# Case study 2: *Brachypelma smithi*

## Background Information

### Scientific and common names

Class: Arachnida

Order: Araneae

Family: Theraphosidae

Scientific name: *Brachypelma smithi* (F. O. Pickard-Cambridge, 1897)

Common names: Mexican red knee tarantula, Mexican redknee tarantula (English); tarantule à genoux rouges du Mexique (French); tarantula de anillos rojos, tarantula mexicana de rodillas rojas, tarantula mexicana pierna roja (Spanish).

### Distribution

*Brachypelma smithi* is endemic to the Mexican state of Guerrero and ranges along the coastal side of the Sierra Madre del Sur mountain range east of the Balsas River Basin to the Acapulco city region (CEC, 2017a; Mendoza & Francke, 2017).

### Biological characteristics

#### General biological and life history characteristics

#### Brachypelma smithi tarantulas inhabit subtropical dry thorn and deciduous secondary forest of the lowlands near the Pacific coast and slightly higher inland elevations. They prefer undisturbed areas shaded by trees or bushes, and favour areas near seasonal water-courses (C. S. Fukushima et al., 2018; Mendoza & Francke, 2017).

*Brachypelma smithi* are a fossorial species that modifies previously excavated burrows or self-excavate their own, often only minor alterations to natural small cavities under debris such as large rocks and tree roots in dense thickets or vegetation of dry thorn forests and deciduous forests (Mendoza and Francke 2017). The burrows have no traces of silk at the entrance giving no clear indication there is a spider inside, and the interior is often multi-tunnelled (Mendoza & Francke 2017). The mating season occurs during the last part of rainy and first part of dry seasons (September to January) when mature males wander in the open to search for females. The males are likely most active at night, cooler daylight hours, and throughout overcast days. Adult females typically moult once per year, just prior to the onset of the annual male emergence. Females will produce cocoons (large silken egg sacs) during the drier winter months with young emerging about two months later, with most young dispersing in the late spring (or early summer), just before the onset of the early summer rains (Mendoza & Francke 2017).

#### Habitat types

Subtropical/tropical dry forest, 0–1,500 in altitude.

#### Role of the species in its ecosystem

These spiders are nocturnal predators that wait near the entrance of their refuge from dusk and into the night to feed primarily on ground-dwelling arthropods (insects, other arachnids, and some myriapods) or even small vertebrates.

#### Population

From C. Fukushima et al. (2019): “Despite no systematic research on populations of *B. smithi*, it is known that there are loss of habitat area and quality (Global Forest Watch 2018) due to human activities such as urbanization and agriculture. Adding to this, the species is suffering from overharvesting due to relatively intense trafficking as well as for use in traditional medicine (George Odell and Alejandro Alagon pers. comm.), especially in the Guerrero coastal area. Some populations in the highlands are depleted by locals and coastal populations are threatened by being run over by cars while crossing highways, since their range follows the main Pacific coastal highway. In the Acapulco vicinities, B. smithi has been collected to extinction. Populations are easily accessed by smugglers and there have already been cases of hundreds of specimens caught with a single smuggler. Adding to this, extensive flooding of the Papagayo River nearly caused the complete destruction of two B. smithi populations (Mendoza and Francke 2017).”

#### Global population size

Unknown. In 2019 the area of occurrence was estimated to be 11,572 square kilometers and area of occupancy was estimated at 4,692 square kilometers (C. Fukushima et al., 2019).

#### Current Global population trends

Decreasing.

#### Global conservation status (IUCN Red List)

Near Threatened.

#### National conservation status for the case study country

*Brachypelma smithi* is protected and listed as a Threatened Species in Mexico (DOF, 2010).

#### Main threats within the case study country

*Brachypelma smithi* faces a multitude of threats to its survival. The expanding urbanization and associated transportation networks in the southern coastal region of its habitat range are causing rapid habitat destruction and fragmentation. This development, especially notable in the port city of Acapulco, extends into the foothills and neighboring coastal towns, primarily driven by tourism-related growth. Consequently, numerous subpopulations have been directly threatened or entirely eradicated by these urbanization activities. The species is further threatened by illegal overharvesting, particularly in the Pacific coastal area of Guerrero State. High levels of trafficking are driven by the demand for the tarantulas for the pet trade and for use in traditional medicine. Some local populations in highland areas have been depleted by local collectors (C. Fukushima et al., 2019).

