CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA

Seventeenth meeting of the Conference of the Parties
Johannesburg (South Africa), 24 September – 5 October 2016

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Inclusion of *Lygodactylus williamsi* in Appendix I, in accordance with Article II, paragraph 1 of the Convention and satisfying Criteria B i) and iv) in Annex 1 of Resolution Conf. 9.24 (Rev. CoP16).

B. Proponent

European Union and United Republic of Tanzania.*

C. Supporting statement

1. Taxonomy

1.1 Class: Reptilia

1.2 Order: Squamata

1.3 Family: Gekkonidae

1.4 Genus, species or subspecies, including author and year: *Lygodactylus williamsi* Loveridge, 1952

1.5 Scientific synonyms: *Lygodactylus picturatus williamsi*, Loveridge, 1952

1.6 Common names:
English: Turquoise Dwarf Gecko, William's Dwarf Gecko
French: Gecko neon bleu
Spanish: Gecko enano de William, Gecko azul o Williams
Swahili: Baragaja
German: Türkis-Zwerggecko, Himmelblauer Zwergtaggecko, Blauer Zwergtaggecko, Blauer Haftschwanzgecko

1.7 Code numbers:

2. Overview

Lygodactylus williamsi is a small gecko, endemic to a few isolated patches of forest in eastern United Republic of Tanzania (hereafter referred to as Tanzania) (Flecks *et al.*, 2012a). Males of the species have striking blue colouration which make the species highly attractive for the pet trade (Maisch, 2013). Demand from the international pet trade reportedly increased sharply following publication of details of the species in 'A Field Guide to the Reptiles of East Africa' by Spawls *et al.*, (2002) (Weinsheimer and Flecks, 2010). It was reported to have been offered for sale on the international pet market in numbers that were not

* *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

sustainable and at a level likely to threaten the wild population (Flecks *et al.*, 2012a). It was estimated that about 15% of the total population was collected for the pet trade within four and a half years (2004-2009) (Flecks *et al.*, 2012a); with many specimens exported to Europe and the United States of America. Although most of the area populated by *L. williamsi* was reported to be within protected areas, ongoing degradation of the remaining habitat from illegal logging, firewood collection, bushfires, and mining have been reported (Flecks *et al.*, 2012a).

L. williamsi was categorised as Critically Endangered in the IUCN Red List of Threatened Species on the basis of an extremely small area of occurrence, a fragmented population and threats from habitat destruction and fragmentation and collection for the pet trade (Flecks *et al.*, 2012b). The species is affected by trade according to the definition in Annex 5 i), and qualifies for inclusion in Appendix I by satisfying the following criteria of Annex 1 of Resolution Conf. 9.24 (Rev. CoP16):

B. The wild population has a restricted area of distribution and is characterized by:

i) fragmentation or occurrence at very few locations;

iv) an observed, inferred or projected decrease in any one of the following:
- the area of distribution
- the area of habitat
- the number of subpopulations
- the number of individuals,
- the quality of habitat; or
- the recruitment.

3. Species characteristics

3.1 Distribution

L. williamsi was reported to occur in four localities in the Morogoro Region in the foothills of the Uluguru Mountains in eastern Tanzania (Figure 1, Annex 1). The extent of occurrence was estimated to be 20 km²; and within this area the area of occupancy was estimated to be less than 8 km² (Flecks *et al.*, 2012b). The population was reported to be fragmented, as the four known subpopulations are isolated with a lack of suitable habitat to facilitate migration between them (Flecks *et al.*, 2012a).

The bulk of the population was reported to occur within two Forest Reserves of the Uluguru Mountains: Kimboza and Ruvu (Flecks *et al.*, 2012a). The species was found in the lowland reserves of Kimboza during surveys in 1983 (Rodgers *et al.*, 1983 cited in Doggart *et al.*, 2004). In Ruvu Forest Reserve, the species was recorded in 2000 by Doggart *et al.* (2004).

The species was also reported from two other localities, Muhalama and Mbagalala; however these populations were considered to be isolated and small (Flecks *et al.*, 2012a).

