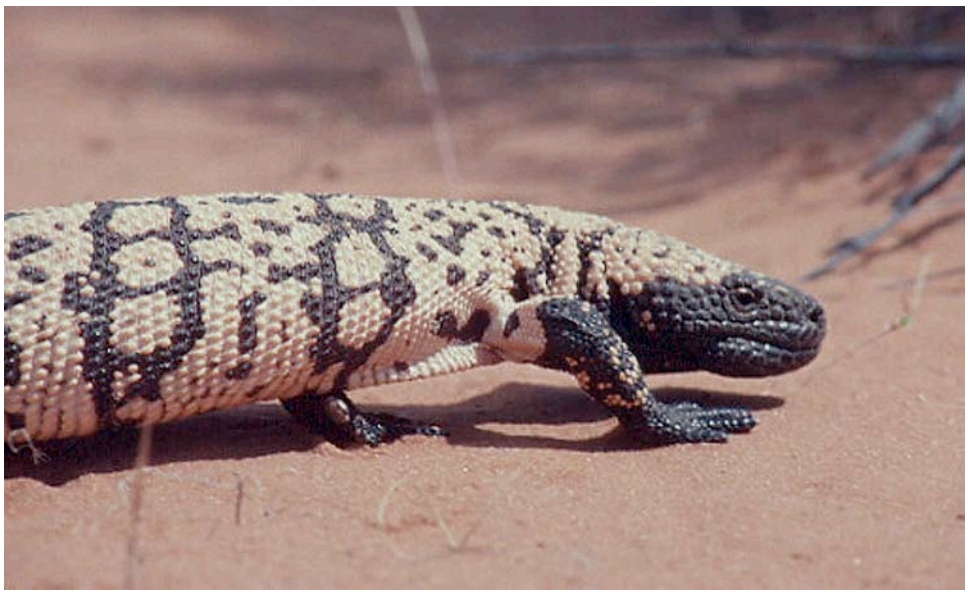
PETITION TO LIST THE UTAH POPULATION OF THE GILA MONSTER *(Heloderma suspectum)* UNDER THE U.S. ENDANGERED SPECIES ACT



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Petition Submitted to the U.S. Secretary of Interior
Acting through the U.S. Fish and Wildlife Service

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WILDEARTH GUARDIANS

Executive Summary

This petition seeks federal protection for the Gila Monster (*Heloderma suspectum*) within the Utah portion of its range.[1] Its Mohave Desert habitat in Utah is being rapidly destroyed by urban sprawl and related effects. The Utah population is isolated from other Gila Monster populations within the southwestern U.S. and Mexico, is ecologically distinct, and is an important, peripheral population of this species. The loss of this fascinating reptile from Utah would be a tragedy, as the Gila Monster still has much to teach us scientifically and about our ethical duties to the natural world.

The federal Endangered Species Act (ESA) provides for the listing of a distinct population segment (DPS) of any vertebrate species. As this petition demonstrates, the Utah population of the Gila Monster qualifies as a DPS. This population has suffered rapid and significant decline and is currently considered by scientists to be critically imperiled. The Monster's decline in Utah stems from habitat loss and degradation, mortality associated with roads and domestic animals, poaching, and a variety of other factors.

The banded subspecies of the Gila Monster has previously been a candidate for ESA protection. In 1996, the U.S. Fish and Wildlife Service (FWS) dropped it from the candidate list on the basis that it was more abundant than previously thought. Our petition seeks to underscore to FWS the imperilment of the species within the northern periphery of its range and to show that the Utah DPS qualifies for ESA listing under multiple criteria. We therefore request ESA listing as Endangered or Threatened for the Utah DPS of the Gila Monster and designation of its critical habitat.

Protection for the Gila Monster could provide important collateral benefits to flora and fauna that depend on intact, thriving Mohave Desert habitat. While the Gila Monster co-exists with federally protected populations of Desert Tortoise (*Gopherus agassizii*) – and even feeds occasionally on its eggs – protection for the Tortoise provides only minimal protection for the Monster. The Gila Monster requires sufficient prey (eggs and nestlings of vertebrates), access to suitable burrows (where its spends 95% of its life), and protection from increasing human populations, our infrastructure, our vehicles, and our domestic animals. The Monster's venom is no defense against humanity.

These numerous threats and imperilment may seem surprising when considering that the lineage that led to the Gila Monster survived the demise of the dinosaurs (and its ancestors likely raided dinosaur nests). The male to male combat ritual of the Monster can last for many hours and exposes its close evolutionary connection with snakes. This animal's evolutionary history is truly remarkable: its approximately 100 million year-old ancestor (*Primaderma nessovi*) was discovered in central Utah, not far from the area at issue in this petition. The Gila Monster has earned the title of a "living fossil," given that its morphology has changed relatively little over the intervening 100 million years. The Gila Monster itself has likely inhabited the American

[1]The primary source for this petition is Beck, Daniel D. 2005a. Biology of Gila Monsters and Beaded Lizards. University of California Press. This book comprehensively reviews the biology, ecology, and conservation status of the two sole extant members of the *Heloderma* genus. We have attached a full copy of this book to our petition.

Southwest for 25,000 years. Despite its long tenure in its current range, this species needs federal protection to survive the Anthropocene Period,[2] namely, us.

While the Monster's venom has inspired fear, it has become of great value to humans. An element of its venom (Exendin-4) has been developed into a promising drug, called Byetta. Byetta is a leading new treatment for Type II diabetes, from which 17 million people in the U.S. suffer. In 2008, Eli Lily pharmaceutical company reported over ¾ of a billion dollars in sales of Byetta. Interestingly, the Gila Monster venom samples that lead to the discovery of Exendin 4 in the 1980s originated from near St. George, Utah (Beck 2005b). Another element in its venom likely improves memory and could therefore benefit sufferers of Alzheimer's and attention deficit disorders.

Indeed, there is much yet to discover about the Gila Monster. For example, the elusive ways of this ancient reptile have prevented scientists from observing its nest conditions or incubation periods in the wild. Scientists don't conclusively know if its tail is a water-storage unit; the role of its "leaky skin"; the role of humidity in its burrow selection; the ecology of juveniles; nor do we even have range-wide population estimates. But, the mysteries enshrouding the Monster must not be used as an excuse to delay protection. Scientists have documented the rapid decline of this species in Utah, and FWS should act on this information to prevent its extirpation from the northern extent of its range, by listing the Utah DPS of the Gila Monster under the ESA and providing it with critical habitat.

[2]See Crutzen (2002), in which Crutzen discussed the concept of an "Anthropocene Period" to the geologic present, in light of humanity's overwhelming and irreversible impacts on the planet.

Introduction

The Gila Monster (*Heloderma suspectum*) ranges across portions of the Sonoran, Mohave, and Chihuahuan deserts in the U.S. and Mexico. Utah represents the northern periphery of its range. Its habitat here is unique and historically boasted the highest recorded densities of Gila Monsters. But its populations have dwindled in Utah as its Mohave Desert habitat in the state has been gobbled up by expanding human populations, and other related dangers. The threats the Gila Monster faces in Utah are many and severe. Without federal protection, this magnificent animal may be lost from Utah and its unique ecological setting there. Federal protection is required to reverse these trends and allow the Monster to persist throughout its natural range.

Petitioners request that the U.S. Fish and Wildlife Service (FWS) list the Utah Distinct Population Segment (DPS) of the Gila Monster under the Endangered Species Act (ESA) in order to give this fascinating, ancient, and sometimes persecuted creature its best chance of survival. Over 99% of the species listed under the ESA still exist.[3] The ESA is the Utah Gila Monster's best hedge against extinction.

Endangered Species Act Implementing Regulations & Policies

Taxa eligible for ESA listing include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature" (16 U.S.C. § 1532(16)).[4] FWS has established guidelines for determining a DPS, and this petition demonstrates that the Utah populations of the Gila Monster constitute a valid DPS.

Section 424 of the regulations implementing the Endangered Species Act (50 C.F.R. § 424) is applicable to this petition. Subsections that concern the formal listing of the Utah population of the Gila Monster as an Endangered or Threatened species are:

> 424.02(e) "*Endangered species* means a species that is in danger of extinction throughout all or a significant portion of its range."…(k) "species" includes any species or subspecies that interbreeds when mature. *See also* 16 U.S.C § 1532(6).
>
> (m) "*Threatened species* means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." *See also* 16 U.S.C § 1532(20).

ESA Section 4 (16 U.S.C. § 1533(a)(1)) sets forth listing factors under which a species can qualify for ESA protection (see also 50 C.F.R. § 424.11(c)):

> A. The present or threatened destruction, modification, or curtailment of habitat or range;

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[3]Compare the number of species currently listed under the ESA (1321) with the species that have been delisted due to extinction (9). *See* **http://www.fws.gov/endangered/wildlife.html** [Accessed November 2009].

[4]The sole exclusion is for "a species of the Class Insecta determined by the Secretary to constitute a pest whose protection…would present an overwhelming and overriding risk to man." 16 U.S.C. § 1532(6). It is difficult to imagine an insect so imperiled as to warrant ESA protection that presents a grave risk to humans.

B. Overutilization for commercial, recreational, scientific, or educational purposes;
C. Disease or predation;
D. The inadequacy of existing regulatory mechanisms; and
E. Other natural or manmade factors affecting its continued existence.

