial County. Limited distribution records indicate that the gecko inhabits rocky, boulder-strewn desert foothills, where it spends most of its life deep in rock crevices and subterranean chambers where humidity is relatively higher then above ground.

Description:

The barefoot banded gecko is a medium-sized lizard, 2 to 3 inches long, with soft skin and fine, granular scales. Its large eyes have vertical pupils, and the grey-brown body has various black and white spots and bands that give it a striking appearance. These lizards store water in fatty tissues in their tails.

Status:

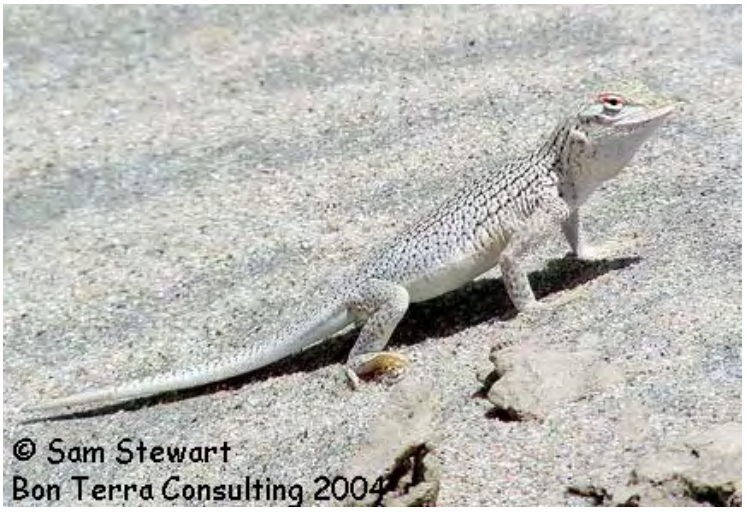
The barefoot banded gecko is reported from San Diego County to as far south as central Baja California, Mexico, and on San Marcos Island in the Gulf of California. The species has been identified in the desert foothills of the Peninsular Ranges in San Diego and Imperial Counties, and its range in southern California may be more extensive. The rarity of this species makes it susceptible to illegal collection by reptile hobbyists and commercial collectors. Habitat destruction by collectors is one of the principal threats to this species.

Anza-Borrego Desert State Park affords protection for some gecko habitat, and the DFG is involved with a federal habitat management plan for BLM land on which the gecko occurs. In November 2002, Anza-Borrego Foundation obtained an 18-month option to acquire 3,339 acres of pristine desert scrub, riparian woodland, and desert freshwater marsh habitat along Vallecito Creek adjacent to Anza-Borrego Desert State Park. Known as the Vallecito Ranch, the property includes portions of Vallecito Creek and Vallecito Cienaga and will protect habitat in Vallecito Valley for approximately 55 sensitive species, including the federally-listed Peninsular bighorn sheep and least Bell's vireo, and the barefoot banded gecko.

The most recent information on the barefoot banded gecko in the NDDB is from the 1970s. The current status the gecko is *Unknown*.

Coachella Valley fringe-toed lizard

Uma inornata



State	Endangered	1980
Federal	Threatened	1980

General Habitat:

This species is restricted to areas of fine, windblown sand deposits in the sandy plains, sand hummocks, and mesquite dunes of the Coachella Valley, Riverside County.

Description:

The Coachella Valley fringe-toed lizard is three to twelve inches long and has a flattened body with very fine scales. Its dorsal ground color and spotting patterns provide excellent camouflage. Its countersunk lower jaw, well-developed ear flaps, and toes fringed with long, pointed scales are all adaptations to the sandy habitat in which this lizard occurs.

Status:

Historically, the Coachella Valley fringe-toed lizard inhabited about 270 square miles of sand dune habitat in Coachella Valley, California. The sand dunes, often referred to as "blowsand" habitat, consist of fine sand that accumulates at the bottom of drainages during flood events and is transported across the Coachella Valley by high winds that continually blow through the area. Today, habitat for the lizard has been reduced to about 50 square miles, and only about 19 square miles of this land continues to receive the naturally occurring "blowsand" that is essential to the long-term survival of the lizard.

The Coachella Valley fringe-toed lizard is threatened by a continual loss of habitat from human activities and development that have eliminated the majority of its historic habitat. Invasive plants that stabilize the moving sand deposits, agricultural development, housing construction, mining activities, OHV use, and feral pets have had deleterious effects on the lizard and its habitat. The Coachella Valley fringe-toed lizard has also undergone genetic isolation from the closely-related Colorado Desert fringe-toed lizard. In 2001, researchers analyzed nine populations of the Coachella Valley lizards using mitochondrial DNA and found them to be nearly identical.

One of the largest remaining populations of the lizard is found within the Coachella Valley National Wildlife Refuge and Coachella Valley Fringe-toed Lizard Preserve. The 13,000-acre Coachella Valley National Wildlife Refuge was established by the USFWS in 1985 to protect the lizard. The Coachella Valley Fringe-toed Lizard Preserve (>20,000 acres), cooperatively managed by The Nature Conservancy, BLM, DPR, DFG, USFWS, and the Center for Natural Lands Management, encompasses additional of fringe-toed lizard habitat adjacent to the refuge. The Coachella Valley Preserve is a preserve system comprised of three separate dune systems, Thousand Palms, Willow Hole, and Whitewater River, each with separate sand sources, to ensure that adequate habitat is protected in the

event that one or two of the dune systems was destroyed. The largest of these units, at roughly 17,000 acres, is centered on Thousand Palms Canyon in the northern Coachella Valley between Palm Springs and Indio. This preserve ranges from near sea level at its southern extreme to over 1000 feet in the Indio Hills. Collectively, the preserves protect about 2% of the lizards' original range.

The Coachella Valley fringe-toed lizard is a covered species under the draft Coachella Valley MSHCP. Under the plan, the conservation strategy focuses on preserving existing populations of the lizard, maintaining habitat cores, monitoring, and adaptive management. The Proposed Conservation Areas include the most viable habitat known for the Coachella Valley fringe-toed lizard. In addition to preserving core habitat, habitat supporting smaller populations is protected in sand-source areas. Selection of core habitat was based on four criteria: 1) an area of sufficient size to support a viable population of lizards (selected as 5,000 to 10,000 individuals) independent of other cores; 2) an area not fragmented by development; 3) intact processes including a source of sand and a sand delivery system; and 4) a discrete source of sand. Implementation of the Coachella Valley MSHCP is expected to maintain and enhance population viability of the Coachella Valley fringe-toed lizard through preservation of unprotected portions of its habitat, potential habitat, and ecosystem processes for the aeolian sand system. A total of 13,806 acres of habitat will be conserved under the Coachella Valley MSHCP.