3.2 Habitat

The habitat of *L. williamsi* was reported to be lowland tropical forest (Burgess *et al.*, 2002). Within this habitat, the species was reported to almost exclusively occur on one species of Screwpine, *Pandanus rabaiensis* (Weinsheimer and Flecks, 2010; Flecks *et al.*, 2012a) and at altitudes of 170-480 m a.s.l. (Flecks *et al.*, 2012a). According to field observations by Flecks *et al.* (2012a), courtship, mating and territorial behaviour take place solely on the leaves of *P. rabaiensis*, and eggs are laid in leaf axils. *L. williamsi* was not reported in localities where *P. rabaiensis* was absent (Weinsheimer and Flecks, 2010). Only large *P. rabaiensis* plants with leaf length of at least one metre were reported to support *L. williamsi* (Flecks *et al.*, 2012a).

P. rabaiensis was noted to be common in swampy areas of the Kimboza Forest Reserve, and associated with high groundwater levels or limestone substrates (Eastern Arc Mountains and Coastal Forests CEPF Plant Assessment Project, 2009). It was reported to be patchily distributed all over the reserve area, being the dominant species in patches and with coverage of 17.6% of the reserve area (Flecks *et al.*, 2012a). The Ruvu Forest Reserve was reported to be drier with scattered *P. rabaiensis* plants, often along the banks of the Ruvu River and in associated wet areas, rarely forming patches (Flecks *et al.*, 2012a).

3.3 Biological characteristics

L. williamsi is a diurnal, territorial gecko, strictly dependant on plants of *P. rabaiensis* (Flecks *et al.*, 2012a). Gravid females, clutches, juveniles and sub-adults were found during a survey between 1 August and 10 October 2009, indicating a continuous reproduction throughout the year (Flecks *et al.*, 2012a).

Further details on the ecology and biological traits of this species were reported to be lacking or based on observations made in captivity (Flecks *et al.*, 2012a). In captivity, the species was recorded to lay two eggs every 3-4 weeks, with an incubation time between 60-120 days depending on temperature (Maisch, 2013). Schneider (2012) reported clutches every 5-6 weeks throughout the breeding season, usually consisting of two eggs. Bungard (2016, *in litt.* to UNEP-WCMC) reported that pairs of eggs from captive females can be found throughout the year, with no discernible breeding season. Surveys conducted in natural habitats by Flecks *et al.* (2012a) indicated that the species was able to reproduce several times in a year and have a relatively high reproductive output. In captivity, the species was reported to be fully grown at the age of 8-9 months, with mature males fully turquoise-blue in colouration by around 15-16 months (Schneider, 2012).

3.4 Morphological characteristics

Mature adult males were noted to be predominantly turquoise-blue on the upper side, while females and immature males are greenish-bronze (Weinsheimer and Flecks, 2010). The belly and undersides of the tail and limbs are orange, and there are distinct dark markings on the head, shoulder and flanks (TRAFFIC, 2011). Body length was reported to be up to 85 mm (Weinsheimer and Flecks, 2010).

3.5 Role of the species in its ecosystem

L. williamsi is a predator of small insects and other invertebrates. Ants were reported to be a prominent part of the diet for *Lygodactylus* (Spawls *et al.*, 2002). Many species of day geckos play an important role as pollinators of native flowering plants (Hansen *et al.*, 2007); however, no specific studies on the role of *L. williamsi* in its ecosystem were located.

4. Status and trends

4.1 Habitat trends

Almost all of the known habitat occupied by *L. williamsi* was reported to be within two protected areas: Kimboza Forest Reserve and Ruvu Forest Reserve (Flecks *et al.*, 2012a). Both reserves were classified as IUCN Category IV Protected Areas (IUCN and UNEP-WCMC, 2015).

The Kimboza Forest Reserve was considered to have the highest abundance of *P. rabaiensis* plants in the region (Flecks *et al.*, 2012a). It was reported to be threatened by tree cutting, forest fires and encroachment (Morogoro Catchment Forest Project, 2004). Flecks *et al.* (2012a) reported ongoing threats from illegal logging, clearing for agriculture and invasive tree species such as *Cedrela*. Damage and destruction of *Pandanus* trees during collection of *L. williamsi* was reported by Flecks *et al.* (2012a). The Ruvu Forest Reserve was reported to be damaged by mining for rubies, tourmaline, rhodolite and alluvial gold (Hymas, 2000) as well as logging, fuel and pole gathering (Burgess *et al.*, 2002).