All factors set forth in 50 C.F.R. § 424.11(c) and in ESA Section 4 (16 U.S.C. § 1533(a)(1)) have resulted in the continued decline of the Gila Monster in Utah and are causing this population to face extinction or endangerment in the foreseeable future. A taxon needs to meet only one of the listing factors outlined in the ESA to qualify for federal listing.

Classification and Nomenclature

Common Name. *Heloderma suspectum* is known by the common names "Gila Monster," "Monster," and "Escorpión Pintado." Settlers earlier referred to the species as "Escorpión," "Escupión," or "The Spitter." Throughout the petition, we refer to *H. suspectum* as the Gila Monster, the Monster, or its scientific name (Beck 2005a).

Taxonomy. The petitioned species is *Heloderma suspectum* Cope, 1869. Its type locality is the Sierra de Moreno, near Monument no. 146, on the international boundary between Sonora, Mexico and Pima County, Arizona (Bogert and Martin del Campo 1956). It is one of only two species in its family and genus, the other being *Heloderma horridum* (Beaded Lizard). The two are collectively referred to as helodermatids, or monstersaurs (Beck 2005a). *Heloderma horridum* has four recognized subspecies (*horridum*, *exasperatum*, *alvarezi*, and *charlesbogerti*), which further inquiry may demonstrate to be full species (Beck 2005a, Douglas et al. 2010). The taxonomic classification for *Heloderma suspectum* is shown in Table 1. There are two recognized subspecies: *H. suspectum cinctum* (Banded Gila Monster), and *H. suspectum suspectum* (Reticulate Gila Monster) (Bogert and Martin del Campo 1956), although the validity of the two subspecies remains unsettled (Beck 2005a, Douglas et al. 2010). The geographic range of the two subspecies is described in a subsequent section.

Recent analysis of the phylogenetic history of the helodermatidae, using both mitochondrial DNA (MTDNA) and intron markers clearly partitioned each of the two species (*H. horridum* and *H. suspectum*). One intron and MTDNA further subdivided *H. horridum* into its four recognized subspecies (*H. h. alvarezi, charlesbogerti, exasperatum, and horridum*). However, the two subspecies of *H. suspectum* (*H. s. suspectum and H. s. cinctum*) were undefined (Douglas et al. 2010). Four regional groupings of *H. suspectum* (from Utah; Arizona; New Mexico; and Sonora, Mexico) showed little divergence from one another. Interestingly, Utah populations grouped most closely not with nearby Nevada populations, but with those of New Mexico (Douglas et al. 2003). The greatest genetic divergence was between México versus Utah/New Mexico [1.4% (±0.4) for each], and the least was 0.3% (±0.1) between Utah/New Mexico versus the remainder of the range (Douglas et al. 2010).

Table 1. Taxonomy of *Heloderma suspectum*.

Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Family	Helodermatidae
Genus	*Heloderma*
Species	*suspectum*

Francisco Hernandez first described the Heloderma genus in 1577. The genus name *Heloderma* derives from the Greek word *helos*, meaning "nail stud" and *derma*, meaning "skin." Combined, they accurately describe the studded skin of the Gila Monster and Beaded Lizard. The species name *suspectum* originates from an historic controversy over whether the Gila Monster was venomous. E.D. Cope, who formally named the species in 1869, employed the name *suspectum* because he suspected that the species was venomous. The venomous capacity of the helodermatids was not fully accepted by the scientific community until the 1920s (Beck 2005a).

The common name "Gila Monster" was coined in the 1870s and either derives from the Gila River in New Mexico and Arizona, where the species is found, or may be derived from the Greek *helios*, meaning "sun." The "monster" portion of its name stems from the enduring human fears around this animal, including its venomousness. The subspecies *H. suspectum suspectum* has a common name "Reticulate Gila Monster" due to the network – or reticulum – of mottling or blotches on its skin, while *H. suspectum cinctum* has a common name "Banded Gila Monster" because of its banded pattern. *Id*.

The Gila Monster is part of an ancient group termed the Monstersauria, which has a 100-million year history. The earliest fossil of a helodermatid, *Primaderma nessovi*, comes from (what is now) Emery County, Utah, not far from the current range of contemporary *H. suspectum* in the state. While slightly larger than the Gila Monster and lacking venom grooves, *P. nessovi* indicates that helodermatids have changed very little in the past 100 million years. The oldest *H. suspectum* fossil is 22,500 years old, but the Gila Monster has likely been established in the American Southwest for the past 25,000 years. *Id*.

The evolutionary history of Heloderma indicates its ancestors often occupied more humid environments, which may explain their high rate of evaporative water loss or "leaky skins." *Id*. at p. 38. Their low metabolism and low energy strategies are an adaptation to the harsher, more seasonal environments occupied since the Miocene (23 mya) (Beck 2005a).

Helodermatid lizards are members of the "Platynota" group, thereby sharing a more recent common ancestor with the Varanidae (monitor lizards), than with other lizards. Beck (2005a: 35) describes helodermatids as "the New World equivalent of a sluggish, venomous monitor lizard." As platynotans, helodermatid lizards are also closely related to snakes – more so than to many lizards, earning them a reference as "legged snakes" (*Id*. at p. 37). This is evident from their, forked tongues, and their remarkable male combat rituals, which include many of the entwining postures shown by snakes (Beck 2005a).

Description

An adult Gila Monster measures approximately 350-500 mm (13.8-19.7 in) in total length; 275-335 mm (10.8-13.2 in) snout-to-vent (SVL) length; with an adult average weight of 500 g (1.1 lbs). Maximum mass of wild individuals is up to nearly 1 kg (2.2 lbs). Their mass can fluctuate dramatically over the course of just several months. Scientists have documented wild hatchlings with mass of 23.1-33.4 g (0.8-1.2 oz) and 135-141 mm (5.3-5.6 in) in SVL. Juveniles entering their first winter have a SVL of less than 150 mm (5.9 in). Subadults, not yet capable of reproduction, have a SVL of 150-220 mm (5.9-8.7 in). *Id*.

The Monster is covered with beadlike osteoderms that give it the appearance of having studded skin. Its head appears bulky, with a blunt, rounded black snout. They have small eyes with movable eyelids; long, recurved teeth, some of which are grooved to conduct venom; and forked, black tongues. Gila Monsters' limbs are relatively short, and they have strong, recurved claws. The thickness of their tail depends on the amount of fat and water resources in their system. *Id*.

Hatchlings and juveniles have a light yellow or light orange background, with four to five black crossbands above their tale and four to five black bands on their tail. In southwestern Utah, adults may retain this coloring, with exceptions: dark adults lacking the juvenile banding were discovered in black basaltic lava flows in southwestern Utah. Other individuals in the Utah population are generally lighter-colored than those farther south. *Id*.

Distinctive Traits & Range Distinction

The only species with which the Gila Monster could conceivably be confused is the Beaded Lizard. The Beaded Lizard is generally longer with a proportionately longer tail, heavier, has more scales, less striking patterns and coloration, and other distinctive traits from the Gila Monster. Moreover, it occupies tropical dry forest habitat and occurs only in Mexico and Guatemala. *Id*. Alternatively, the petitioned DPS occupies very distant Mohave Desert habitat in southwestern Utah.

Geographic Distribution: Historic & Current

The Gila Monster occurs in southwestern Utah (Washington County), southeastern Nevada (Clark and Lincoln counties), southeastern California (San Bernardino and Inyo counties), western and southern Arizona (Cochise, Gila, Greenlee, Graham, Maricopa, Pima, Pinal, Yavapai, and Yuma counties), southwest New Mexico (Hidalgo, Grant, Luna, and perhaps Dona Ana counties), and Sonora, Mexico. Elevation of its habitat ranges from sea level to 1,738 m (5,700 ft) (Beck 2005a and references therein). The *cinctum* subspecies occurs in California, Utah, Nevada, and western Arizona. The *suspectum* subspecies occurs in southern Arizona, New Mexico, and Sonora, Mexico. *Id*. and Figure 1.

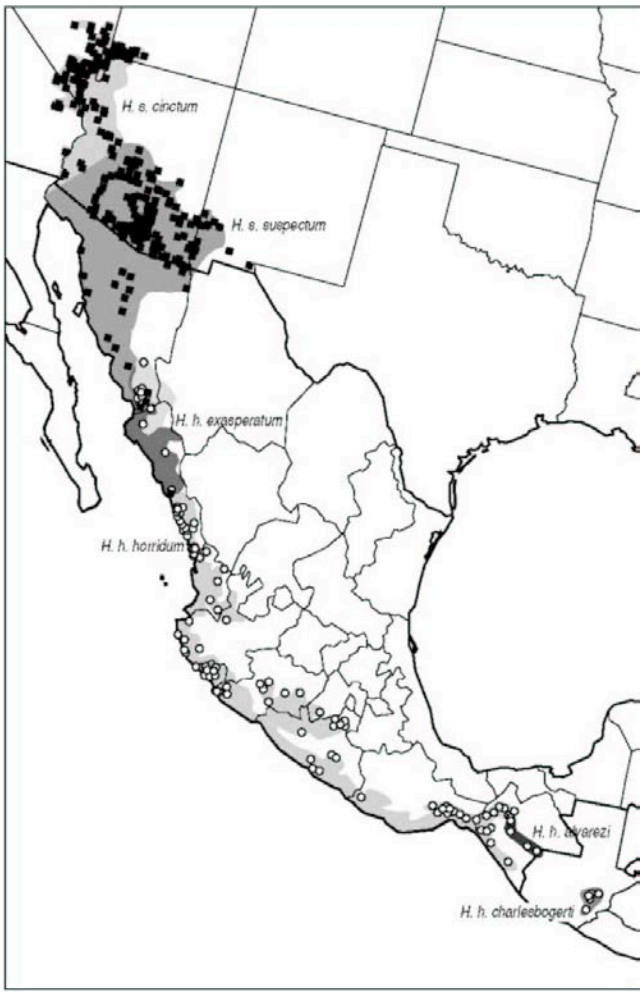

Figure 1: Range of the Gila Monster and Beaded Lizard.
Source: Beck (2005a).