Core areas selected under the MSHCP include the Snow Creek-Windy Point Conservation Area, the Whitewater Floodplain Preserve, Willow Hole Preserve area, and Thousand Palms Preserve. Snow Creek-Windy Point will conserve approximately 1,243 acres of suitable habitat. Habitat includes aeolian sand sources from the Whitewater and San Gorgonia Rivers and their tributaries. The Whitewater Floodplain Preserve contains 5,586 acres of habitat and will conserve 5,278 acres. Sand for this area originates in the Whitewater River and its tributary, the San Gorgonio River. Sand is deposited in the floodplain west of the preserve and then blown onto and across the Conservation Area. Secondary sources are Mission Creek and Garnet Wash which augment sand in the eastern half of the Conservation Area.

The Coachella Valley fringe-toed lizard has been studied extensively at the 1,230-acre Whitewater Floodplain Preserve. Researchers initiated a long-term demographic study of the species in 1985. They constructed a 5.56 acre plot approximately midway along the east-west axis of the preserve and counted all lizards on the site between 1985 and 2000. From their data, they calculated a density of approximately 23 lizards per acre for the reserve. The population size at the study site dropped to 38 individuals (approximately 7 per acre; 8,400 for the reserve) during the severe drought from 1985-1990. A conservative estimate of lizards at the Preserve is approximately 12 individuals per acre or 14,342 lizards at the Preserve.

The Willow Hole Conservation Area will protect approximately 1, 754 acres of habitat, some of which is fragmented by roads including Palm Drive. This Conservation Area provides numerous habitat patches for the lizard and is supplied by three separate sand sources. The discrete patches offer safe sites for the lizard in the event that a population crashes at one or more patches although ultimately connecting these patches would benefit the species. The Thousand Palms Preserve and additional habitat within the Conservation Area encompass approximately 3,948 acres; 3,857 acres will be conserved within this area. The majority of sand in the Preserve originates in the Indio Hills and from floodwaters flowing through Thousand Palms Canyon. The preserve design protects both sand sources. The Indio Hills sand source is also enhanced by a flood control project that delivers sediment-laden materials to a settling area upwind of the Preserve.

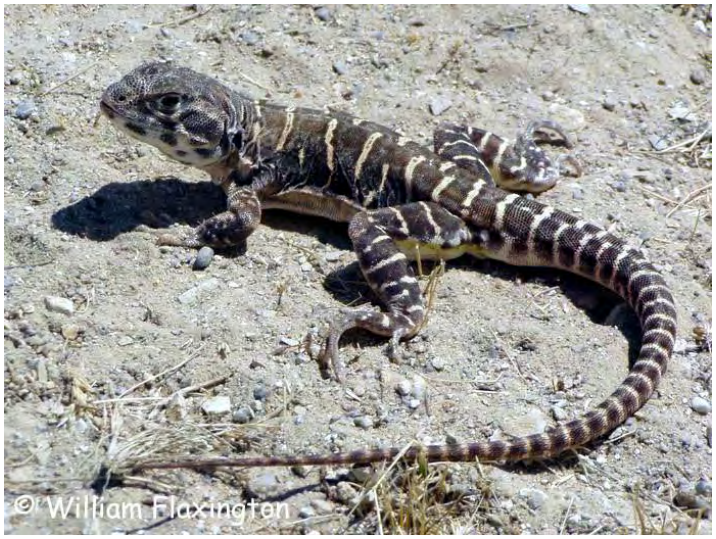
There are no long-term demographic studies within the Thousand Palms Preserve. However, a series of strip transects give relative abundance of the lizard. Data from these transects allowed for habitat quality distinctions with the best habitat labeled as primary (1°), lower quality habitat as secondary (2°), and all other areas as non-habitat. However, an earlier density estimate at the Preserve was nearly identical to the estimate of lizard density in primary habitat at the Preserve. Combining these calculations, the population size for primary habitat at the Preserve was estimated at 8,150 – 10,483 lizards and that of the secondary habitat at 2,333 – 14,400 lizards. The total size was estimated at 10,483 – 24,883 lizards.

Other conserved areas include Edom Hill, the East Indio Hills, and the Santa Rosa and San Jacinto Mountains. The Edom Hill area protects sand habitat between Willow Hole and Thousand Palms. The MSHCP will conserve 98 acres of habitat as a linkage between the two Core Areas. The East Indio Hills area protects approximately 839 acres of habitat. The sand source for this area from the west has been fragmented by intervening development. There is uncertainty about the long-term suitability of this area for the lizard in the absence of a viable sand source. The Santa Rosa and San Jacinto Mountains Conservation Area provide little suitable habitat for the Coachella Valley fringe-toed lizard except in sandy substrates at the toe of the San Jacinto Mountains adjacent to the Snow Creek-Willow Hole area. The MSHCP will conserve approximately 112 acres of habitat in this area.

The current status of the Coachella Valley fringe-toed lizard is *Stable.*

Blunt-nosed leopard lizard ***Gambelia sila (formerly G. silus)***

State	Endangered	1971
	Fully Protected	
Federal	Endangered	1967



General Habitat:

The blunt-nosed leopard lizard occurs in the San Joaquin Valley region in arid areas with scattered vegetation at elevations ranging from about 100 feet to 2,600 feet above sea level. They inhabit non-native grassland and alkali sink scrub communities characterized by poorly drained, alkaline, and saline soils. They are also found in the chenopod community associated with non-alkaline, sandy soils in the foothills of the southern San Joaquin Valley and Carrizo Plain. The blunt-nosed leopard lizard is absent from areas of steep slopes and dense vegetation, and areas subject to seasonal flooding.

Description:

The blunt-nosed leopard lizard is a large lizard with a long, round tail. This lizard is grey or brown dorsally, with whitish crossbars on the back and tail. Dark blotches on the back and tail and a short, blunt snout give this species its common name. Breeding females have orange or reddish spots on the sides. Length from snout to vent in adults is three to five inches. The blunt-nosed leopard lizard can hybridize with the long-nosed leopard lizard where their ranges overlap.