4.2 Population size

Flecks *et al.* (2012a) conducted visual encounter surveys of *L. williamsi* in the Kimboza and Ruvu Forest reserves and surrounding areas between August and October 2009, and found the species to be relatively abundant within its range. Based on observations on the mean number of individuals on each *P. rabaiensis* and the distribution and abundance of the plant, the population size of *L. williamsi* in the Kimboza forest was estimated to be 148,684 ± 112,365 adult individuals, with a population density of 353 individuals per hectare (ha) (Flecks *et al.*, 2012a). The potential population size, based on habitat availability, was estimated to be 234,921 adult individuals (with a density of 557 individuals per ha), with the difference between potential and actual population size suggested to indicate a drastic population decline (Flecks *et al.*, 2012a).

The Ruvu Forest Reserve, although larger and covering 3092 ha, was reported to contain a smaller area of suitable habitat for *L. williamsi* (Hymas, 2000). Flecks *et al*. (2012a) believed this population to be much smaller than that in Kimboza, due to fewer *P. rabaiensis* plants. The isolated population at Mbagalala was reported to survive on 14 *Pandanus* plants and a similar situation was noted at Muhalama (Flecks *et al.*, 2012a).

4.3 Population structure

Lygodactylus species were reported to be territorial, living in small colonies dominated by the adult male (Spawls *et al.*, 2002). Other adult males are not permitted into a colony and when male juveniles reach a certain size they are forced out by the dominant male (Spawls *et al.*, 2002). *L. williamsi* typically occur in a family group consisting of a male, female and a small number of juveniles occupying a *Pandanus* plant (Bayliss, 1994). Flecks *et al.* (2012a) noted that a family territory covers a single crown of a *Pandanus* plant which may have several crowns. The largest number of adult males detected on one crown was four, together with four females and two subadults, however, 58% of the surveyed *Pandanus* plants yielded only a single specimen of *L. williamsi* (Flecks *et al.*, 2012a).

4.4 Population trends

According to the IUCN Red List assessment, the total population of the species was reported to be decreasing (Flecks *et al.*, 2012b). The population at Kimboza Forest Reserve was calculated to be approximately 150,000 individuals in 2009, and was estimated to have declined by one third since 2004 when the collection for the international pet trade began (Flecks *et al.*, 2012a) (Annex 1, Figure 2). Local people reported that *L. williamsi* was more abundant prior to collection for trade (Flecks *et al.*, 2012a).

4.5 Geographic trends

5. Threats

Flecks *et al.* (2012a) considered over-collection to be the main threat to the species. Its limited distribution and habitat fragmentation were considered to make the species prone to overharvesting (Flecks *et al.*, 2012a; Weinsheimer and Flecks, 2010). Habitat loss was regarded as another important threat (Flecks *et al.*, 2012a; Weinsheimer and Flecks, 2010). Despite the Kimboza and the Ruvu forests being located within forest reserves, illegal logging, collection of firewood, conversion of forest to agricultural land, and mining were reportedly taking place (Hymas, 2000; Morogoro Catchment Forest Project, 2004). Flecks *et al*. (2012a) noted that *P. rabaiensis* trees were typically cut down to capture *L. williamsi*, further contributing to habitat degradation.

Heavy collection for the pet trade, along with severe habitat fragmentation (within an extremely limited area of occupancy) has contributed to the species being classified as Critically Endangered (Flecks *et al.*, 2012b).

6. Utilization and trade

6.1 National utilization

No reports of national utilisation were located.

6.2 Legal trade

Flecks *et al.* (2012a) reported that according to officials of the Tanzania Wildlife Research Institute, collection and export of the species had never been licensed in Tanzania, and hence all trade in *L. williamsi* from the country could be considered illegal.

6.3 Parts and derivatives in trade

L. williamsi are traded as live individuals.

6.4 Illegal trade

Wild specimens were reported to be illegally collected and traders were reported to deliberately mislabel and export the species as *Lygodactylus* spp. or as *L. capensis* (Flecks *et al.*, 2012a). According to reports of local people, the total number of *L. williamsi* specimens collected between December 2004 and July 2009 ranged between 32,310 and 42,610 (Flecks *et al.*, 2012a).

L. williamsi was reported to have been available for sale in Europe since 2007, at first in small numbers at high prices, but, as the species became more readily available, prices were reported to have fallen (van Leeuwen, 2009). This was reported to be due to availability of wild-sourced specimens rather than successful captive breeding (Schneider, 2012). A review of availability of the species within the European Union undertaken in 2013 found that *L. williamsi* was widely available on websites and in demand in most of the 18 countries included in the survey (UNEP-WCMC, 2013).