The petitioned DPS occurs only in Washington County, Utah. Within this portion of its range, it has a patchy distribution, inhabiting washes, sandy valleys, and slopes at the foot of sandstone bluffs (Beck 1990, 2005a). It is found on the Beaver Dam Slope in southwestern Utah, the St. George and its vicinity, Leeds, Shivwits and Cedar Pockets Wash (Beck 2005a, McLuckie et al. 2007, Figure 2).

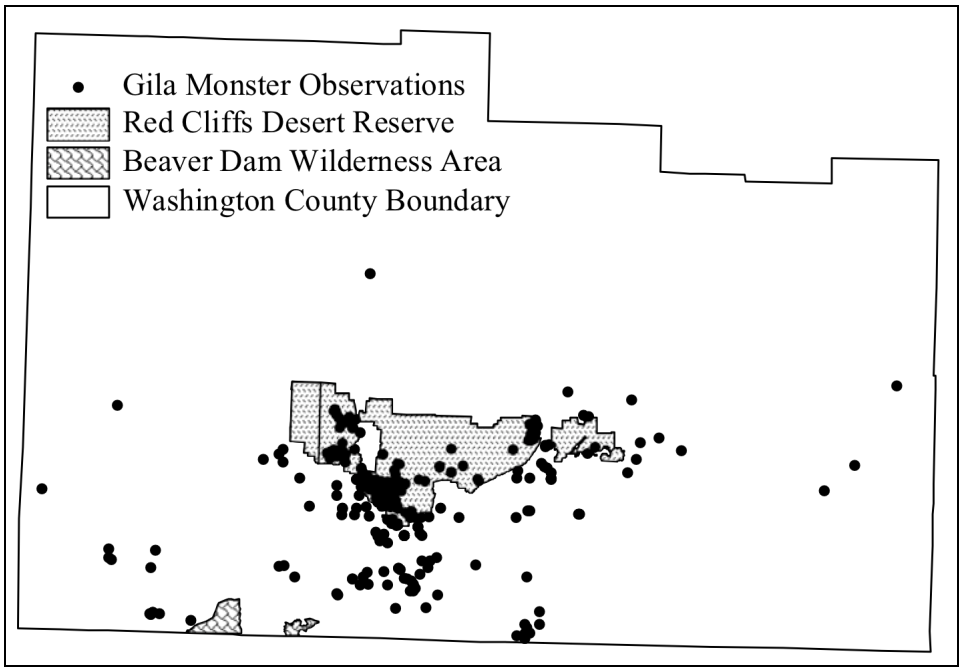

Figure 2: Gila Monster Observations in Utah (Washington County).
Source: McLuckie et al. 2007.

Population Status: Historic & Current

Historic and Current

The Gila Monster used to be abundant near Bloomington, St. George, Santa Clara, and Washington, Utah, but has been extirpated from much of this area due to commercial and residential development (Beck 2005a, McLuckie et al. 2007). Beck (2005a: 152) describes the Utah population as "in jeopardy" and McLuckie et al. (2007) consider it to be uncommon and suspect it is in decline. While range-wide declines of the species cannot be documented at this time, its status in Utah is bleak:

> A more ominous situation exists in the Mohave Desert of southwestern Utah. The majority of Gila Monster populations have already been lost from that state, and most remaining populations are in the direct path of another of the nation's fastest-growing communities (Beck 2005a: 155).

This burgeoning human population is taking its toll on some of the best Gila Monster habitat. Historically, the St. George vicinity contained the highest quality habitat range-wide, with as many as 20 *H. suspectum* per square mile. However, from 1980-2000, St. George's human population more than quadrupled, from 11,350 to 49,663 people. *Id*. States Beck,

> This once-tiny farming community has grown into a bustling hub of recreation and real estate development and surrounding cities have followed suit, swallowing most of the Gila Monster habitat that once existed in southwestern Utah. *Id*.

In this region, Gila Monsters are at their limit, in elevation and latitude. Displaced populations therefore cannot move elsewhere. *Id*. Beck concludes, "Clearly, significant conservation efforts must be taken if viable *H. suspectum* populations are to persist in Utah." *Id*. at p. 156.

Because of their secretive habits and rare appearances above ground, population estimates are very difficult to make for Gila Monsters. Before the 1960s there were likely thousands of Gila Monsters in Utah. Today those estimates are likely in the hundreds of individuals; certainly not in the thousands.

Tortoises have been in steady decline in Utah since they were listed in the 1980 (45 Fed. Reg. 55654-55666). The Desert tortoise is an herbivore, a primary consumer near the base of the food web. As predators that depend on vertebrate nests, Gila Monsters sit higher on the food web and desert habitats cannot support Gila Monster populations at as high a density as those habitats can support desert tortoises. Nowhere are Gila Monster populations known to occur at as high of densities as desert tortoises. The fact that the tortoise is in serious trouble in Utah does not bode well for the Gila Monster in the state.

Habitat Requirements

The Gila Monster occurs in desert scrub, desert grasslands, and woodlands in the Mohave, Sonoran, and Chihuahuan deserts. (As discussed in a subsequent section, there are important differences between its Mohave Desert habitat and habitat in other deserts.) Small trees, shrubs, and herbaceous vegetation in its habitat provide important cover and food for the Gila Monster's prey species. The Monster has even been observed climbing into small trees. This species uses arroyos as foraging sites. Of paramount importance is the availability of suitable shelters. Shelters are found in rock cavities and crevices, pack rat mounds, and burrows created by rodents, tortoises, and other predators, such as foxes, badgers, and coyotes (Beck and Jennings 2003, Beck 2005a).

Figure 3: Gila Monster in Paradise Canyon, Utah, taken in May 1983.
Photo by Dr. Daniel Beck.

Home range sizes range from approximately 6-147 ha (14.8-363.1 ac). There is wide variation in home ranges between individuals and populations. Males tend to have larger home ranges than females. This difference may become even more apparent during the spring and summer months (Beck 2005a, Kwiatkowski et al. 2008).

Natural History

The Gila Monster is one of only two extant lizards known to be venomous (the other species is the Beaded Lizard). This species is evolutionarily closer to snakes than other lizards, leading some researchers to describe it a "snake with legs." This snake on legs is also tenacious, as once it bites, the Monster often won't let go. Its bite is thought to be primarily for defense against predators, and it generally won't bite humans unless threatened or harassed (Beck 2005a).

Diet & Metabolism

The Gila Monster is strictly a nest predator, feeding exclusively on eggs and nestlings of vertebrate animals, including mammals, birds, and other reptiles. Some prey species don't go quietly: desert tortoises defend their eggs (Gienger and Tracy 2008) and round-tailed ground squirrels defend their pups from the Monster. Indeed, some of the tail scars often seen in wild Gila Monsters may be the result of bites from ground squirrels (Beck 2005a).

Gila Monsters likely use their acute sense of hearing and their memory to locate nestlings. They may travel long distances to find nests. An adult requires approximately 524 g (1.2 lbs) of food per year. Scientists have observed the species consuming as much as 1/3 of its annual calorie requirements in one meal. Its energy requirements are similar to rattlesnakes. *Id*. Helodermatid standard metabolic rates are the lowest of any lizard, and they are "among the most frugal energy consumers" (Beck 2005a: 63). Their long periods of inactivity provide energy savings. Gila Monsters store fat (and water) in their thick tails and body cavity, which allows them to go long periods without eating. Such strategies are necessary due to the patchiness of their food source (Beck 2005a).

Shelters

Over 95% of a Gila Monster's life is spent in its shelter, and the majority of this time is spent resting. Shelters provide means for thermoregulation, protection from predators, access to foraging areas, and access to potential mates. Rock burrows are thought to be more stable, but the Monster will also use soil burrows. Individual Gila Monsters show very strong site fidelity to particular burrows, which they require throughout the year (Beck and Jennings 2003). Both males and females defend their burrows, except when a male and female cohabitate, and these shelters likely play an important role in the social structure. Males seek out shelters occupied by females, and females will enter a shelter inhabited by males (Beck 2005a).

Figure 4: Gila Monster Basking. Photo by Dr. Daniel Beck.

The availability of shelters may be a limiting resource for this species. Gila Monsters are very selective in which shelters they will use: vapor pressure and direction of entrances are both

important, and there is variation throughout the year. For example, vapor pressure is important in selection of late spring and early dry summer shelters; winter shelters should be rockier, deeper and with south-facing entrances on south-facing slopes; dry summer shelters can be more variable in which direction they are oriented; and spring shelters may be east-oriented, rockier, and shallower. The amount of time *H. suspectum* spends in a certain shelter varies seasonally, with the highest proportion of time within a shelter generally occurring during winter. In contrast, individuals may change shelters every 4-5 days during summer months (although important exceptions have been documented) (Beck 2005a).