Status:

The blunt-nosed leopard lizard formerly occurred throughout the floor of the San Joaquin Valley and Sierra Nevada foothills from Stanislaus County southward to the Tehachapi Mountains in Kern County. West of the San Joaquin Valley, the species occurred on the Kettleman and Carrizo Plains, and in southeastern Cuyama Valley in San Luis Obispo, Santa Barbara, and Ventura counties. Based on information presented in the 1998 Recovery Plan for Upland Species of the San Joaquin Valley, California, the currently known occupied range of the blunt-nosed leopard lizard is in scattered parcels of undeveloped land on the San Joaquin Valley floor, and in the foothills of the Coast Range. The species is still presumed to be present in the upper Cuyama Valley although there are no recent records for that area.

Urbanization and agricultural development have eliminated more than 70 percent of blunt-nosed leopard lizard habitat in the San Joaquin Valley. OHV use, mineral extraction, petroleum and gas field development, construction of transportation corridors, and water transport systems have further impacted the habitat of

this species. Habitat disturbance and destruction has resulted in the fragmentation and isolation of lizard populations.

Livestock grazing can result in removal of herbaceous vegetation and shrub cover and destruction of rodent burrows used by lizards for shelter. However, light or moderate grazing may be beneficial, unlike cultivation of row crops, which precludes use by leopard lizards. Direct mortality occurs when animals are killed in their burrows during construction, killed by vehicle traffic, drowned in oil, or fall into excavated areas from which they are unable to escape. Displaced lizards may be unable to survive in adjacent habitat if it is already occupied or unsuitable for colonization. The use of pesticides may directly and indirectly affect blunt-nosed leopard lizards. The insecticide Malathion has been used since 1969 to control the beet leafhopper, and its use may reduce insect prey populations. Fumigants, such as methyl bromide, are used to control ground squirrels. Because leopard lizards often inhabit ground squirrel burrows, they may be inadvertently poisoned.

Conservation efforts have included habitat and population surveys, studies of population demography and habitat management, land acquisition, and development of management plans for public lands that have benefited blunt-nosed leopard lizards as well as other listed species. The California Energy Commission conducted two important large-scale natural community and species surveys in the 1990s. The first was The Southern San Joaquin Valley Ecosystem Protection Program for which quarter-section surveys of natural lands in most of the Tulare Basin were made. Later, the California Energy Commission conducted quarter-section surveys on the Carrizo Plain Natural Area with funding provided by the U.S. Bureau of Land Management. The 1992 California Energy Commission's Southern San Joaquin Ecosystem Protection Plan has provided the framework on which the resource management agencies have developed their mitigation and conservation strategies.

A number of large-scale habitat conservation plans, such as the Metropolitan Bakersfield HCP and Caliente Resource Area Interim Grazing Plan, have been or are being prepared in the San Joaquin Valley. The majority of these plans include the blunt-nosed leopard lizard as a target species. Other conservation efforts that benefit the blunt-nosed leopard lizard include the TNC and DFG Carrizo Natural Heritage Program, California Energy Commission mitigation programs, land acquisition at the Alkali Sink, Allensworth, and Panoche Hills Ecological Reserves, and the endangered species habitat protection programs in the Elk Hills (Department of Energy) and the Kern and Pixley National Wildlife Refuges.

Although habitat for the blunt-nosed leopard lizard has been acquired or is being protected by various conservation instruments, appropriate habitat management prescriptions have not been identified. The recovery plan identifies several factors in recovering the lizard. These factors include identifying compatible land uses in habitat occupied by the lizard; identifying and implementing management prescriptions to preserve and enhance populations on existing habitat; protecting additional habitat and connectors in key portions of their range; surveying in unsurveyed portions of the range of the lizard; and analyzing lizard responses to environmental variation within their range. This information can be used to prioritize protection and acquisition of additional parcels of land to enhance survivorship of the lizard.

The recovery plan also identifies another important factor: the analysis of extinction patterns on blocks of natural land on the San Joaquin Valley floor. The effects of habitat size and diversity on population viability is not known. There are no current overall population size estimates for the species. Ultimately, determining a viable population size, preserving genetic variation, and creating connectors between geographically isolated populations, are needed to ensure recovery.

Southern rubber boa *Charina umbratica (=Charina bottae umbratica*

State: Threatened 1971
Federal: None

General Habitat:

The southern rubber boa is found in montane coniferous forests near streams and meadows. Habitat is dominated by Jeffrey pine, ponderosa pine, sugar pine, white fire, incense cedar, and black oak. Riparian corridors become important during warmer weather. Areas with rock outcrops and a southern exposure are a particularly significant habitat feature. The outcrops serve as hibernation sites snags, logs, and other surface debris provide cover. The southern rubber boa is known from several localities in the San Bernardino Mountains in San Bernardino County, near Idyllwild in Riverside County, and on Mount Pinos in Kern County.

Description:

The southern rubber boa is a stout-bodied snake with a short, blunt tail that resembles the head. The skin is smooth and shiny. The scales on top of the head are large and sometimes asymmetrical. Coloration is olive or pale yellowish-brown dorsally and light yellow ventrally, and there may be a few dusky flecks on the lower sides. Adults grow to about two feet.

Status:

Few studies exist that specifically examine the southern rubber boa. Important information that is lacking includes movement, dispersal, home range, migration, and microhabitat requirements. Although the species occurs in relatively isolated populations, unoccupied habitat between metapopulations is likely important for gene flow. Intervening areas may also have seasonal importance to the species. Although there is little or no information about movement patterns and dispersal, it is likely that the intervening areas between metapopulations are important for gene flow. Recent genetic studies support separation of the southern rubber boa from all other populations of rubber boa. The subspecies appears to have diverged from the more widespread rubber boa between 12.3 and 4.4 million years ago. Possible intergrades between the southern rubber boa and the rubber boa found in the Tehachapi Mountains and on Mt. Pinos warrant further study.

