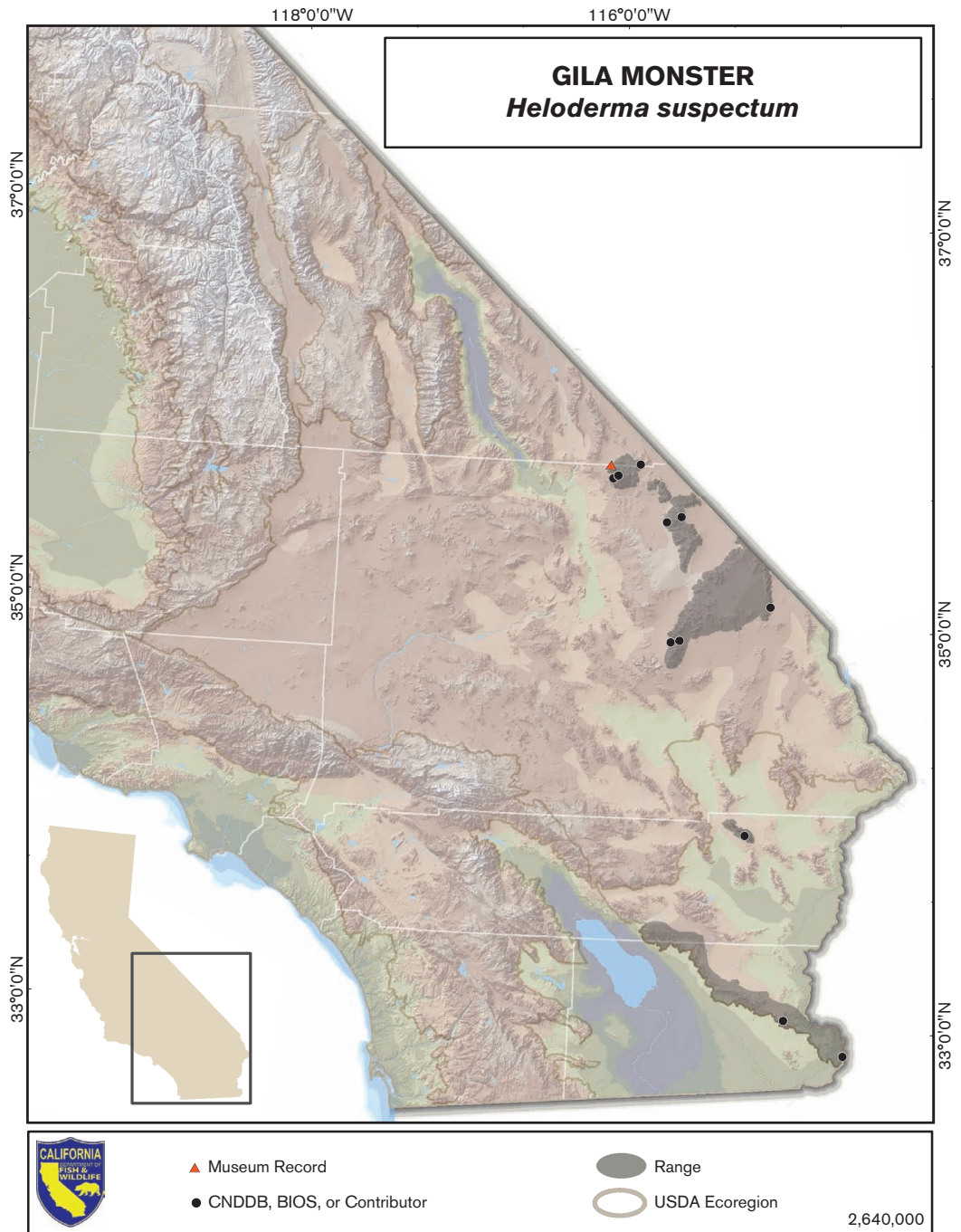




GILA MONSTER

Heloderma suspectum Cope 1869

PHOTOS: (top) Gila monster documented 29 May 1993 in the Kingston Mountains, San Bernardino County, California. Courtesy of Beth Behm. (bottom) Gila monster documented 7 May 2015 in the Mesquite Mountains, San Bernardino County, California. Courtesy of Barrett Scurlock.



Status Summary

Heloderma suspectum is a Species of Special Concern, though we refrain from assigning it a priority status due to lack of information. The species received a Total Score/Total Possible of 60% (30/50) and was data deficient for several metrics. During the previous evaluation, it was also considered a Species of Special Concern (Jennings and Hayes 1994a).