Movements

The Gila Monster is relatively slow, with a top speed of 1.9 km/hr (1.2 mi/hr) and has a very conservative energy use strategy. This may provide it with an advantage over competitors and predators in the very seasonal environments it occupies. Gila Monsters show less activity in Utah, particularly in July or August, than in Nevada or Arizona. *Id*.

While shelters are important for thermoregulation, the Monster also basks in the sun, likely for the same goal of regulating its body temperature. In Utah, the period of *H. suspectum* basking is generally late March through May, and occasionally on cool days during the summer. This is a shorter basking period than elsewhere in its range. *Id*.

With their peak active time in the spring (particularly May), Monsters appear to be better able to withstand cold than hot temperatures. However, their activity temperature range is 17.4°C-36.8°C (63.3°F-98.2°F), with a preferred temperature of approximately 30°C (86°F). They seek refuge as temperatures approach 38°C (100.4°F); become paralyzed at 42°C (107.6°F); and are rarely active at body temperatures below 24°C (75.2°F). Morning appears to be the peak activity time for much of the year, but individuals can be active during day or night. *Id*.

The Monster's intolerance of excessively hot temperatures may be due to its need to reduce evaporative water loss, through its skin and cloaca. To regulate its body temperate when thermally stressed, *H. suspectum* expels water through its cloaca, rather than by panting, unlike other lizards (Denardo et al. 2004). This genus has high rates of water loss in comparison to other lizards, possibly more than double those of lizards in arid habitats. Active animals may lose water at 3-4 times the rate of resting animals. Avoiding hot temperatures, being active at night, and seeking cool and humid burrows are therefore important survival strategies for the Gila Monster. In addition, Gila Monsters can store water in the urinary bladder and use that water for later use as a physiological reservoir to moderate dehydration (Davis and DeNardo 2007). Most of their water needs are met through the moisture of their prey, supplemented by drinking from rain pools and metabolic production of water (Beck 2005a).

Monsters may travel only a few meters or over a kilometer, particularly when they are returning to a favorite shelter. In their average aboveground journey, they will travel approximately 250 m (820.2 ft). They walk in an undulating, often meandering style, swinging their front, then rear, side to side. Their standard pace is approximately 250 m/hr. While walking, they investigate with their forked tongue, a chemosensory organ that allows detection of prey, location of shelters, communication with other Monsters, and identification of predators. *Id*.

Reproduction and Dispersal

One of the most remarkable behaviors of the Gila Monster (and in the animal world) is the male-to-male combat ritual performed during the breeding season (Figure 5). These entwining wrestling matches are reminiscent of those performed by snakes and can last from several minutes to many hours (the longest recorded was a staggering 12 hours). The male Gila Monster has a very high aerobic capacity (particularly for a slow-moving reptile), likely due to the importance of the combat rituals in determining which males will successfully mate and pass along their genes (Beck et al. 1995). These spectacular displays are not vicious brawls; rather, the primary goal is maintaining a superior position and pressing one's opponent to the ground (Beck 1990, 2005a, Geinger 2003, Gienger and Beck 2007). Resident lizard may have an advantage in combat. Spring basking may be associated with male combat and male/female pairings within burrows (Beck 2005a).

Figure 5: Male Gila Monsters in Combat, Vying for Access to a Female Gila Monster.
Photo by Dr. Daniel Beck in Paradise Canyon, Utah.

Little is known about reproduction in the wild. Mating likely takes place within shelters in April and May. Copulation in captive pairs lasts from 3 minutes to 2.5 hours. Captive females lay their eggs 6-8 weeks later in July and August (Beck 2005a). Average clutch size is 5.7 eggs, and, in the wild, reproductive females seldom reproduce every year (a 2-3 year cycle is more likely). While eggs are laid in the summer, hatchlings have not been observed until the following spring. It is not known whether hatching occurs in the fall or spring. If eggs do not hatch until the spring, this would mean the species has a very long incubation period: 240-300 days. After hatching, Gila Monsters absorb the yolk from their egg in the course of their first weeks of life. *Id*.

Gila Monster eggs are sensitive to moisture and temperature levels while they incubate. In fact, this sensitivity may be important in limiting helodermatid distribution. *Id*.

After hatching, Gila Monsters stay in or around the nest for weeks or months and may be largely nocturnal. Young individuals can grow rapidly, but growth rates vary. Some juveniles have been

documented to grow by 50 mm (2 in) per year, but some large adults may only negligibly grow after 3 years. In captivity sexual maturity can be reached at 2-3 years of age, but in nature takes closer to 3-4 years. *Id*.

Timing of *H. suspectum* activities varies with age. Newly hatched Gila Monsters are active on the surface from May-August. Subadult individuals peak in activity in July. Adults peak in activity in April and May, and, especially in the Sonoran Desert, in July/August with the onset of summer rain. *Id*.

Longevity

Heloderma suspectum is a long-lived species. In captivity, and even in the wild, they may live for 20 years or more. In one population in Arizona, the average life expectancy was 7.4 years. Annual mortality and emigration from a population ranged from 6.5-27.5% at one long-term monitoring site. Average adult annual survivorship is approximately 85% (Beck 2005a). Juvenile survivorship has not been measured, but is certainly much lower than adult survivorship. Given susceptibility of juveniles to road mortality, predators, dessication, and food shortages, survivorship rates are likely well below 5% in most populations.

Sexual Dimorphism

The heads of adult male Gila Monsters are wider than females (Gienger and Beck 2007). However, well-fed *H. suspectum* also tend to have wider heads (Beck 2005a).

Venom

The Gila Monster is the only venomous lizard in the United States. Its venom glands are modified salivary glands. Their function is likely defensive, rather than being used primarily to subdue their usually defenseless prey. Helodermatid venom is as toxic to mammals as the Western Diamondback Rattlesnake (*Crotalus atrox*). The venom causes varied results, including respiratory irregularities, cardiovascular failure or impaired function, hemorrhaging of eyes and internal organs, welling of internal organs, vomiting, and excruciating pain. *Id*.

Scientists suggest that venom may also play a role in aiding digestion and regulating glucose levels, which is particularly important given that the Monster may go long periods without eating. Another peptide in its venom, called gilatide, likely improves memory. This, perhaps, helps increase predator avoidance of the Monster, as a bitten predator can remember the excruciating experience. *Id*.

Despite the historic persecution of this animal out of fear, Hernandez fairly stated more than four centuries ago that "it never tends to harm anyone unless offended or provoked" (Bogert and Martin del Campo 1956, cited in Beck 2005a at p. 3). Indeed, unless directly threatened, the Gila Monster will not bite. The relatively few bites that occur each year are due to human carelessness, with alcohol often involved. Persons in good health that seek medical treatment will likely fully recover in a short time frame (Beck 2005a).

It turns out that that which has made us fear the Gila Monster could be of great value to humans. An element of its venom, called Exendin-4 and discovered from Gila Monsters in the petitioned DPS, has provided the basis for a synethetic version that has become a major new treatment for Type II diabetes, from which 17 million people in the U.S. suffer. In addition, gilatide, another peptide discovered from Gila Monster venom, could therefore benefit sufferers of memory, attention, and hyperactivity disorders. *Id*.

Qualification as Distinct Population Segment

Substantial evidence suggests that the Utah population of the Gila Monster qualifies as a DPS under the ESA. The ESA specifies that a DPS can only be designated for vertebrates (16 U.S.C. § 1532(16)). In 1996, FWS (and the National Marine Fisheries Service) established a set of guiding principles[5] for defining a DPS. 61 FR 4722. To qualify as a DPS, a population must be discrete from other populations of the species and significant to the species:

> *Discreteness:* A population segment of a vertebrate species may be considered discrete if it satisfies either one of the following conditions:
> 1. It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.
> 2. It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.
>
> *Significance:* If a population segment is considered discrete under one or more of the above conditions, its biological and ecological significance will then be considered in light of Congressional guidance…that the authority to list DPS's be used…"sparingly" while encouraging the conservation of genetic diversity. In carrying out this examination, the Services will consider available scientific evidence of the discrete population segment's importance to the taxon to which it belongs. This consideration may include, but is not limited to, the following:
> 1. Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon,
> 2. Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon,
> 3. Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range, or
> 4. Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

Id. at p. 4725. Notably, the policy does not require absolutive reproductive isolation nor does it require genetic evidence of differentiation.

[5]The Services describe the policy as "non-regulatory in nature" (61 FR 4722 at p. 4723) and "guiding principles" (*Id*. at p. 4725), and they therefore should be considered policy guidance, rather than regulation.