Habitat loss and fragmentation due to resort and housing development, OHV activities, logging, fern harvesting, and wood gathering are the principal threats to this species. Fern picking in the spring occurs at the same time that boas are coming out of hibernation. OHV use has been documented to occur in areas occupied by the southern rubber boa, resulting in the destruction of ground cover and riparian areas, and compaction of soils. Firewood harvesting, fire management, and collection of fallen wood remove the ground debris that provides habitat for this species. Poaching is also a threat. Immediate threats include large-scale timber salvage operations following tree die-off and the possibility of catastrophic fire in the San Bernardino Mountains.

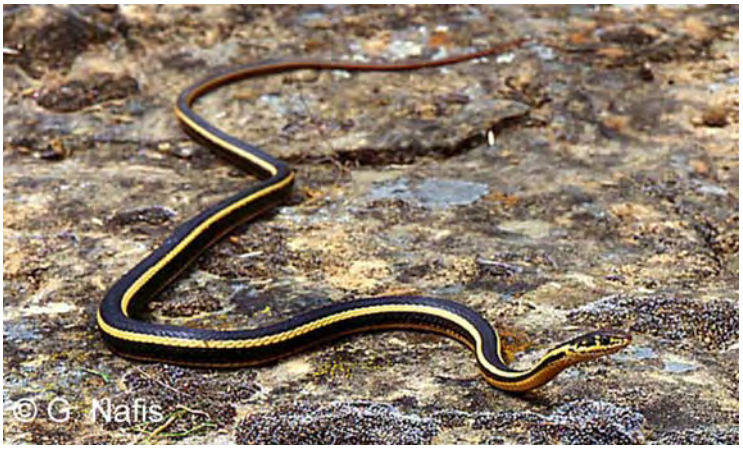
Because much of southern rubber boa habitat is within national forest lands, management of the southern rubber boa by the USFS will be critical to the survivorship of this species.

The southern rubber boa is a covered species in the Western Riverside MSHCP where it occurs in the San Jacinto Mountains. The population in Riverside County is geographically isolated and occurs mostly in designated wilderness. For conservation analysis, suitable habitat for this species includes all montane wooded habitats and interspersed chaparral and grassland habitats above 5000 feet in the San Jacinto Mountains (San Jacinto Mountains Bioregion). An estimated 2,500 acres of suitable habitat will be conserved for this species within the planning area. To date, the only land specifically set aside for conservation of this taxon within the planning area is a 40-acre site, the Heaps Peak Arboretum, in San Bernardino County.

The status in 2002 of the southern rubber boa: *Unknown*.

Alameda striped racer (=Alameda whipsnake) ***Macsticophis lateralis euryxanthus***

State	Threatened	1971
Federal	Threatened	1997



General Habitat:

The Alameda whipsnake is restricted to Contra Costa and Alameda Counties where it occurs primarily in open and partially open, low-growing shrub communities such as coastal scrub and chaparral communities. Recent telemetry data indicate that, although home ranges of Alameda whipsnakes are centered on shrub communities, they venture up to 500 feet into adjacent habitats, including grassland, oak savanna, and occasionally oak-bay woodland. Rock outcrops with deep crevices or abundant rodent burrows are important habitat components for overnight dens, refuges from predators and excessive heat, and foraging. According to USFWS, suitable habitat for this species includes communities that support mixed chaparral, coastal scrub, and annual grassland and oak woodlands that are adjacent to scrub habitats. Grassland areas that are linked to scrub by rock outcrops or river corridors are also considered to provide habitat for this species.

Description:

The Alameda whipsnake is a subspecies of the California whipsnake (*Masticophis lateralis*). It is a slender, fast-moving, diurnal snake that has a narrow neck and a relatively broad head with large eyes. Adults may reach a length of five feet. The dorsal surface is colored sooty black or dark brown with a distinct yellow-orange stripe down each side. The anterior portions of the ventral surface are orange-rufous colored, the midsection is cream colored, and the posterior and tail are pinkish. The Alameda subspecies is distinguished from the more common chaparral whipsnake by the wide orange stripes on its sides. Snakes of intermediate appearance are also known.

Status:

The primary cause of the decline of the Alameda whipsnake is the loss of habitat from human activities. Also contributing to the decline of this species is the alteration of suitable habitat as a result of fire suppression and

the increased likelihood of catastrophic wildfires. Current threats to the Alameda whipsnake include (1) potential destruction, modification, or fragmentation of habitat or range due to urban development, inappropriate grazing practices, or habitat alteration from fire suppression; (2) overcollection for commercial, recreational, scientific, or education purposes; (3) disease or increased predation from native and nonnative predators; and (4) the difficulty of habitat management at the urban/wildland interface.

The Alameda whipsnake is reported from 53 occurrences although many of those represent historic collections. All populations are threatened by more than one factor, including habitat loss, fire suppression, habitat fragmentation, grazing practices, and mining. Habitat fragmentation from urban development and associated highway and road development has led to genetic isolation of most populations. Extant populations are found in five areas. Each of these populations potentially consists of several to numerous subpopulations with varying degrees of connectivity among them. Two principal corridors connect these population areas.

- The Tilden-Briones population, in the western portion of the Alameda whipsnake's range, is threatened by habitat loss and fragmentation due to urbanization and rural development, the potential for catastrophic wildfire, and the displacement of native vegetation by non-native invasive plants such as eucalyptus and broom. Portions of this population area overlap with regional parklands and municipal watersheds. Regional preservation and land management within the framework of public lands could be implemented.
- The Oakland-Las Trampas population is threatened by the decline in habitat quality as chaparral/scrub stands form a closed canopy and become decadent, a high potential for catastrophic wildfire, and the effects of habitat loss and fragmentation as a result of urban development.
- The Hayward-Pleasanton Ridge population is the most susceptible to extirpation; it is most isolated from other population centers to the north and south. This isolation increases the susceptibility of this population to genetic drift and random catastrophic events. This population has lost significant areas of occupied habitat to urban development, and pressure to develop continues to be intense.
- The Mount Diablo-Black Hills population is located in the eastern portion of the whipsnakes' range. Similar to other population areas, the Mount Diablo-Black Hills population is threatened by a high potential for catastrophic wildfire, suburban/rural development and its associated impacts, and incompatible land uses such as mining. Because of the location of public lands, the actions of private nonprofit organizations to protect wildlife corridors, and the potential for improved fire and grazing management on these lands, this population is a good candidate for recovery.
- The Sunol-Cedar Mountain population is threatened by catastrophic wildfire and incompatible land uses including mining and off-road vehicle use. Although fairly free of habitat loss or fragmentation due to suburban development, the pressure for housing is increasing. This southern population attracts reptile enthusiasts and collectors and may have the highest probability of unauthorized collection due to its remote roads and abundant assemblage of native reptiles, this area.