Trade data reported in the United States Law Enforcement Management Information System (LEMIS) database, provided by the United States (U.S.) Fish and Wildlife Service upon request[1], indicated that 1200 live wild-sourced specimens of *L. williamsi* were imported directly from Tanzania since 2010[2] (with all trade occurring in 2012 and 2013). An additional 2668 live wild-sourced specimens of *Lygodactylus* spp. were imported to the U.S. since 2010. All trade in this genus to the U.S. was reported to be for commercial purposes.

HMRC (2016, *in litt.* to UNEP-WCMC) reported that a shipment of 166 specimens of *L. williamsi* was seized at Heathrow Airport, UK, in 2015.

6.5 Actual or potential trade impacts

Flecks *et al.* (2012a) estimated that over a period of four and a half years (2004-2009), at least 15% of the potential population had been collected for the pet trade, making collection a major threat to the species. One group of collectors estimated that up to 1800 individuals per month had been collected during 2005, and up to 900 individuals had been collected per month during 2006 and 2007 (Annex 1, Figure 2) (Flecks *et al.*, 2012a). The data presented indicates that at least 25,000 specimens were collected over this period (Annex 1, Figure 2). Collection was reported to cease during January and February, possibly due to cold temperatures in the importing countries (Flecks *et al.*, 2012a). Actual collection levels from Kimboza Forest Reserve were considered by Flecks *et al*. (2012a) as likely to be higher, as other groups of collectors operated in the reserve (Flecks *et al.*, 2012a). The wild population was considered to be drastically declining and the observed population was thought to be approximately one third smaller than the potential population (Annex 1, Figure 2) (Flecks *et al.*, 2012a).

The long-term survival of *L. williamsi* was reported to be threatened by over-collection due to its limited natural distribution and increasing demand (Flecks *et al.*, 2012a). Mortality during transport was thought to be high due to storage periods with middlemen and exporters, although this was not quantified (Flecks *et al.*, 2012a). Schneider (2012) reported that females often do not survive the process of capture and trade.

P. rabaiensis plants were reported to be partially or completely cut down to access the geckos and damaged or destroyed plants were frequently observed in the Kimboza Forest Reserve (Flecks *et al.*, 2012a).

7. Legal instruments

7.1 National

L. williamsi almost exclusively occurs within the national Forest Reserves of Kimboza and Ruvu Forests, which are managed by the central government 'Tanzania Forest Service' following the Forest Act, 2002; unlicensed collecting of wildlife is strictly prohibited within these reserves (Flecks *et al.*, 2012a; Government of United Republic of Tanzania, 2002).

1 *Data received on 11 August 2015.*

2 *Trade reported in 2015 has been included, but will be incomplete*.

7.2 International

L. williamsi was listed in Annex B of EU Wildlife Trade Regulation (EC) 338/97 on 20 December 2014.

8. Species management

8.1 Management measures

Most of the population of *L. williamsi* occurs in protected areas although management/enforcement was reported to be insufficient, and illegal removal of wood occurs (Morogoro Catchment Forest Project, 2004; Flecks *et al.*, 2012a). Although a central government owned reserve, the Kimboza Forest Reserve was reported to be managed jointly by the local village governments in partnership with the District Forest Officer (Morogoro Catchment Forest Project, 2004). A lack of financial, technical and human capacity were considered to render effective management of the Kimboza forest area difficult (Morogoro Catchment Forest Project, 2004). No specific conservation measures for *L. williamsi* or *P. rabaiensis* were undertaken (Morogoro Catchment Forest Project, 2004).

8.2 Population monitoring

No details relating to population monitoring were located.

8.3 Control measures

L. williamsi was not reported to have specific control measures and unlicensed collection of wild animals is prohibited within the Forest Reserves (Government of United Republic of Tanzania, 2002). Due to wild-caught specimens reportedly being illegally collected and deliberately mislabelled as other species of the genus, neither control nor accounting for numbers of exported individuals was possible (Flecks *et al.*, 2012a). Identification of juveniles, sub-adults and females of this species was reported to be difficult for customs officers and a photographic guide was produced to support forestry staff, police, customs, conservationists, and other authorities to identify the species (TRAFFIC, 2011).

8.3.1 International

8.3.2 Domestic

8.4 Captive breeding and artificial propagation

Whilst Schneider (2012) reported that, in general, *L. williamsi* was not easy to keep and breed in captivity, others have reported it relatively easily to breed (Maisch, 2013). The species has been observed to breed readily on plants other than *P. rabaiensis* in captivity (Bungard *in litt*. to UNEP-WCMC, 2016).

