

Original Research Article

## A case for listing the Union Island Gecko *Gonatodes daudini* in the Appendices of CITES

Chris R. Shepherd <sup>a,\*</sup>, Jordi Janssen <sup>a</sup>, Josh Noseworthy <sup>b</sup>

<sup>a</sup> Monitor Conservation Research Society, PO BOX 200, VOL 1G0, Big Lake Ranch, BC, Canada

<sup>b</sup> Global Conservation Solutions, E3A 5C5, Fredericton, NB, Canada

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### ABSTRACT

The Union Island Gecko *Gonatodes daudini* is a Critically Endangered gecko, endemic to Union Island, Saint Vincent and the Grenadines. This species is occurring in an area less than 1 km<sup>2</sup> in one of the Grenadines only remaining stands of mature forest. Illegal trade in this species was first reported in 2011 and over-harvesting for the international pet trade is now considered the single most important threat to the continued survival of this species. The Union Island Gecko was proposed for a CITES Appendix I listing for Cop18, to be held in Sri Lanka in 2019. Here we support this proposed listing by showing that international trade in this species is ongoing. We documented the advertisement of 36 Union Island Geckos in 19 advertisements between September 2014 and December 2018. Germany (39%), Netherlands (22%) and Austria (14%) were the most frequent reported origin of advertisements. For 5 animals a wild-caught origin was reported. Our findings support those of previous trade surveys. Recent surveys suggest a sharp (80%) decline in the most accessible habitats of the wild population and any offtake could have detrimental consequences. As such, there is strong justification for an immediate listing of the Union Island Gecko in Appendix I.

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## 1. Introduction

The Union Island Gecko *Gonatodes daudini*, also known as the Grenadines Clawed Gecko, is endemic to Union Island, Saint Vincent and the Grenadines (Powell and Henderson, 2011). It was first discovered in 2005 during botanical surveys and was subsequently described and studied in greater detail (Powell and Henderson, 2005). This species has an extremely limited distribution, occurring in an area less than 1 km<sup>2</sup> on the slopes above Chatham Bay in one of the Grenadines only remaining stands of mature forest (Bentz et al., 2011). Within this restricted range, the species is found occupying rocky outcrops with small crevices and beneath boulders and logs (Quinn et al., 2010). Several threats to the Union Island Gecko have been identified, including invasive species such as feral goats and cats, as well as habitat loss and illegal collecting (Bentz et al., 2011; Powell and Henderson, 2011; Daltry et al., 2016). Due to its extremely small range size, specialised habitat requirements and consequent vulnerability to a range of threats, the Union Island Gecko has been assessed as Critically Endangered by the IUCN Red List of Threatened Species (Powell and Henderson, 2011). Until recently, the Union Island Gecko and its habitat were largely protected by its relative inaccessibility, however, a road constructed in 2005 now provides access

\* Corresponding author.

E-mail address: [shepherd.chrisr@gmail.com](mailto:shepherd.chrisr@gmail.com) (C.R. Shepherd).

to the area (Bentz et al., 2011). Illegal trade in this small and uniquely coloured and patterned species was first reported in 2011 (Powell and Henderson, 2011) and over-harvesting for the international pet trade is now considered the single most important threat to the continued survival of this species (Daltry et al., 2016). Such pressure could have a serious impact on the remaining population (Powell and Henderson, 2011), as illegal collecting not only reduces their already low numbers, but also destroys the limited habitat by overturning rocks and logs (Powell and Henderson, 2005; Daltry et al., 2016). In 2010, the total population of Union Island Geckos was estimated to be 6562 individuals (Bentz et al., 2011). A more recent survey (2018) estimates the total population at 9957 individuals (CITES Proposal CoP 18 for *G. daudini*). While initially the population seemed to be larger than previously estimated by Bentz et al. (2011), that survey was based on a small number of transects and did not include a recent discovered rocky outcrop with a relatively high density of geckos. Re-analysis of the data by Bentz et al. (2011) resulted in an estimate of 8176 geckos. Regardless, the density estimates in the most accessible parts of the species range i.e. leaflitter, went from 87 geckos per hectare in 2010 to 19 geckos per hectare in 2018, an approximate 80% decline (J. Daltry, Fauna & Flora International, pers. comm, January 2019).

Although the Union Island Gecko has yet to be included in the Schedules of protected species of the *Wildlife Protection Act* of Saint Vincent and the Grenadines (Act 16 of 1987, Amended by Act 42 of 1988 and Act 16 of 1991; Saint Vincent and the Grenadines, 1991), this process is currently underway (Noseworthy, 2017). However, without a permit granted by the Chief Wildlife Officer, Article 15 of the *Wildlife Protection Act* prevents any person from, (1) hunting any species of wildlife, (2) disturbing, damaging or destroying the nest or eggs of any species of wildlife, or (3) holding possession any species of wildlife. Furthermore, no person may export any wildlife from Saint Vincent and the Grenadines without the written permission of the Minister of Agriculture, Forestry, Fisheries, Rural Transformation, Industry and Labour (Daltry et al., 2016).