The two corridors have differing threats. The Caldecott Tunnel corridor is already highly developed and fragmented. Much of this area burned during the firestorm of October 1991. As a result, vegetation with low volatility is being promoted, including nonnative species while native chaparral and scrub species are being discouraged. Consequently, vegetation within the corridor may not be suitable for the whipsnake. The Niles Canyon-Sunol corridor has physical barriers that impede or prohibit the movement of individual whipsnakes. These barriers include Alameda Creek, a concrete barrier that lies south of Niles Canyon Road and north of Alameda Creek, railroad tracks that run along both sides of Alameda Creek, and heavy vehicular traffic along Niles Canyon Road. The degree to which these barriers discourage or halt the movement of whipsnakes is unclear. Appropriate vegetation is also limited in this corridor, much of the land being under cultivation or mined for gravel.

The Alameda whipsnake is threatened directly and indirectly by the effects of fire suppression policies common in urban areas. Fire suppression activities directly affect the Alameda whipsnake by allowing the buildup of fuel (underbrush and woody debris), which exacerbates the intensity of wildfires if they occur. Although most snakes are likely to retreat into burrows or rock crevices or to move from the fire's path, there is still the potential for

individual snakes to be burned. Natural fires occur in the late summer and early fall when accumulated fuel is abundant and dry. The intensity of these fires is likely to be higher than in prescribed burns, which typically are scheduled during wetter months. During the late summer and early fall, hatchling and adult Alameda whipsnakes are above ground, and populations may sustain direct losses from fires. Burns during wetter months, however, may indirectly affect the Alameda whipsnake, as burning the chaparral and scrub habitats during this time may be detrimental to the health of the chaparral/scrub community. Prescribed burns are only one form of vegetation management used to reduce fuel loads; others include discing and bulldozing fire breaks, moderate to heavy grazing to limit vegetative growth, and replacing chaparral/scrub habitat with grassland through mechanical or chemical means. The timing and extent of these activities will determine their effects on the Alameda whipsnake.

To date approximately 570 acres of Alameda whipsnake habitat have been protected in perpetuity as conservation lands. This level of protection is a result of mitigation of lawful take of the Alameda whipsnake. In addition, 35 acres have been protected in perpetuity within a conservation bank. Save Mt. Diablo, a local lands protection organization, has been instrumental in the protection of over 2,000 acres in the Black Hills area of Mt. Diablo, more than half of which is confirmed occupied Alameda whipsnake habitat. This protection was a condition of development of the lower elevation acres, and the land has been dedicated to Mt. Diablo State Park. Save Mt. Diablo has also been active in protecting a wildlife corridor from Mt. Diablo to Black Diamond Mines Regional Preserve. Within this corridor the organization has purchased "Chaparral Springs", 333-acre parcel with approximately 40 acres of high quality chaparral, and (in conjunction with East Bay Regional Park District) a portion of "Clayton Ranch". Future plans may include protection of adjacent properties. The Pleasanton Ridge Conservation Bank in Alameda County is the first mitigation bank where "credits" can be purchased to offset the lawful "taking" of the Alameda whipsnake. The 654-acre site will protect approximately 35 acres of Alameda whipsnake habitat, as well as functioning as a preserve area for the threatened California red-legged frog. Lands protected within Regional Parks, watersheds, Federal facilities, State Parks, and local parks contain approximately 20 percent of the remaining Alameda whipsnake habitat. Although not always specifically managed for the whipsnake, the quasi-protected status of these open lands has established the foundation for the recovery strategy for the Alameda whipsnake.

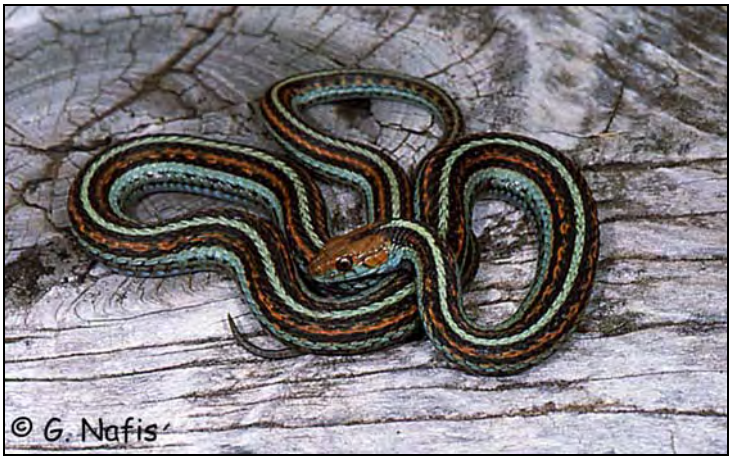
The recovery strategy for the Alameda whipsnake combines long-term protection of large blocks of habitat; protection in perpetuity of strategic areas such as habitat harboring population centers or areas needed for connectivity of populations; special management considerations such as fire management, grazing regimes, and control of destructive nonnative species; and research that focuses on management objectives and recovery of the species.

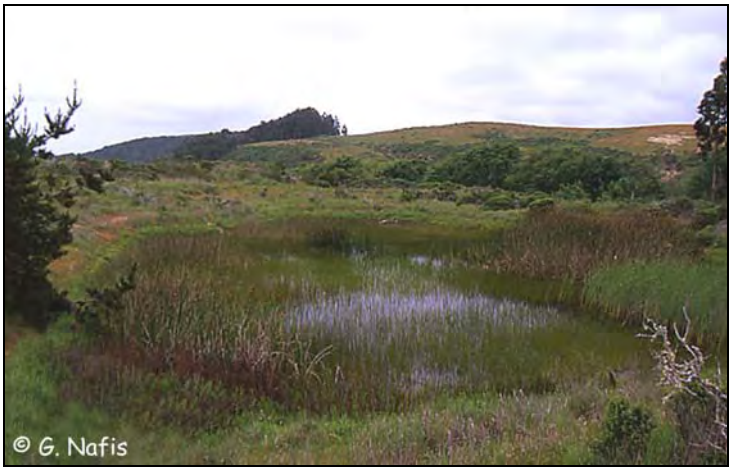
As of 2003, there had been no approved HCPs that cover the Alameda whipsnake or its habitat. At least three HCPs that cover the species are in development: Alameda Watershed HCP (San Francisco Public Utilities Commission); Mount Diablo State Park HCP (California Department of Parks and Recreation); and East Bay Watershed Lands HCP (East Bay Municipal Utilities District). The Alameda whipsnake will be one of the special status species covered in the East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan. Of the known occurrences of the Alameda whipsnake, 19 are found within the East Contra Costa plan inventory area. A large portion of the Mount Diablo–Black Hills population of the Alameda whipsnake occurs within this inventory area.