Discreteness – The Utah population of the Gila Monster is discrete from other populations throughout its range. In Utah, *Heloderma suspectum* occurs as a separate unit, largely within the Dixie Valley surrounding St. George. This region is geographically isolated from other Gila Monster populations, separated by the Virgin River Gorge and the Beaver Dam mountains to the southwest and the Pine Valley mountains to the north. Gila Monster populations disappear at elevations above 1300 m (3,600 feet) to the north and east of St. George, Utah, where *Heloderma suspectum* reaches the northern terminus of its geographic distribution. Utah populations are distributed unevenly across the landscape, ocurring in pockets often associated with rocky outcrops and intact Mohave Desert plant assemblages (Beck 2005a, Beck and Emblidge 2008, Emblidge 2010). To the south of St. George, little suitable Gila Monster habitat remains, with one potentially favorable pocket near Fort Pearce Wash in Warner Valley (Beck and Emblidge 2008). Remnants of a small population may persist along the Arizona border on the Beaver Dam slope in Utah, but their numbers are extremely low; fewer that 10 validated records exist on the Beaver Dam slope (UDWR database), and all were recorded before the catastrophic fires of 2005 destroyed much of the remaining prime Mohave Desert habitat on the Utah side of the Beaver Dam slope.

There are ecological, physiological and behavioral factors that also set Utah populations of *Heloderma suspectum* apart from others within its range. Fossil evidence suggests that the genus evolved in semi-arid subtropical environments similar to the tropical dry forests it now inhabits in Mexico (Beck 2005a). During the Miocene, when the North American climate became drier and more variable, *Heloderma* likely became more specialized toward drier subtropical and desert environments (Stevens 1977, Pregill et al. 1986, Beck 2005a). A legacy of this tropical ancestry remains with the Gila Monster in its relatively high rate of cutaneous water loss (DeNardo et al. 2004, Beck 2005a), and on its reliance on summer precipitation throughout its range. Gila Monster populations in the Mohave Desert, where summer rain contributes a minority of annual precipitation, show ecological differences from Sonoran desert populations that evolved in response to a precipitation regime dominated by summer rain. Interestingly, Gila Monsters are conspicuously absent from much of the Mohave and Lower Colorado Deserts where summer rainfall falls below 25% of the total annual precipitation. St. George, Utah, where summer precipitation (June-Sept) comprises 27% of annual precipitation of 8.25 inches (NOAA, W. Regional Climate Center data 1892-2005), comprises the best known habitat for *Heloderma suspectum* within the Mohave Desert.

Because of more severe summer drought in the Mohave Desert, Utah Gila Monster populations show a greater portion of annual activity in the spring, and less response to summer precipitation. Mohave Monsters continue to be active in June, but the species decreases its activity levels in the Sonoran Desert at this time of year. In Utah, most (~64%) of the Gila Monster's activity takes place from late April-early July (Beck 1990). Here they show a much smaller surge in late summer activity, whereas Sonoran and Chihuahuan populations become more active when late July and August monsoons arrive (Beck 2005a). Gila Monsters also spend much less time on the surface in southwestern Utah – an average of just 65 hours per year – versus in Sonoran and Chihuahuan desert habitats. In one Arizona location, researchers estimate the species spends as much as 670 hour per year active on the surface. Contrasts are also apparent between Mohave populations, as scientists found Gila Monsters traveling twice as far in their average journey in Nevada as they did in Utah (Gienger 2003, Beck 2005a). In addition, Utah Gila Monsters are

subjected to colder winter temperatures than Arizona populations and show significantly lower body temperatures during winter dormancy (Emblidge 2010), which may have important implications for energy conservation during winter.

Research on Utah Gila Monster populations has shown that these lizards comprise a unique subset of the ecological and physiological strategies used by desert ectotherms to cope with life in highly seasonal and unpredictable environments (Beck 1985b, 1990, 2005a; Beck and Emblidge 2008, Emblidge 2010). Nowhere within the Mohave Desert are Gila Monsters known to occur at the high densities recorded in the Dixie Valley of Utah (Barnum, A., pers. comm. 1984, Coombs 1977, Beck 1985b, 2005a). These populations are now in serious jeopardy. Loss of this unique population segment would be a tragedy not only on ethical grounds, but also from a scientific perspective.

Significance – In Utah Gila Monsters occur in a unique and unusual ecological setting for the taxon. The Dixie Valley comprises a spectacular mixture of Jurassic Navajo sandstone and Holocene basaltic lava flows found nowhere else within the range of *Heloderma suspectum*.

At its southern limits, the Mohave meets the Sonoran Desert in a rather broad, fuzzy boundary, but in the north, along its transition with the Great Basin in Utah, the boundaries are more sharply defined. Mohave Desert plant assemblages mingle within this region with those of the Great Basin to create a unique habitat in which Gila Monsters have historically thrived. Snow Canyon and Paradise Canyon (named in the 1970s because it was a "paradise" for Mohave Desert reptiles) provide excellent examples of this. In Nevada, towering Navajo sandstone cliffs also occur in very limited habitat for some *Heloderma* populations, but Nevada populations are even more spotty than in Utah, and nowhere but Utah does the unique combination of Holocene basaltic lava flows mix with Navajo Sandstone to create such unique, majestic habitat. Indeed, these same scenic features of Utah Gila Monster habitat have attracted so many people to the region, and spawned the development boom that has placed the Utah Gila Monster in peril.

The diverse topography of Utah Gila Monster habitat constitutes not only an unusual ecological setting for the taxon, but also offers unique scientific opportunities. A recent analysis of Utah habitat revealed the importance of topographical complexity on the occurrence and distribution of *Heloderma*. Gila Monsters are more commonly encountered in habitats with intermediate topographical complexity, and with diverse Mohave Desert plant assemblages (Emblidge and Beck 2008, Emblidge 2010). The surprising occurrence of dark individuals (without crossbands) on black basaltic lava flows in Utah provided insight into the evolutionary forces acting on *Heloderma* to blend in with the unique geomorphic features of their habitats (Beck 1985a). Recent genetic research has shown relatively little variation across the range of *H. suspectum* (Douglas et al. 2010). Interestingly, however, Utah populations show greater genetic similarity with geographically distant populations of New Mexico (another state where their distribution in very limited) than with more proximate Arizona and Nevada populations (Douglas et al. 2010).

Humans have long been drawn to the spectacular geology and biological diversity that makes southwestern Utah an icon of desert beauty (Zion National Park, Snow Canyon State Park, BLM Red Cliffs are but a few examples). It would indeed be a tragedy to lose one of its most iconic reptile species -- the Utah Gila Monster – from this unusual, unique, and majestic place.

After meeting the discreteness and significance tests, the final question is whether the Utah Gila Monster warrants ESA protection. We outlined evidence earlier in this petition that the Utah population is declining and has been much-reduced from its historic levels. Further, as we demonstrate below, it meets all five ESA listing factors (even though it need only meet one), and therefore warrants protection as a Threatened or Endangered DPS under the ESA.

Why protect the Utah DPS? In its 1996 DPS policy, FWS provided a compelling reason:

> Listing, delisting, or reclassifying distinct vertebrate population segments may allow the Services to protect and conserve species and the ecosystems upon which they depend before largescale decline occurs that would necessitate listing a species or subspecies throughout its entire range. This may allow protection and recovery of declining organisms in a more timely and less costly manner, and on a smaller scale than the more costly and extensive efforts that might be needed to recover an entire species or subspecies. The Services' ability to address local issues (without the need to list, recover, and consult rangewide) will result in a more effective program.

61 FR 4722 at p. 4725. All of the threats discussed below apply at both the DPS and full species level. Populations in Arizona, California, Nevada, New Mexico, and Mexico will likely experience declining population trends unless habitat is protected, research is funded, and individuals are safeguarded from mortality. Our petition presents FWS with the opportunity to list the Utah DPS not as an end in an of itself, but as a first step toward recognizing that the Gila Monster's needs should be taken into account by private and public land managers across its range. Otherwise, we will all but ensure costly measures that may come too late for this remarkable "living fossil."

Identified Threats to the Petitioned Species: Criteria for Listing

The Utah population of the Gila Monster meets all of the criteria for listing under the ESA:

A. Present and threatened destruction, modification, and curtailment of habitat and range;
B. Overutilization for commercial and recreational purposes;
C. Disease or predation;
D. The inadequacy of existing regulatory mechanisms; and
E. Other natural or manmade factors affecting its continued existence.

The habitat of this DPS is being rapidly reduced, degraded, and fragmented by commercial and residential development (Factor A). Additional habitat threats include proliferation of noxious weeds and altered fire ecology, which harm both the Gila Monster and its prey species. While trade of Gila Monsters is regulated, the species is still vulnerable to poaching and illegal trade (Factor B). Continued legal trade can provide cover for illegal collection of the species from the wild (Beck 2005a). Gila Monsters are preyed upon by a variety of natural predators, but more dangerous are their increasing exposed to domestic predators such as dogs and cats (Factor C). Due to continued habitat destruction, illicit trade, predation, and other threats, it is evident that

existing regulatory mechanisms are inadequate to ensure the persistence of this DPS (Factor D). Road mortality, continued (baseless) human persecution, and ill-fated translocations further threaten the species (Factor E). The rapid decline of the species in Utah has generated an additional threat – its vulnerability to extirpation from stochastic events due to small population size and restricted range (Factor E). Climate change and burgeoning human populations are additional threats to the species (Factor E).