The construction of roads, particularly the north-south coastal Pacific highway poses another threat. Males are vulnerable to vehicular mortalities during the species' mating season, when they roam in search of a mate (C. Fukushima et al., 2019).

The species is also threatened with an increased frequency of detrimental natural events, such as severe weather and flooding in the coastal region of Guerrero State (C. Fukushima et al., 2019). A notable example is the extensive devastation caused by the hurricane season of 2012–2013, which nearly eradicated certain subpopulations of *B. smithi* (Mendoza & Francke, 2017).

## Species Management

### Management Measures

In Mexico, the General Wildlife Law (*Ley general de Vida Silvestre*—LGVS) establishes national policy for wildlife protection and programs for sustainable exploitation of wildlife. Furthermore, the LGVS also defines the following risk categories for Mexican at-risk species and populations (DOF, 2021):

* Endangered (P): species whose survival is threatened by drastic declines in population, distribution and/or habitat loss or disruption.
* Threatened (A): species which may be in danger of extinction in the short or medium term if the threats to their survival are not reduced.

Subject to special protection (Pr): potentially threatened species for which special efforts are required to secure and promote their conservation.

Species that are assessed as being at-risk and their category of risk are listed in the Official Mexican Standard NOM-059-SEMARNAT-2010 (NOM-059). NOM-059 is the “reference instrument” of the LGVS. The NOM-059 defines the criteria that must be met for a species to be considered “at risk”, provides the criteria for reviewing the conservation status of native Mexican species of animals and plants, and categorizes those species that require special protection (DOF, 2010).

The LGVS regulates the establishment of Management Units for the Conservation of Wildlife Management and Exploitation Units (*Unidades de Manejo y Aprovechamiento*—UMAs). UMAs are properties and facilities used by the owners for the sustainable use of native species that operate under a management plan that was approved by the General Directorate for Wildlife (*Direccion General de Vida Silvestre*—DGVS) (DOF, 2010).

An UMA management plan must contain the following components (DOF, 2021):

* The specific short-, medium- and long-term goals and indicators of success.
* Relevant biological information about the species being managed.
* A physical and biological description of the area and its infrastructure.
* The sampling methods and monitoring mechanisms to be used.
* A calendar of activities.
* The measures to be used for management of habitat, populations and specimens.
* Contingency measures.

Where appropriate, the system to be used to identify the specimens, parts and derivatives that are used in a sustainable manner.

There are two types of UMA: extensive and intensive. An extensive UMA (*Unidad de Manejo y Aprovechamiento Extensivo*) manages the conservation and sustainable exploitation of wildlife in their natural habitats. The goal is to ensure that the activities conducted within the UMA do not significantly affect the ecological dynamics or endanger the long-term survival of the species concerned. An intensive UMA (*Unidad de Manejo y Aprovechamiento Intensivo*) focuses on breeding or propagating wildlife species in a controlled environment. The goals are to increase the population of the species concerned and facilitate their commercial production. This may be accomplished to support conservation breeding programs, research, or for commercial purposes such as farming or the pet trade. The management practices of intensive UMAs typically involve reproductive management, commercial activities that may include the sale of wildlife, and conservation goals. Although intensive UMAs have commercial objectives, they must also contribute to the conservation of the species concerned. *Brachypelma* tarantulas are bred in intensive UMAs for sale and possible export from Mexico. The collection of wild specimens for parental stock is permitted only via the UMA framework.

### Monitoring system

#### Methods used to monitor harvest

Unknown.

#### Confidence in the use of monitoring

Unknown.

### Legal framework and law enforcement

The Secretariat of Environment and Natural Resources (*Secretaría de Medio Ambiente y Recursos Naturales—*SEMARNAT) is responsible for protecting, restoring, and conserving the ecosystems, natural resources and assets of Mexico; it is also responsible for promoting sustainable development. SEMARNAT is ultimately responsible for conserving native species and for implementing CITES.