The status in 2004 of the Alameda whipsnake is *Declining.*

San Francisco garter snake

Thamnophis sirtalis tetrataenia





State	Endangered	1971
Federal	Endangered	1967

General Habitat:

All known populations of this species occur in San Mateo County from Sharp Park to Año Nuevo and east into the Santa Cruz Mountains where suitable habitat occurs. Preferred habitat is a densely vegetated pond near an open hillside where they can sun themselves. Emergent and bank-side vegetation such as cattails, bulrushes, and spike rushes apparently are preferred and used for cover. The area between stream and pond habitats and grasslands or bank sides is used for basking, while nearby dense vegetation or water often provide escape cover. Snakes also use floating algal or rush mats, if available. They are most often found around ponds and marshes that support large populations of frogs.

Description:

The San Francisco garter snake is recognized by its mid-dorsal stripe of greenish-yellow bordered by a black and a red stripe on each side which may be broken or divided. The belly is greenish-blue, and the top of the head is red. Adults grow to a length of two to three feet.

Status:

The San Francisco garter snakes occurs in scattered wetland areas from the San Francisco Peninsula south to Santa Cruz County. The existing populations occur are now mostly small and fragmented and lack connectivity to other populations.

Commercial and urban development has destroyed the majority of the prime habitat for this snake, and continues to fragment remaining habitat and eliminate habitat linkage corridors. Many of the threats, including loss of habitat and collection by reptile fanciers and breeders, that led to the listing of the San Francisco garter snake in 1967 continue to impact the species. Additional threats to the species include the documented decline of the California red-legged frog, an essential prey species, and the introduction of bullfrogs into San Francisco garter snake habitat. Although the San Francisco garter snake preys on juvenile bullfrogs, it does not eat adult bullfrogs. Bullfrog predation of other species of garter snake is known and it may similarly prey on the San Francisco garter snake. Bullfrogs prey on other species of frogs, further limiting prey species of the San Francisco garter snake.

Expansion of BART to the San Francisco Airport bisected the only known population of the snake on the bay side of the San Mateo Peninsula. DFG staff worked with BART officials to minimize impacts to the snake. Before

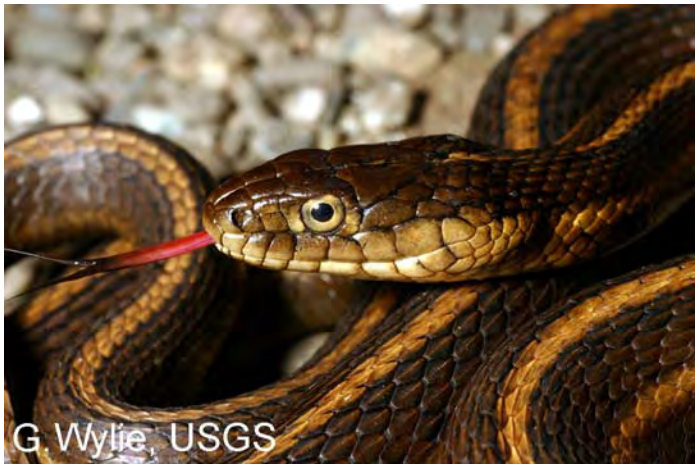
construction could begin, snakes were trapped and special fences were erected to keep snakes out of the construction area. Snakes were removed from the site until construction ended. A biological monitor was present during construction and workers received special instruction about the snake. Following construction, the ponds and wetlands were restored and snakes were placed back in their habitat. Six snakes were lost during construction, all due to human activities. Snakes are still extant at the West of Bayshore population on the Peninsula. Trapping last fall caught significantly fewer snakes than five years previously. The populations at Waddell Creek and Año Nuevo are also still present.

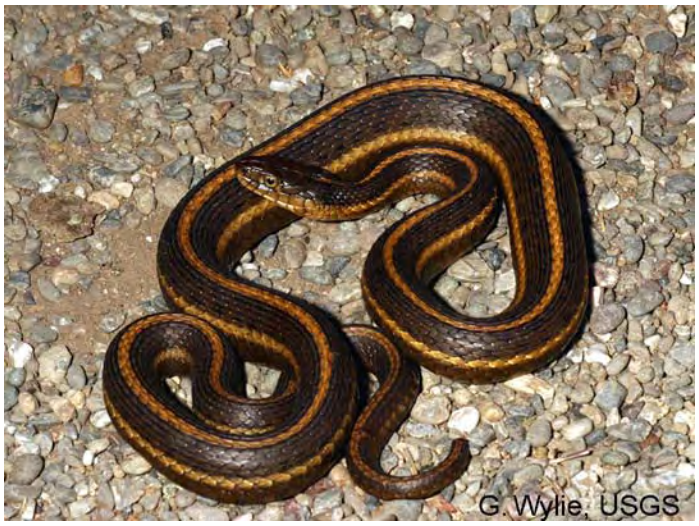
The San Francisco garter snake co-occurs with other species of garter snake. On or west of the crest of the Santa Cruz Mountains, they can be found with the Santa Cruz aquatic garter snake (*T. atratus atratus*), which has only a bright yellow dorsal stripe. and the coast (terrestrial) garter snake (*T. elegans terrestris*), which lacks the red head, but has faint broad red flecks or broad orange-red lateral bands. East of the crest, the San Francisco garter snake is usually replaced by, and may intergrade with, the red-sided garter snake (*T. sirtalis infernalis*), which has red lateral spots. Overlapping ranges and intergradation of *T. sirtalis* subspecies makes identification of subspecies based on range difficult.

The status in 1999 of the San Francisco garter snake: Declining.