I. Present and Threatened Destruction, Modification, or Curtailment of Habitat or Range.

Rapid development around St. George has caused declines in the Gila Monster population over the past 20 years. Habitat loss, degradation, and fragmentation affect helodermatid lizards in several ways. Such habitat alteration can isolate previously connected patches of suitable habitat and therefore impede or prevent immigration, emigration, and gene flow in Monster populations. The consequently smaller populations will generally have lower recruitment success and reduced genetic variation, making them more susceptible to extirpation. These smaller populations may also be less tolerant of extreme events such as severe droughts. Conversion of habitat to commercial and residential development can lead to increased poaching or human persecution, and invasion by exotic species, disease, and non-native or subsidized predators. Importantly, habitat fragmentation may limit resources for the Monster's prey species, which will likewise harm the Monster itself (Beck 2005a).

Recent analyses of Gila Monster habitat in Utah provide some quantitative estimates of what habitat remains, and what features are most strongly correlated with Gila Monsters in Utah (Beck and Emblidge 2008, Emblidge 2010). No valid Gila Monster sightings exist at elevations above 1250 m (4,100 ft) in Utah. In addition to elevation, habitat features most strongly associated with Gila Monster presence in Utah were (1) moderate topographical complexity, (2) presence of potential shelters (actual Gila Monster locations had significantly more shelters than random locations), and 3) diversity of diagnostic Lower Sonoran life zone plant species (e.g. creosotebush, white bursage, as measured by Shannon diversity index). Using these and other variables associated with Gila Monster presence in Utah, Emblidge and Beck created a weights-of-evidence (WofE) predictive habitat model that mapped Washington County into varying levels of Gila Monster habitat quality. They found that development has already swallowed up at least 16,900 ha, or over 65 mi^2 of former prime/favorable habitat, and that only about 3570 ha, (under 14 mi^2) of prime habitat remains, and approx 16,810 ha (under 65 mi^2) of favorable habitat remains in Utah. "Prime" habitats are areas where relatively large populations of Gila Monsters (~20 lizards/mi^2) are known to exist. "Favorable" habitats (approx. 16,810 ha or 64.9 mi^2) are within the elevational range of Gila Monsters, have moderate topographic complexity, and Lower Sonoran vegetation community.

Over 45% of prime and favorable habitat has already been irreversible lost from Utah. The vast majority of remaining habitat (614 mi^2) was classified by Emblidge and Beck as "marginal", i.e. within the elevation range, but with less topographic complexity and few records of Gila Monsters. Marginal areas are likely composed mostly of habitat that cannot support high Gila Monster densities, interspersed with smaller patches of favorable

habitat. If repatriation of *Heloderma* is ever necessary in Utah, marginal habitat will offer very limited options for translocation (see Sullivan et al. 2004).

Other forms of habitat loss include disturbances, invasive plants, and altered fire regimes. Disturbances such as erosion, alteration of shrubs, off-road vehicles, non-native ungulates, human recreation, and other land uses can reduce suitable shelters (in both rock and soil) for the Gila Monster. Invasion by non-native grasses can displace native forage important for the Monster's prey species and alter a natural fire regime by increasing fire frequency and intensity. Individual *H. suspectum* can be killed by these fires, their burrows may be destabilized, the plant community can be further invaded by non-native species, and the Monster's prey species may also be adversely affected (Beck 2005a).[6]

McLuckie et al. (2007) recognize all of these forms of habitat degradation as threatening the Gila Monster in Utah.

II. Overutilization for commercial, recreational, scientific, or educational purposes

Historically, commercial trade in Gila Monsters has been intense. In the first half of the 1900s, thousands of individual Monsters were traded. By the 1970s, trade in the species was regulated throughout its range. Currently, trade and wild collection of Gila Monsters is regulated at the state level in Utah and also at the national and international levels. However, illicit trade and poaching continue and remain a threat. Indeed, the legal captive trade can provide cover for illegal activities, given the difficulties in discerning whether captive animals were poached from the wild. Unfortunately, Gila Monsters are "among the most common black-market reptiles in the southwestern United States," (Beck 2005a: 162) and the banded morph of Gila Monster (found in Utah) may be under particular pressure due to its rarity. *Id*. Beck (2005a: 162) states,

> Poaching is a significant threat to the diminishing populations in southwestern Utah, and enforcement activities have picked up there. In the late 1980s, a pet shop owner near Salt Lake City, Utah, was arrested after paying collectors to bring Gila Monsters from St. George to sell to pet shop customers.

McLuckie et al. (2007: 11) agree that "poaching is considered a significant threat in southwestern Utah and there is current evidence of illegal trade."

In addition to illegal trade within the U.S., there is significant smuggling of Gila Monsters across international borders, both between the U.S. and Mexico, as well as cases involving European dealers. This trade continues due to their high commercial value: they are one of the most commercially valuable reptiles on the continent Beck (2005a).

The Gila Monster is an Appendix II species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). This designation means that trade is

[6]Beck (2005a) discusses Esque et al.'s (2003) suggestion that fire effects on helodermatid lizards are similar to the desert tortoise (*Gopherus agassizii*). See discussion of effects to the Sonoran desert tortoise in the 2008 petition to list the Sonoran desert tortoise under the Endangered Species Act: WildEarth Guardians and Western Watersheds Project (2008).

regulated, not prohibited. Attempts by conservationists and animal protection groups to obtain more protections through an Appendix I classification have failed. *Id*.

III. Disease or Predation

A number of native species prey upon adult and/or juvenile Gila Monsters, including coyotes, badgers, bobcats, foxes, mountain lions, king snakes, rattlesnakes, roadrunners, hawks, owls, and ravens. While under natural circumstances this predation would likely not constitute a threat, it may further compound anthropogenic threats, particularly given the small population size and reduced area of the Gila Monster in Utah. Non-native species also prey on Gila Monsters, including dogs (which can kill Gila Monsters of any size) and cats (which can kill juveniles) (Beck 2005a). Given growing human populations, with accompanying increases of domestic dogs and cats, as well as human subsidies to native species such as coyotes and ravens, predation will likely exacerbate the predation threat to the Monster.[7] McLuckie et al. (2007) recognize the danger to Gila Monsters in Utah from domestic animals.

It is unknown whether disease constitutes a threat to the Gila Monster. Parasites and potential for gout are possibilities (Beck 2005a).

IV. The inadequacy of existing regulatory mechanisms

The Utah population of the Gila Monster is not adequately protected by federal or state laws or policies to prevent its endangerment or extinction.

NatureServe Global Status: NatureServe ranks the full species as G4 and each of the subspecies as G4T4.[8] This rank is defined as follows:

> **G4 Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.[9]

T4 is an analogous ranking at the subspecies level.[10]

NatureServe National Status: The Gila Monster has a national ranking of N4, analogous to its global rank, but at the national level.

USFWS: *H. suspectum cinctum* was a former Category-2 candidate for ESA protection. FWS dropped it as a candidate when it eliminated the Category-2 list in 1996. 59 FR 58982, 61 FR 7595-7613. This subspecies is now considered a "Species of Concern" by FWS, which provides it with no regulatory protections.[11] The Gila Monster currently has no status under the ESA: it is not listed, proposed, or a candidate for listing.

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[7]The role of human subsidies in aggravating predation pressure is discussed in the Sonoran desert tortoise ESA listing petition and is applicable to the Gila Monster as well (WildEarth Guardians and Western Watersheds Project 2008).
[8]See **http://www.natureserve.org/explorer** accounts for *Heloderma suspectum, H. suspectum suspectum, and H. suspectum cinctum* [Accessed November 2009].
[9]*See* **http://www.natureserve.org/explorer/ranking.htm#globalstatus** [Accessed November 2009].
[10]*Id*.
[11]*See* **http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C05Q** [Accessed November 2009].

The only significant Habitat Conservation Plan (HCP) pertinent to the petitioned DPS is the Washington County HCP, issued in 1995 (Washington County HCP Steering Committee and SWCA Environmental Consultations 1995). This 20-year HCP authorizes take of 1,169 desert tortoises on 12,264 acres of their occupied habitat and 31,282 acres of potential tortoise habitat. It allows for development and many other harmful land uses and activities across this extensive area. The Red Cliffs Desert Reserve, which comprises approximately 64,000 acres (approximately 40,000 of which harbor suitable habitat for tortoises and Gila Monsters; the rest is too high in elevation), was provided as an important mitigation. While Gila Monsters occur on this preserve, because it is not listed under the ESA, the HCP does not provide any enforceable regulatory mechanisms to protect this species. FWS's 1996 biological opinion for this HCP does not mention the Monster (USFWS 1996).

Desert tortoise habitat protection on Red Cliffs Reserve can provide some degree of umbrella protection for the Gila Monster, but it is not a perfect umbrella (Beck 2005a). Indeed, the HCP discloses that, "Elimination of several population pockets of this unique lizard is expected to occur as a result of the HCP implementation" (See HCP at p. 150). Figure 2 shows that many, if not most, Gila Monster observations in the county are not within the boundaries of the Red Cliffs Reserve.

The Red Cliffs Desert Reserve faces a multitude of serious threats. An extensive highway is proposed to cross it; recreation pressure is very intense; recent fires destroyed 25 percent of the habitat in Red Cliffs Desert Reserve; and weeds are a perennial problem. Many suburban homes border the Red Cliffs Reserve adding numerous threats associated with the edge effect: roadkills, and predation by marauding cats and dogs.