Identification

Among California lizards, *Heloderma suspectum* is virtually unmistakable. *Heloderma suspectum* is a large (22.8–35.5 cm SVL) stocky lizard with a dark ground color and distinctive pinkish, orange, or yellow patterning over the trunk and tail that forms bands or a reticulating network. This species possesses distinctive bead-like scales and large, strongly curved claws (Bogert and Martín del Campo 1956, Beck 2005). The ventral coloration is similar to the rest of the body, with alternating black and yellowish or pinkish bands that may form a reticulated pattern (Bogert and Martín del Campo 1956). Within its range, this species could only possibly be confused with the chuck-

walla (*Sauromalus ater*), which sometimes develops a pinkish or yellowish coloration on top of a dark ground color but lacks the banded or reticulate patterning and does not have large, bead-like scales.

Taxonomic Relationships

Heloderma suspectum is one of two extant members of the family Helodermatidae. It is a close relative of the Mexican beaded lizard (*H. horridum*). The description of this species is generally attributed to Cope (1869), although it was actually depicted in print earlier by Baird (1859) using the name *H. horridum*. Cope's (1869) description is a one-paragraph secondhand summary; a far more complete description of the taxon is given by Bogert and Martín del Campo (1956) in their monographic treatment of the family Helodermatidae. The recognition of two species in the genus has not been questioned since the initial description. More recent molecular results confirm the distinctiveness of the two taxa (Douglas et al. 2010).

Two subspecies of *H. suspectum* have been described based on the pattern of reticulation (or lack thereof) in coloration. *Heloderma suspectum suspectum* has a reticulated color pattern, whereas *H. s. cinctum* has a banded pattern that largely lacks reticulations among the bands. A recent genetic survey of intraspecific variation found little evidence supporting these groupings. Additional data are needed to more fully examine intraspecific variation within this species (Douglas et al. 2010). All specimens known from California match the *H. s. cinctum* color pattern, with the single exception of an individual photographed near Piute Springs, San Bernardino County (see the "Distribution" section) (Lovich and Beaman 2007).

Life History

The life history of *Heloderma suspectum* has not been studied in California. Here we use data from other parts of the range (primarily Utah) and cautiously assume that the life history in California is similar.

Gila Monster: Risk Factors

Ranking Criteria (Maximum Score)	Score
i. Range size (10)	10
ii. Distribution trend (25)	Data deficient
iii. Population concentration/migration (10)	0
iv. Endemism (10)	0
v. Ecological tolerance (10)	10
vi. Population trend (25)	Data deficient
vii. Vulnerability to climate change (10)	10
viii. Projected impacts (10)	Data deficient
Total Score	30
Total Possible	50
Total Score/Total Possible	0.60

Heloderma suspectum overwinters in burrows on rocky slopes adjacent to lower-elevation arroyos and bajadas (Beck 1990, Beck 2005). In California, it likely emerges in April or early May. The species spends nearly all of its time in underground burrows (>95% in Utah), emerging rarely to forage for food and to locate mates (Beck 1990). This species is a strict nest predator, preying on the nests of mammals, ground-nesting birds, and reptiles (Hensley 1949, Jones 1983, Beck 1990, reviewed by Beck 2005). *Heloderma suspectum* is venomous, although it is not known to use venom in subduing prey (Beck 2005). Rather the venom probably serves as a predator avoidance mechanism (Beck 2005).

In California, the daily activity pattern is not well characterized. Nocturnal activity has not been reported, although data are lacking. Reproduction likely occurs in April and May, with oviposition occurring shortly thereafter. Elsewhere in the range (Arizona), males leave their burrows and undertake relatively long (~1.6 km) walks to visit other burrows in search of females (Beck 2005). When males encounter each other during this period of activity, prolonged male–male combat may ensue. This behavior entails males entwining one another and attempting to pin one another to the ground (Beck 2005). The time required for eggs to hatch is poorly characterized, although young appear in the spring, which suggests that they overwinter in the burrow before dispersing. Elsewhere in the range, sexual maturity develops in 2–3 years, and adults are probably long-lived (>20 years) (Jennings 1984, Beck 2005). This species appears to be highly susceptible to water loss, which partially explains its relatively sedentary activity patterns (Beck 2005).

Habitat Requirements

Heloderma suspectum occupies a relatively wide variety of desert habitats throughout its range. In California, it is known primarily from a few desert mountain ranges in the eastern Mojave Desert. It inhabits rocky slopes, arroyos, baja-

das, and washes, and is presumably limited on a larger scale by the availability of summer rainfall in the California deserts. Areas that are known to support this species receive a moderate amount of their total annual rainfall during the summer months (24% of the total), which is similar to the pattern in adjacent areas of Arizona that also support this species (39% of total; Lovich and Beaman 2007). On a more local scale, distribution may be controlled by the availability of relatively deep burrows, the presence of food, and availability of riparian or xeroriparian habitat (Lovich and Beaman 2007). Preferences for certain burrow conditions apparently exist but are poorly understood (Beck 2005). Individuals frequently return to specific burrows while leaving others, apparently suitable ones, unoccupied (Beck 2005). Adult Gila monsters are known to return to the same burrows year after year, showing remarkable homing ability and apparent knowledge of the location of many different burrows within their home range (Beck 2005). Too few records exist from the California portion of the range to form a thorough understanding of habitat requirements, although many records are associated with large and relative high mountain ranges as well as with riparian areas (Lovich and Beaman 2007)