Giant garter snake *Thamnophis couchi gigas*

State	Threatened	1971
Federal	Threatened	1993





General Habitat:

The giant garter snake is usually found in marshes, sloughs, ponds, small lakes, low gradient streams, irrigation and drainage canals, and rice fields. Upland habitat is used for cover and retreat sites during the snake's active season and for refuge from flood waters during its dormant season. Giant garter snakes are typically absent from larger rivers because of lack of suitable habitat, and from wetlands with sand, gravel, or rock substrates. Some riparian woodlands may not provide suitable habitat because of excessive shade, lack of basking sites, and absence of giant garter snake prey.

Description:

The giant garter snake is one of the larger species of garter snakes and can exceed five feet in length. The basic color is dull brown with a checkered pattern of well-separated black spots on the dorsal side. There is a dull yellow, mid-dorsal stripe, but lateral stripes are often not present. The head is elongated with a pointed snout. The giant garter snake can be distinguished from the common garter snake (*T. sirtalis*) and the western terrestrial garter snake by its color pattern, scale numbers, and head shape. The giant garter snake lacks the red lateral markings of the common garter snake. The western terrestrial garter snake has well defined stripes and a black to dark gray ground color.

Status:

Based on historic records, the giant garter snake probably ranged throughout the central valley from Buena Vista Lake in Kern County north to near Gridley in Butte County. Loss, degradation, and fragmentation of habitat are the primary threats to the giant garter snake. Conversion of wetlands for agricultural, urban, and industrial development has resulted in the loss of more than 90% of suitable habitat for this species in the Central Valley. Conversion of rice farms to other types of agriculture, such as orchard or vineyard, is similarly deleterious. Maintenance of flood control and agricultural waterways, weed abatement, vector and rodent control, discharge of contaminants into wetlands and waterways, and overgrazing in wetland or streamside habitats may also cumulatively threaten the survival of some giant garter snake populations. Another potential threat to the giant garter snake is

the export of water by rice growers to other areas of the state. Fallowing of rice fields following such sales immediately eliminates the rice field as habitat for the garter snake.

Land management at DFG Wildlife Areas and private duck clubs also affects the suitability of wetland habitat for giant garter snake. In the 1970s, for example, wetlands management in the Grasslands, a mosaic of federal, state, and privately owned wetlands, representing a third of California's remaining Central Valley wetlands, in Fresno and Merced Counties changed from watergrass (*Echinochloa* sp.) to moist-soil management for swamp timothy and smartweed. This practice resulted in earlier spring irrigation and decreases in summer water, which provides the giant garter snake with foraging habitat. Although CVPIA has provided the Grasslands wetlands with sufficient water for optimum habitat development for wintering migratory waterfowl, current management allows large areas to dry up during the summer.

Studies conducted by DFG in the 1990s found a possible correlation between such wetland management practices and the observed decline of the giant garter snakes in the Grasslands. New studies have been proposed to CALFED by the Grassland Water District, USFWS, USGS Western Ecological Research Center (WERC), USBR, and DFG. The objective of this study to develop to characterize habitat for the giant garter snake in the northern San Joaquin Valley so that management of this habitat can be improved, restoration projects can begin, and populations can be re-established. The studies will evaluate past and present water management practices and impacts to the giant garter snake, assess water quality, and examine the effects of bull frog predation. One hypothesis is that the limited availability of water in summer in the Grasslands may concentrate bullfrogs and newly-born giant garter snakes in a few waterways where predation on juvenile giant garter snakes by bullfrogs is intense.

Other factors contribute to the decline of the giant garter snake. Road kills of giant garter snake have been documented when garter snake habitat is in proximity to paved roads. Nematode infection of giant garter snakes has also been documented in the American Basin. A potential threat to the giant garter snake is the southern water snake (*Nerodia fasciata*), which has established on Willow Creek and Humbug Creek, tributaries into the American River above Lake Natoma. Perennial pepperweed (*Lepidium latifolium*), an invasive weed, is widespread in the Central Valley. It outcompetes native vegetation and forms dense stands on the banks of sloughs and canals. It may eliminate basking sites and inhibit snake use during the active season. Toxic contamination, particularly from selenium, and impaired water quality have also been identified as threats to some populations of the giant garter snake. Preliminary studies have documented potential bioaccumulation effects on giant garter snakes or their prey species caused by contaminants derived from agricultural products.

Prior to 1970, the giant garter snake was known from 17 populations. By 1993, 13 of these populations were extant and only three of these populations were considered stable and safe from threats. All populations are distributed discontinuously in small isolated patches without protected dispersal corridors and are vulnerable to extirpation by random, naturally occurring environmental events; population dynamics; and genetic processes. Each population represents a cluster of discrete occurrences and coincides primarily with historical riverine flood basins and tributary streams throughout the Central Valley: Butte Basin (Butte County); Colusa Basin (Colusa County); Sutter Basin (Sutter County); American Basin (Sacramento and Sutter Counties); Yolo Basin/Willow Slough and Yolo Basin/Liberty Farms (Solano County); Sacramento Basin and Badger Creek area of the Cosumnes River Preserve (Sacramento County); Caldoni Marsh at the White Slough WA, the East Stockton Diverting Canal, and Duck Creek (San Joaquin County); North and South Grasslands (Fresno and Merced Counties), Mendota WA (Fresno County); and in the vicinity of the Burrel and Lanare railroad sidings southwest of Fresno (Fresno County).

Prior to the 1990s, there had been few population size estimates for giant garter snakes. In 1994, WERC entered into a partnership with the State of California to provide information for NCCP planning in the Sacramento Valley. The Giant Garter Snake Habitat Ecosystem Initiative was developed to plan, execute, and evaluate research and related activities necessary for conservation of the garter snake and its ecosystem. Passive integrated transponder (PIT) tags are being used in the study to permanently mark and establish a data base for giant garter snakes sampled during the study. Morphological measurements and tissue samples for genetic determinations are

being taken to improve the taxonomic description of this species, which is inadequately treated in the current literature. Surgical techniques and design of radio transmitters have been modified to successfully use radio telemetry for this species.