SEMARNAT meets its mandate through the activities of a number of sub-entities within the Secretariat, including the following:

* The General Directorate for Wildlife (*Direccion General de Vida Silvestre*—DGVS).
* The National Commission for the Knowledge and Use of Biodiversity (*Comisión Nacional para el Conocimiento y Uso de la Biodiversidad*—CONABIO).

The Federal Attorney for Environmental Protection (*La Procuraduría Federal de Protección al Ambiente*—PROFEPA).

The DGVS is responsible for the management of wildlife in the country and the implementation of the General Law of Wildlife (*Ley General de Vida Silvestre*—LGVS) (DOF, 2021). The DGVS acts as the CITES Management Authority in Mexico and is responsible for issuing permits, keeping records and liaising with the CITES Secretariat. The DGVS also manages the National System Management Units for the Conservation of Wildlife (*Sistema Nacional de Unidades de Manejo para la Conservación de la Vida Silvestre*—SUMA) (CONABIO, 2023), which includes the approval of plans for UMAs.

CONABIO is responsible for promoting, coordinating, supporting and implementing activities to improve the knowledge of biological diversity, its conservation and sustainable use. Conabio serves as the CITES Scientific Authority in Mexico and is responsible for completing NDFs.

PROFEPA is a decentralized administrative body of SEMARNAT that has technical and operational autonomy. PROFEPA responds to and controls environmental deterioration. One of PROFEPA’s primary tasks is to enforce compliance with environmental regulations. PROFEPA is responsible for enforcing CITES in Mexico under the authority of the LGVS.

As noted, the LGVS regulates the sustainable use, conservation, and management of native wild animals and plants. Article 55 of the LGVS implements CITES in Mexico (DOF, 2021). The LGVS also includes some provisions that are stricter than are required by the Convention.

The Regulations for the LGVS (*Reglamento De La Ley General De Vida Silvestre*) enable and implement the LGVS and provide the essential requirements for the integration of the SUMA, and the inclusion, establishment, management and operation of the UMAs (DOF, 2014).

## Utilization and Trade

### Type of use

*Brachypelma smithi* is commercially traded almost exclusively as captive-bred live specimens for the pet trade (Tables 11 & 12).

### Harvest

#### Harvesting regime

The harvest of wild specimens of *B.* *smithi* is prohibited by Mexican law except for collection of parental specimens for breeding via permit under the UMA framework, or for collection for valid and approved scientific purposes (DOF, 2021).

### Legal and illegal trade levels

#### Legal trade

Specimens of *B. smithi* are sometimes erroneously sold as *B. annitha* or *B. hamorii* in the international commercial tarantula pet trade. *Brachypelma smithi* and *B. hamorii* are morphologically very similar and difficult to tell apart (Cooper et al., 2019).

In 2016, captive-bred juveniles sold for approximately USD$30–$35 in Canada and the United States, USD$10 in Mexico and USD$5 in the EU. Adult males sold for approximately USD$95 in Canada and USD$60 in the United States. Adult females sold for approximately USD$250 in Canada and the United States, and USD$60 in the EU (CEC, 2017b).

Data downloaded from the UNEP-WCMC CITES Trade Database showed that in the years 2017–2020, Mexico exported a total of 13,194 specimens of *B. smithi.* All were live, captive-bred specimens traded for commercial purposes. More than 77% (n=10,212) were exported to the United States. The remaining were exported to Canada, China, Germany, Poland and the United Kingdom (Table 14). As of August 2023, Mexico had not reported any exports of *B. smithi* for 2021.

A total of 2,463 specimens of *B. smithi* were reportedly exported from non-range States in 2017–2021. All were reported as live except for five specimens exported from Zimbabwe in 2019 that were unspecified. All specimens were captive-bred and traded for commercial purposes. The Japan, the United States and the European Union were the primary markets for specimens exported from non-range States (Table 15).

#### Illegal trade

Wild specimens are known to be illegally collected and exported from Mexico, often using “brown-boxing” techniques (E. Cooper, pers. obs.). “Brown-boxing” is the shipping of unlabeled packages of animals from an exporting country to an importer (TBS, 2018). This commonly involves specimens illegally collected and/or illegally exported (E. Cooper, pers. obs.). The volume of specimens illegally traded is unknown.