Also concerning are reports of HCP violations from Bill Mader, who administrated the Washington County HCP from 1994-2008. Mader has contended important breaches, including state and county attempts to authorize a freeway through the Red Cliffs Desert Reserve; and re-allocation of $200,000 in funds slated for surveys or acquisition of habitat for sensitive species to construction of a building. On the latter example, Mader asserts that both the Utah Department of Natural Resources and FWS were complicit in this alleged misappropriation of funds (pers. comm., Bill Mader).[12]

Utah

NatureServe ranks the Utah state status of this species as S1, which is defined as:

> **Critically Imperiled**—Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction.[13]

The Utah Comprehensive Wildlife Conservation Strategy ("CWCS") considers the Gila Monster to be a Tier II Species (Sutter et al. 2005 at p. 5-3). It cites human disturbance, development, and

[12]Letter from Bill Mader, dated 2009, is attached. [Attachment 24]
[13]*See* **http://www.natureserve.org/explorer/ranking.htm#globalstatus** [Accessed November 2009].

illegal collection as threats (Table 2). *Id*. at p. 6-7. The CWCS does not, however, provide any enforceable regulatory protections to the Gila Monster.

Table 2. Gila Monster Species Account in Utah Comprehensive Wildlife Conservation Strategy.

Gila Monster *Heloderma suspectum* Tier II Reptile	**Biology and Life History**	**Population**	**Distribution**
	Inhabits rocky canyon bottoms or washes.	Population size and trends unknown.	Found in localized portions of Washington County.

General Threats	**Specific Threats**	**General Conservation Actions**	**Specific Conservation Actions**	Priority
Human Disturbance	Predation by domestic animals and human recreation	Protect Significant Areas	Prioritize and protect undisturbed areas with fencing or other restrictions	H
Development	Municipal and industrial development eliminating available habitat	Protect Significant Areas	Prioritize and protect undisturbed areas with zoning and/or acquistions; seek habitat restoration opportunities	M
Harvest	Subject to illegal collection	Education and Outreach	Complete and distribute educational brochure	M

As discussed above, collection and trade of Gila Monsters is regulated in Utah. However, these measures have been inadequate to stop continued collection of Gila Monsters in the wild, including within Utah (Beck 2005a; McLuckie et al. 2007).

The State of Utah developed a conservation plan for the Gila Monster in January 2007 (McLuckie et al. 2007). The actions it prescribes are to:

> 1) Identify current distribution, status and long-term trends of Gila monsters to determine if conservation measures are effective in protecting populations;
> 2) Identify, maintain, protect, and enhance important habitat to protect and conserve Gila monsters in southwestern Utah;
> 3) Reduce threats to Gila monsters and their habitat;
> 4) Develop and implement a relocation program to increase survival of displaced animals as well as minimize impacts on existing Gila monster populations; and
> 5) Increase public awareness and support for the recovery of the Gila monster in southwestern Utah through the use of educational opportunities and materials.

See McLuckie et al. (2007: 11). The most important tangible measures to reduce threats to the Gila Monster are Goals 2 and 3, the protection of habitat and reduction of threats, respectively. While monitoring Monster populations (Goal 1) is necessary to provide a basis for evaluating the status of the species and the results of management efforts, and is underway, it does not afford actual protections. Goal 4 (relocation of individuals) will not recover this species, given scientific research demonstrating that relocated Gila Monsters either do not survive or return (at great energy expense) to their original site (see Sullivan et al. 2004, Beck 2005a). Goal 5 (public education) is vital, but provides no direct, immediate measures to reduce threats to the species.

Focusing in on Goals 2 and 3, the most significant specific tasks are:

> Task 2.2.2. Identify and implement effective management actions for each prioritized local Gila monster population to ensure the continued protection and conservation of Gila monsters in southwestern Utah.
> Task 2.3.2. Identify and protect biological corridors that link quality habitat areas.
> Task 2.3.3. Identify and implement management actions to enhance connectivity of important habitat areas.

> Task 3.1.1. Work with developers to incorporate wildlife habitat within developments to minimize impacts on wildlife.
> Task 3.1.2. Encourage developers to incorporate open space, high-density housing, retain habitat heterogeneity (e.g., boulders and burrows) and native vegetation, and maintain or establish habitat corridors (i.e., washes) into residential and commercial developments.
> Task 3.2.1. Involve UDWR conservation officers, City of St. George and SCSP [Snow Canyon State Park] law enforcement officers in enforcing wildlife laws.

See McLuckie et al. (2007: 14-15). Each one of these tasks is labeled by McLuckie et al. as contingent on cooperation by other parties and most depend on additional funding. These are significant sources of uncertainty, given that "working with" and "encouraging" developers, for instance, may not eliminate threats to the species from development of their habitat. More broadly, there are no penalties for non-compliance and no mechanisms to ensure funding. Given the non-binding nature of the plan, it is voluntary.

In March 2003, FWS adopted an approach to evaluating conservation plans, called the "Policy for Evaluation of Conservation Efforts When Making Listing Decisions" or "PECE" 68 Fed. Reg. 15100-15115. PECE includes a two-part test to determine whether a conservation plan provides a basis for not listing a species under the ESA, or for listing it as threatened versus endangered species. First, there must be a high degree of certainty that a plan will be implemented. For this first criterion, there are 9 provisions that must be met. Examples include assured enforcement; adequate funding, staffing, and other resources; description of legal procedural requirements; explanation of incentives and likelihood of voluntary participation; regulatory mechanisms necessary to ensure implementation; and an implementation schedule. *Id*. at pp. 15114-15115.

Second, PECE requires that there be a high degree of certainty that the plan will be effective in reducing threats to a species. There are six underlying provisions: description of threats and how the plan reduces those threats; incremental goals and deadlines for the conservation effort; detailed steps for implementing the plan; quantifiable, science-based parameters for demonstrating achievement of objectives; reporting on implementation and effectiveness; and adaptive management principles. *Id*. at p. 15115.

It is appropriate to apply PECE to the Utah conservation plan for the Gila Monster given that this plan states as its purpose, in part, to "preclude federal listing of this species under the Endangered Species Act" (McLuckie et al. 2007: 1). Regrettably, the Utah conservation plan fails to meet either "the certainty of implementation" or the "certainty of effectiveness" tests. It lacks enforceability, funding, deadlines, and incentives for (or assurance of) voluntary compliance. Any reliance by FWS on the Utah plan to avoid listing the petitioned DPS would run counter to the finding by many courts that the agency cannot rely on voluntary, speculative plans as a substitute for ESA listing.[14]

[14]Many courts have held that future conservation efforts by federal and state agencies do not justify further delay in listing species. See cases involving the Alexander Archipelago wolf (*Canis lupus ligoni*) (*Biodiversity Legal Foundation v. Babbitt*, 943 F.Supp. 23 (D.D.C.1996); Queen Charlotte goshawk (*Accipiter gentilis laingi*) (*Southwest Center for Biological Diversity v. Babbitt*, 939 F.Supp. 49 (D.D.C.1996)); Barton Springs Salamander (*Eurycea sosorum*) (*Save Our Springs Legal Defense Fund, Inc. v. Babbitt*, Civ No. 96-168-CA (W.D.Tex., Mar 25, 1997));

International

As discussed above, this species is classified under CITES Appendix II. Reclassification under Appendix I would provide increased protection for the Gila Monster from trade and wild collection. Petitioners have described above how poaching and illicit trade continue within the range of this DPS. However, FWS has refused to file for reclassification of the species to Appendix I (Beck 2005a).

The classifications and conservation measures detailed above fail to singly or collectively provide adequate regulatory or policy mechanisms to protect the Gila Monster from endangerment or extinction in Utah.

V. Other natural or manmade factors affecting its continued existence

Human-caused mortality. Mortality from vehicular collisions is a significant threat – probably second only to habitat loss (Beck 2005a; McLuckie et al. 2007). This lizard's slow pace makes it vulnerable to being struck by cars, as does the increasing proliferation of roads in their habitat. Juveniles may be especially vulnerable when they are dispersing from nests, as they are frequently active at night (Beck 2005a). *See* Andrews et al.'s (2008) review of effects of roads on herptiles.

In addition, people kill Gila Monsters intentionally because they are feared due to the perception that they are dangerous. While well-intentioned people may relocate Gila Monsters away from human buildings and living spaces, relocated Monsters tend to either die or return to their original site (from which they were relocated) (Sullivan et al. 2004, Beck 2005a).

Biological Vulnerability. McLuckie et al. (2007) describe the Monster's life history traits, of low population density, specialized diet, and large home ranges, as making the species more vulnerable to anthropogenic threats. Other biological traits exacerbating human threats are its low fecundity and slow maturation rate (Beck 2005a).

In addition, FWS has routinely recognized that small population size and restricted range - which describe the Gila Monster's circumstances in Utah - increase the likelihood of extinction.[15] For the Langford's tree snail (*Partula langfordi*), the Service states:

> Even if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the limited number of known individuals of this species. This circumstance makes the species more vulnerable to extinction due to a variety of natural processes. Small populations are particularly

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Oregon Coast evolutionarily significant unit of Coho salmon (*Oncorhynchus kisutch*) (*Oregon Natural Resources Council et al. v. Daley et al.*, 6 F.Supp.2d 1139 (D.Or.1998)); and bull trout (*Salvelinus confluentus*) (*Friends of Wild Swan, Inc. v. U.S. Fish and Wildlife*, 945 F.Supp. 1388 (D.Or.1996)).