Radio telemetry is showing aspects of habitat use and movements that were previously poorly understood for this species. For example, the USGS found that snakes remained motionless to avoid detection rather than readily fleeing from disturbance, a trait previously thought to be characteristic of this species. Because of their motionless behavior and cryptic coloration, the USGS determined visual surveys to be of little use in detecting this species. They also found snakes to be active far later into the fall than was previously believed, an observation which will change suggested timing of road, ditch, and levee maintenance in the rice fields these snakes inhabit. The telemetry information is incorporated into a geographical information system, yielding statistically valid spatial analysis for estimating home range size and habitat preferences.

In addition to continuing projects at Colusa National Wildlife Refuge and the Natomas Basin, WERC scientists will begin surveying for giant garter snakes on private lands for the FWS Partners for Fish and Wildlife program. They will also provide science support to the Corps of Engineers by assessing the effects of bank stabilization methods on giant garter snakes in the Colusa Drain. Other projects include habitat restoration at Colusa National Wildlife Refuge (NWR) and Sacramento River NWR. These projects were funded by the U.S. Bureau of Reclamation (USBR) through the Central Valley Project Improvement Act (CVPIA).

In 1998, the Sacramento NWR Complex was awarded a grant to purchase agricultural lands adjacent to the Colusa NWR and create wetland habitat that would specifically benefit the population of giant garter snakes on the refuge. The restoration project is being funded, in part, by a North American Wetlands Conservation Act grant. Construction of these wetlands was completed in fall 1999. The habitat has responded favorably to restoration efforts. Preliminary monitoring results have indicated that additional permanent wetland habitat restored at Colusa NWR has been actively used by giant garter snakes since spring 2000. WERC scientists caught 128 individual giant garter snakes in 2002 (53 male; 75 female). Of the snakes caught in 2002, 31 were recaptures mostly from the previous two years. The total number of snakes caught has increased each since monitoring began in 2000. The size distributions of snakes caught reflect a healthy population of giant garter snakes with successful recruitment of the young.

Numerous ongoing conservation efforts target the giant garter snake. The California Rice Industry Association has developed stewardship practices for rice farming to protect giant garter snakes and the Bureau of Reclamation addresses potential impacts to endangered species caused by operations and maintenance of Central Valley Project (CVP) facilities through its Endangered Species Conservation Program. Conservation efforts for the giant garter snake have also been undertaken on several occasions using sources of funds targeted for the Central Valley Habitat Joint Venture Implementation Plan. The goals of the Central Valley Project Habitat Restoration Program are integrated with those of the CALFED Ecosystem Restoration Program (ERP). The U. S. Environmental Protection Agency and the California Department of Pesticide Regulation have produced rodenticide bulletins for Butte, Colusa, Fresno, Glenn, Kern, Madera, Merced, Sacramento, San Joaquin, Solano, Sutter, Yolo, and Yuba Counties. These bulletins identify use limitations that apply to areas where giant garter snakes have been reported.

A number of regional habitat conservation planning efforts are underway that allow for development, while setting aside, enhancing, and protecting habitat for the giant garter snake and other sensitive species found in the region. The Natomas Basin HCP, originally prepared by the City of Sacramento in the 1990s, was approved by the USFWS in December 1997. That plan was overturned in 2001 following a court challenge. In the original plan, funding derived from development fees was inadequate to acquire the most important habitat lands and to ensure that these habitat areas would be protected in perpetuity. The settlement allowed some development to go forward in the Natomas Basin during the one to two-year period in which a new regional HCP. The revised plan was approved by the USFWS in 2003. The new HCP allows development in the Natomas Basin area of the city of Sacramento and Sutter County. Development will be allowed in specified areas totaling 15,517 acres, or about 29% of the basin.

Other regional HCPs that include the giant garter snake are the South Sacramento HCP, Yolo County HCP, San Joaquin County MSHCP and Open Space Plan, the Kern Water Bank HCP, Maxwell Irrigation District HCP, Natomas Basin Metro Air Park HCP, and the DFG Striped Bass Management Program HCP.

The Natomas Basin Conservancy began operation in 1998 to oversee the mitigation goals of the Natomas Basin HCP. Mitigation fees paid by developers are used to acquire, restore, and manage mitigation lands to provide habitat for protected species and maintain agriculture in the Natomas Basin. Since the program inception, Natomas Basin Conservancy has acquired approximately 2,800 acres. Land owned by the conservancy is designed to provide marsh, riparian, and grassland habitats. Over 50-yr life of HCP, 8750 acres will be set aside as a preserve. The Dixon Field Station of the USGS Biological Resources Division entered into an agreement with the Natomas Basin Conservancy to study giant garter snakes in the Natomas Basin area of northern Sacramento County during the 2002 field season. The purpose of the study was to develop information on distribution and abundance, habitat use, and demography of giant garter snakes in the Natomas Basin and to help develop strategies to properly manage and conserve giant garter snakes in this part of Sacramento County. From late April into September, the USGS captured 76 female giant garter snakes and 64 male snakes, for a total of 140 individual captures; 58 snakes were captured multiple times. A giant garter snake was found at the Conservancy's first constructed managed marsh in August 2003. The snake was found in a trap set by USGS scientists on the Conservancy's Kismat tract, approximately four miles north of ARCO Arena. The Kismat tract was purchased by the Conservancy on April 16, 1999. Marsh construction took place in 2001 and 2002.

Conservation banks have been established to mitigate impacts to giant garter snake habitat. The Dolan Ranch Conservation Bank is located on 252 acres of private land near the Colusa NWR. Managed by Wildlands, Inc., habitat will be preserved and created at the conservation bank. The Pope Ranch in Yolo County encompasses 391 acres. The Wildlife Heritage Foundation holds the conservation easement for site. This project is designed to create a combination of aquatic and upland habitats and to provide habitat for the giant garter snake. Ecological restoration efforts will create approximately 40 acres of open water and channels, 108 acres of perennial marsh, and 243 acres of seasonal wetland and upland habitat. The site will be managed to promote giant garter snake habitat, while also supporting waterfowl and upland game birds.

The USFWS prepared a draft Recovery Plan for this species in 1999. The plan identified four recovery units within the range of the giant garter snake (Sacramento Valley, Mid-Valley, San Joaquin Valley, and South Valley) and proposes recovery criteria. The recovery criteria include adaptive management and monitoring, successful reintroduction within the historic range of the species, documentation of successful breeding and survivorship in 90 percent of the subpopulations in the recovery units, and maintenance of connectivity between subpopulations.

As of 2003, the giant garter is stable in some portions of the state while declining in other areas.