Table 14. Mexican Exports of Brachypelma smithi, 2017–2020

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **Exporter** | **Importer** | **Exporter reported quantity** |
| 2017 | Mexico | Canada | 100 |
| Germany | 120 |
| United States | 71 |
| **Subtotal** | **291** |
| 2018 | Mexico | Canada | 750 |
| Poland | 102 |
| United States | 827 |
| **Subtotal** | **1,679** |
| 2019 | Mexico | China | 10 |
| United Kingdom | 400 |
| United States | 1,694 |
| **Subtotal** | **2,104** |
| 2020 | Mexico | Canada | 850 |
| United Kingdom | 450 |
| Poland | 200 |
| United States | 7,620 |
| **Subtotal** | **9,120** |
| **Grand total** | | | **13,194** |

Source: World Conservation Monitoring Centre (WCMC) CITES Trade Database. All specimens were live, captive-bred and traded for commercial purposes. Mexico had not reported any exports of *B. smithi* for 2021 at the time of writing.

Table 15. Exports of Brachypelma smithi from non-Range States, 2017–2021

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **Exporter** | **Importer** | **Exporter reported quantity** |
| 2017 | Switzerland | Hong Kong | 25 |
| Germany | Switzerland | 2 |
| Japan | 49 |
| Norway | 16 |
| United States | 900 |
| Ukraine | Canada | 50 |
| Japan | 120 |
| Netherlands | 100 |
| **Subtotal** |  | **1,262** |
| 2018 | Germany | Japan | 50 |
| Norway | 2 |
| Ukraine | Canada | 105 |
| Japan | 100 |
| Malaysia | 20 |
| **Subtotal** |  | **277** |
| 2019 | Germany | United States | 30 |
| Ukraine | Canada | 95 |
| Japan | 100 |
| Netherlands | 457 |
| United States | 225 |
| Zimbabwe | Unknown | 5 |
| **Subtotal** |  | **912** |
| 2020 | Germany | United States | 9 |
| **Subtotal** |  | **9** |
| 2021 | Germany | United States | 1 |
| Russia | Azerbaijan | 2 |
| **Subtotal** |  | **3** |
| **Grand total** | | | **2,463** |

Source: World Conservation Monitoring Centre (WCMC) CITES Trade Database. Re-exports were excluded. All were reported as live except for the five specimens exported from Zimbabwe in 2019 that were unspecified. All specimens were captive-bred and traded for commercial purposes.

## Non-Detriment finding procedure

### Step 1: Identification

Cooper et al. (2019) illustrates the morphological characters useful for identifying specimens of *Brachypelma smithi* and how to distinguish specimens from the very similar species *Brachypelma hamorii.* The publication also discusses collecting and preserving DNA samples to confirm the identification of tarantula specimens.

### Step 2: Evaluation

As discussed previously, all of the specimens of *B. smithi* in legal trade in the years 2017–2021 were captive-bred specimens.

Generic guidance for confirming that specimens are truly captive-bred is provided in Resolution Conf. 10.16 (Rev CoP19) and Resolution Conf. 17.7 (Rev CoP19) (CITES, 1997, 2016). Guidance for applying CITES source codes is offered in Lyons, D., et al. (2017) and guidance for inspecting captive breeding facilities is discussed in Lyons, Jenkins, et al. (2017).

### Step 3: Conclusion

Based on the information presented in the draft *Guidance for undertaking Non-detriment Findings for Terrestrial Invertebrates*, the reported trade in *B. smithi* would not be detrimental to survival of the species in the wild.

However, the source of the parents should be considered when completing an NDF for trade in the species. If the If the parents were also captive bred, then the impact of the trade on wild populations would be minimal. If one or both parents were removed from the wild, then the Scientific Authority should also consider the impact of this removal on wild populations and may find it informative to review Step 2.3 of the guidance. For exports of *B. smithi* the specimens to be exported must have been produced from an accredited UMA. For specimens of *B. smithi* that were captive-bred in other countries (non-range States) it may be important to consider whether the parental stock had been legally imported.