Sex determination in captivity was thought to be linked to temperature (Bungard *in litt*. to UNEP-WCMC, 2016). van Leeuwen (2009) noted that only a small number of females were reported to exist in captivity. Schneider (2012) reported higher mortality of females in captivity and the associated need for replacement females. Bungard (2016, *in litt*. to UNEP-WCMC) considered there to be a small, probably negligible, skew in the sex ratio of zoo populations. According to Cizelj (2016, *in litt*. to UNEP-WCMC), high mortality rates in females during shipment may be because gravid females that are held in conditions that are not suitable for laying will retain the eggs inside the body, which can be fatal.

Males were reported to be actively selected due to their colour (Bungard *in litt*. to UNEP-WCMC, 2016; Skelton *in litt*. to UNEP-WCMC, 2016). It was noted that long-term captive males, and potentially also captive bred males, may lose their bright colouration during captivity, becoming less appealing to commercial buyers and thereby encouraging collection of wild caught animals by breeders in the future (Cizelj *in litt*. to UNEP-WCMC, 2016). Skelton (2016 *in litt*. to UNEP-WCMC) noted that, when housed together, one male adopts a more sub-dominant colouration, similar to that of a female. Cizelj (2016 *in litt*. to UNEP-WCMC) considered the loss of colouration in males to be connected with husbandry issues. The majority of specimens offered for sale were thought to be taken from the wild (Weinsheimer *et al.*, 2010).

A breeding programme was reportedly initiated via the European Studbook Foundation to monitor the genetic diversity and population size of the species in captivity (van Leeuwen, 2009; Maisch, 2013). Bungard (*in litt*. to UNEP-WCMC, 2016) reported that a proposal is being made to the European Association of Zoos and Aquaria (EAZA) to register the species as a European Studbook (ESB). According to the Zoological Information Management System (ZIMS), currently 25 institutions in the European region hold 64 males, 53 females and 40 juveniles of *L. williamsi* (Bungard *in litt*. to UNEP-WCMC, 2016).

8.5 Habitat conservation

Almost all of the species habitat is confined within the Forest Reserves of Kimboza and Ruvu, which are biodiversity areas of international status and strictly protected under the Forest Act, 2002 (Government of United Republic of Tanzania, 2002). Flecks *et al.* (2012a) reported dense human population around the Forest Reserves and clearance of natural vegetation in surrounding areas outside the protected forests. Within the Kimboza Forest Reserve historic and ongoing logging and clearance were reported, with subsequent replacement of indigenous trees with timber species that have since become invasive (Flecks *et al.*, 2012a). Ruvu Forest Reserve was reported to be damaged by mining, logging, fuel and pole gathering (Burgess *et al.*, 2002).

8.6 Safeguards

9. Information on similar species

The genus *Lygodactylus* comprises more than 60 species of small, diurnal geckos, most of them distributed in southern and eastern Africa and in Madagascar, with two species occurring in South America (Spawls *et al.*, 2002). There are 18 species of this genus reported from Tanzania and nine of them are endemic to the country (Spawls *et al.*, 2002). The most similar species, *L. kimhowelli* and *L. luteopicturatus* (both are also appearing in the pet trade), are easily distinguished from *L. williamsi* by their different colouration (TRAFFIC, 2011).

10. Consultations

Various consultations took place between the United Republic of Tanzania and the EU and its Member States regarding this species.

11. Additional remarks

The species mainly occurs within protected areas and no collection or export of the species has been permitted, yet international trade persists. National controls have so far been ineffective in managing collection and trade. Although this is an endemic species, an Appendix III listing may not achieve any additional benefits. The species meets the biological criteria listing in Appendix I.