[15]See, e.g., Service candidate assessment forms for *Doryopteris takeuchii, Huperzia stemmermanniae, Megalagrion nesiotes, Melicope degeneri, Melicope hiiakae, Myrsine mezii, Ostodes strigatus, Partula langfordi, Peperomia subpetiolata, Phyllostegia bracteata*, and *Tryonia circumstriata*. Accessible via FWS website at **http://www.fws.gov/endangered/wildlife.html** [Accessed November 2009].

> vulnerable to reduced reproductive vigor caused by inbreeding depression, and they may suffer a loss of genetic variability over time due to random genetic drift, resulting in decreased evolutionary potential and ability to cope with environmental change (Lande 1988; Pimm et al. 1988; Center for Conservation Update 1994; Mangel and Tier 1994).[16]

Here, the Service relies on citations not specific to *Partula langfordi* that indicate the threat to survival presented by limited population numbers alone. The Service similarly notes for a snail called Sisi (*Ostodes strigatus*), "Even if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the small number of extant populations and the small geographic range of the known populations."[17] Because the Gila Monster's population in Utah is small and occupies a restricted area, FWS should consider this condition to constitute a threat to the taxon.

Drought/Extended Drought due to Climate Change. Effects of climate change relevant to the Gila Monster in Utah include warming temperatures and increased length and severity of droughts (IPCC 2007, Karl et al. 2008, 2009). Beck (2005a) describes several dynamics that would intersect with climate change to threaten, or compound threats to this species. These include: potential extirpation of small populations due to drought; females likely not being able to produce clutches of eggs following drought years; susceptibility of Gila Monsters to overheating; danger of dehydration during drought; and increased activity at night when days are too hot. The risk of more activity at night would be increased road mortality.

Human population growth. While habitat loss and degradation is the leading threat to the Gila Monster in Utah, human population growth is driving that threat. Beck (2005a: 155) describes an exponential rate of human population increases in Utah:

> Gila Monsters occur in Utah solely within Washington County, the fourth-fastest-growing county in the United States. From 1980-1990, Washington County's human population nearly quadrupled in size, from 26,125 to over 90,000, excluding the estimated 20,000 temporary resident 'snowbirds' who add to the population each winter…Estimates for 2005 tip the county's population over 100,000.

McLuckie et al. (2007) also note the importance of this threat, and state that, "Growth projections predict a steady annual increase" (see p. 9). The county's population indeed, continues to grow rapidly. The U.S. Census Bureau[18] reported in 2008 that Washington County's population reached 137,589 people. Figure 6 indicates exponential human population growth in this county. Human population density has likewise skyrocketed, from just 4.2 persons per square mile in 1960 to 59.7 persons per square mile by 2008 (Figure 7). There has been a concomitant rise in the number of housing units in the county. The expansion of St. George, Utah constitutes the

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[16]See 2009 Listing Form for Partula langfordi at: **http://ecos.fws.gov/docs/candforms_pdf/r1/G0AI_I01.pdf** [Accessed November 2009] at p. 5.
[17]See 2009 Listing Form for *Ostodes strigatus* at: **http://ecos.fws.gov/docs/candforms_pdf/r1/G0A5_I01.pdf** [Accessed November 2009] at p. 4.
[18]All data on human population, human population density, and housing units was found online at: **www.factfinder.census.gov** [Accessed December 2009].

majority of this growth. The total population in St. George as of 2008 was 72,210, up from 49,663 in 2000 (less than a decade earlier). The total housing units were 30,869 in 2008, up from 21,083 in 2000. These extreme rates of human population growth are fueling an explosion in development, to the detriment of the petitioned DPS. For example, while there were 19,523 housing units in 1990, by 2008 that number more than tripled, to 56,539 housing units (U.S. Census Bureau 2009).

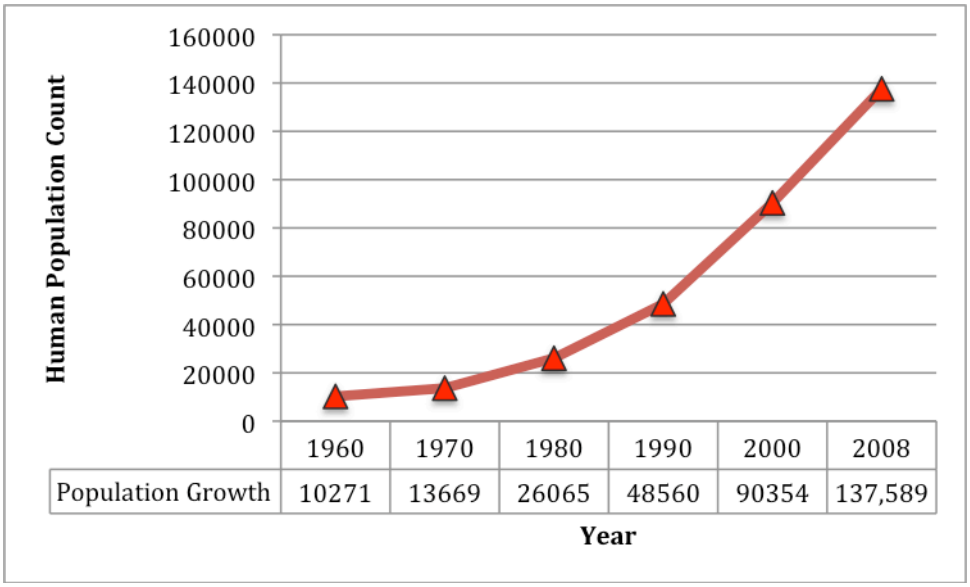

Figure 6: Human Population Increases in Washington County, Utah.
Source: U.S. Census Bureau 2009.

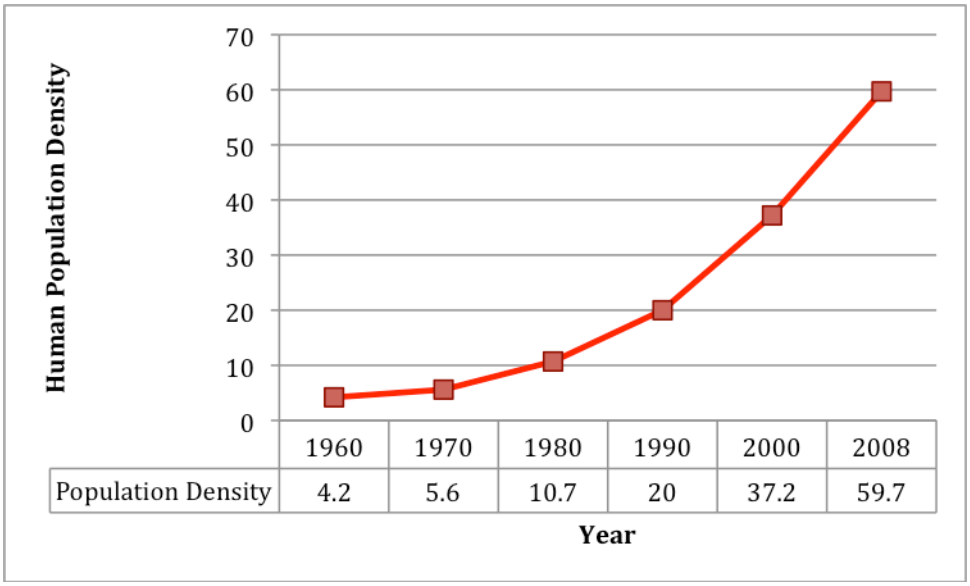

Figure 7: Human Population Density Increases in Washington County, Utah.
Source: U.S. Census Bureau 2009.

Summary

The Utah population of the Gila Monster merits listing as an Endangered or Threatened DPS under the Endangered Species Act. This population is discrete from other Monster populations and significant to the species as a whole, given its habitation of a unique ecological setting in southwestern Utah. The Gila Monster faces a barrage of threats in southwestern Utah, including commercial and residential development of its habitat; illicit trade and poaching of individuals; road mortality due to roads, vehicles, and human persecution; native and non-native predators; biological vulnerability due to limited range and small population size; climate change; human population increases; and inadequate regulatory mechanisms to address these threats.

The Utah population of the Gila Monster only occurs in Washington County. But this limited area represents the northern terminus of the species' range and represents Mohave Desert habitat unique from other areas. While the Monster historically occurred at its highest densities in Utah, it has become a rare and spottily distributed member of the state's faunal community. Federal protection for the Gila Monster in Utah could also inspire conservation efforts across the range of the full species before it faces an even more extensive emergency. We submit this petition with the hope that federal protection will be granted and will prevent the Utah Gila Monster's further decline. We believe ESA listing is vital to preserving and recovering the species in Utah.

Requested Designation

WildEarth Guardians and Dr. Daniel D. Beck hereby petition the U.S. Fish and Wildlife Service under the Department of Interior to list the Utah population of the Gila Monster (*Heloderma suspectum*) as an Endangered or Threatened Distinct Population Segment pursuant to the Endangered Species Act. This listing action is warranted, given the numerous threats this population faces, as well as its low and declining numbers and reduced range. The Gila Monster in Utah is threatened by all five listing factors: present and threatened destruction, modification and curtailment of habitat and range; overutilization; predation; the inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence.

Critical habitat

Given that threats to its Mohave Desert habitat are a significant cause of imperilment for the Gila Monster in Utah, Petitioner requests that critical habitat be designated concurrent with final ESA listing.

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