Distribution (Past and Present)

Heloderma suspectum ranges from extreme southwestern Utah, through southern Nevada, southwestern Arizona, and south to Sinaloa, Mexico. In California, the species is known from 30 records in the Kingston, Providence, Clark, Piute, and Chocolate Mountain ranges (Bradley and Deacon 1966, De Lisle 1979, Ford 1981, Bicket 1982, De Lisle 1983, Ford 1983, Lovich and Beaman 2007, Ruppert 2010a, Ruppert 2010b, Lovich and Haxel 2011). Lovich and Beaman (2007) reviewed 26 records in California. Four additional records are now known. On 29 May 1993, a single adult *H. suspectum* was photographed on Smith Talc/Kingston Mountain road in the Kingston Mountains, Inyo County, California, approximately 24 km

east of Tecopa (B. Behm, pers. comm.). The photographs show an animal with the banded pattern typical of other animals found in California (we include the clearest photograph here). An additional record comes from Vulcan Mine Road on the western side of the Providence Mountains on 2 May 2009. A natural history class from Cuesta College observed and photographed a single adult moving along the road (Sneed 2009, Ruppert 2010a, Ruppert 2010b). The most recent record that we are aware of from California was documented on 7 May 2015 in the Mesquite Mountains of California. A single adult animal was found resting under the partial shade of a cat's claw plant in a wash running parallel to Kingston Road (B. Scurlock, pers. comm). Lovich and Haxel (2011) report an additional credible sighting from Black Mountain in the southern Chocolate Mountains that occurred on 30 April 1974 as well as a second record from the same vicinity that is less well substantiated but may be credible. In addition, old records from the vicinity of Blythe, the Lower Colorado River in Imperial County, Chuckwalla Valley, and the Mojave River are in the literature but are less well substantiated than the more recent records (Woodson 1949, Funk 1966, Tinkham 1971, Lovich and Beaman 2007). The species may also occur in a few additional desert mountain ranges in California where records have not yet been recorded. In particular, the New York Mountains are a likely candidate for future records. These mountains lie between the Providence and Piute Mountains, both of which have records and contain what appears to be suitable *Heloderma* habitat. Other large and potentially suitable mountain ranges in the area include the Whipple Mountains, Turtle Mountains, Chemehuevi Mountains, and the Chuckwalla Mountains (Brown and Carmony 1991, Lovich and Beaman 2007).

Trends in Abundance

No data exist on the current or historical abundance of this taxon in California. Elsewhere in the range, the species exists in low densities

(maximum recorded is ~10 individuals/km²) (Beck 1985). Given the paucity of records in California, the species is likely more rare here than in the rest of the range.

Nature and Degree of Threat

The principal threats facing *Heloderma suspectum* in California are its small and extremely patchy distribution, coupled with the probable marginal habitat found in the state and presumed sensitivity to the effects of climate change. Further, we know virtually nothing about the ecology or population status of this species in California, so declines may occur that go undetected.

Status Determination

The almost complete lack of information on this taxon in the state, coupled with a life history that is potentially sensitive to changing climate, justifies designating this taxon as a Species of Special Concern. Because we have virtually no information about the magnitude of threat in this species, we refrain from assigning it a priority at this time.

Management Recommendations

Management recommendations are extremely difficult to formulate other than to protect habitat known to support this species from modification. Activities that might collapse or otherwise destroy burrows, including intense livestock grazing and mining activities, should be avoided in areas suspected of harboring *Heloderma suspectum* populations. Sightings of this infrequently encountered species should be submitted to the California Natural Diversity Database or other natural history databases (e.g., the LACM RASCals project, <http://www.nhm.org/site/activities-programs/citizen-science/rascals>).

Monitoring, Research, and Survey Needs

It may be impossible to study this species in the field in California because it is so rarely encountered. However, opportunities to do so should be pursued. Telemetric data, in particular,

would be difficult to gather because this species is encountered so infrequently, but would also be an important step in enabling the collection of additional information about California populations. We recommend modeling the climate envelope capable of supporting *Heloderma suspectum* to help focus efforts for future surveys. After potential habitat patches have been identified, dawn and dusk surveys during the spring and following summer rain events probably have the best

chance at identifying additional populations. A key priority for future sightings of this species is to collect nonlethal genetic samples that can then be compared to those collected from elsewhere in the range. These tissues will help to clarify intraspecific variation in the species and, if enough samples can eventually be collected, have the potential to supply information about distinctiveness and isolation of populations inhabiting different mountain ranges in the state.