12. References

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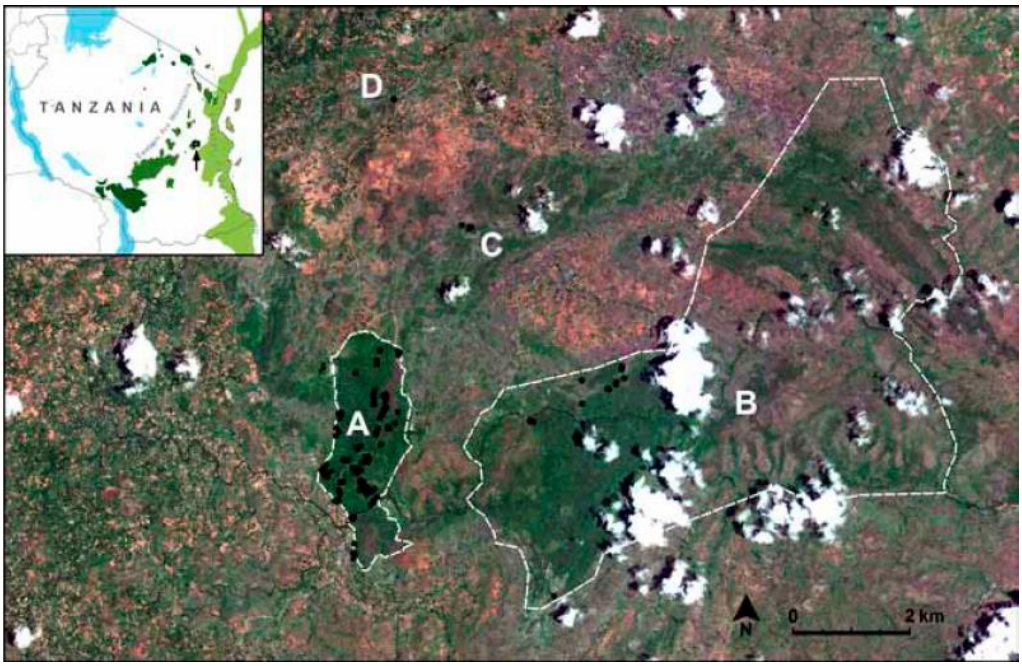

Figure 1. Distribution of *Lygodactylus williamsi*. Dashed lines indicate reserve borders of Kimboza Forest Reserve (A) and Ruvu Forest Reserve (B); dots mark single localities (i.e. inhabited plants) of measured specimens including the newly discovered populations at Muhalama (C) and Mbagalala (D). Satellite image from Google Earth/GeoEye. Source: Flecks *et al.* (2012a).

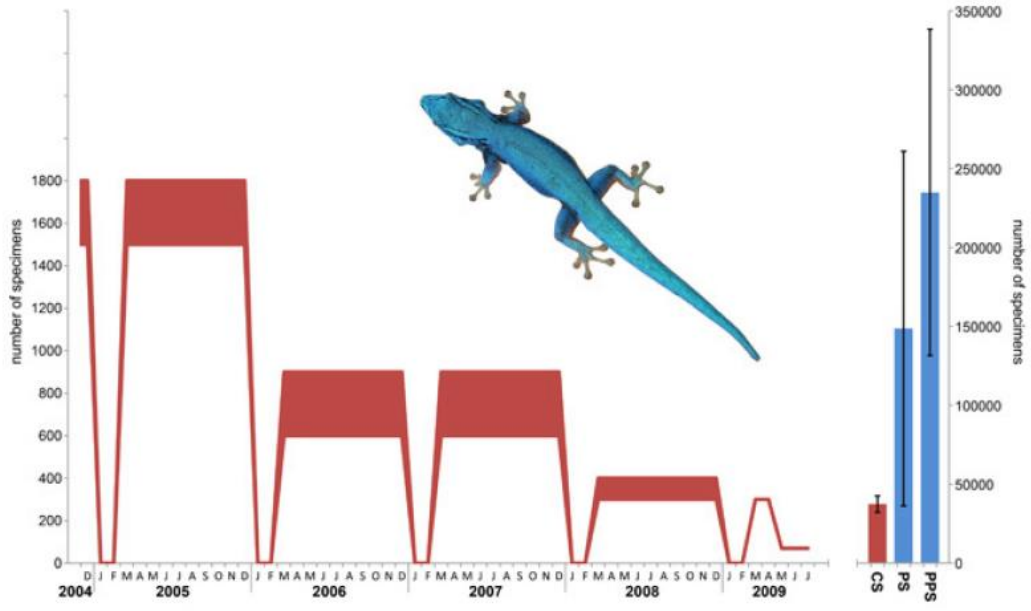

Figure 2. Harvest trend for *Lygodactylus williamsi* per month between December 2004 and July 2009. The upper bound of the red line represents the maximum, lower bound minimum number of specimens collected each month for the international pet trade. Bar charts show total numbers of specimens collected (CS, black line shows range) compared to the estimates of population size (PS, black line shows standard deviation) and potential population size (PPS, black line shows standard deviation). Source: Flecks *et al.* (2012a).