Rare, endemic and range-restricted species are frequently in high demand in the international black market for exotic pets (Shepherd and Ibarriondo, 2005; Courchamp et al., 2006; Kanari and Xu, 2012; Nijman and Stoner, 2014; Janssen and Shepherd, 2018). While previous surveys clearly show that illegal collecting and export has occurred (Powell and Henderson, 2011; Daltry et al., 2016), the current scale of international trade in Union Island Geckos is unknown. During a recent survey carried out by Monitor of the reptile trade involving the Netherlands (Janssen and Leupen, 2019), two specimens of this species were found for sale online, augmenting the results of a previous online survey (Noseworthy, 2017 – see below). These observations prompted this paper and support the call to provide this species with international protection under the Convention on International trade in Endangered Species of Wild Fauna and Flora (CITES). Listing in a CITES Appendix was identified as a priority in the Union Island Gecko Conservation Action Plan (Daltry et al., 2016). As long as the species is not included in the Appendices of CITES, there is virtually no legal instrument to prevent international exploitation. Species protected in their range states receive little protection within EU borders when not listed on CITES Appendices or EU Annexes (Nijman and Stoner, 2014; Vinke and Vinke, 2015; Alther, 2016; Auliya et al., 2016; Janssen and Shepherd, 2018). While the Union Island Gecko was listed on the UNEP-WCMC review of species that may require further consideration in the run up to CITES CoP17 (UNEP-WCMC, 2015), no further action was taken at that time. However, the species has since been proposed for inclusion in CITES Appendix I for CoP 18 (CoP 18 Proposal *G. daudini*) by Saint Vincent and the Grenadines. As commercial trade in the Union Island Gecko could potentially be devastating, international protection through CITES would be extremely beneficial. This would provide law enforcement with the necessary legal tools to seize smuggled specimens. In order to justify listing the species, it is important that evidence is presented to demonstrate that international trade is in fact taking place, and that such a listing in the Appendices of CITES would be justified.

## 2. Methods

We aimed to quantify the trade in Union Island Geckos by searching on known reptile trade sites online, in particular Terraristik (<http://www.terrarium.com>), Social Media (Facebook) and other reptile classified platforms (including websites of reptile shops) until the end of 2018. Advertisements were collected opportunistically in order to find evidence on when the species was traded, current trade volumes and if wild-caught animals were available. Search terms were both in English and German and included “*Gonatodes daudini* for sale” “*G. daudini* for sale” and “*G. daudini* anzeigen”. We chose these search terms as personal experience has shown that advertisement on these sites rarely contain common names, and nearly always the scientific name. German search terms were added as Germany is identified as the largest importer of reptiles in the European Union by far (Auliya et al., 2016), and is home to “Terraristika”, a quarterly held reptile fair, by many considered one of the largest in the world. A minimum quantity of 1 was assumed when no quantity was mentioned in the advertisement.

Under the United States (US) Lacey Act, import of any wildlife in violation of foreign legislation (§3372, a2A) is prohibited. Import and export data for the United States (USA) was obtained from the US Fish and Wildlife Service (USFWS) Law Enforcement Management Information System (LEMIS) through a previously submitted Freedom of Information Act request, covering the period 2005–2015. Additional data, 2016–2017 were not received in time. LEMIS specifies the content of each shipment with either a species code, a genus code or a more general code (e.g. NONR= Non-CITES reptile). As LEMIS contains trade data concerning non-CITES species, its inclusion in our analysis enables a more detailed overview of the trade in the Union Island Gecko. Here, data specifically labelled as *Gonatodes daudini* were examined.

The results of this survey were combined with those of Noseworthy (2017), whose methods involved a Google search using the English terms “*Gonatodes daudini* for sale”, “Union Island Gecko for sale”, “Grenadine Clawed Gecko for sale”, “Powell’s lizard for sale” and “Daudin’s gecko for sale”. A comprehensive review of all search engine hits for each search term was conducted. If evidence of a sale was found, a screenshot of the webpage was recorded, as was the sale name, country of sale,

website name and URL, trade motive (seller, breeder or buyer), and any comments regarding the sale value, specimen origin, and whether advertised as captive-bred or wild-caught. Prices were converted to USD using the yearly average for the year of the advertisement (see [IRS, 2018](#)).

### 3. Results

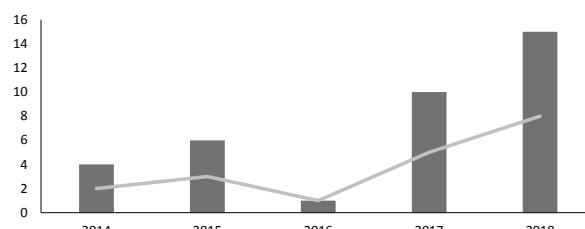
A total of 19 advertisements, for a minimum of 36 Union Island Geckos, were found on the internet posted between September 2014 and December 2018 ([Fig. 1](#)). The majority of animals (67%) were reportedly male, followed by females (17%) and unknown sex (17%). Sellers advertising Union Island Geckos originated from seven different countries, of which German sellers accounted for 39% of all advertisements. Together with the Netherlands (22%), Austria (14%) and France (11%), these countries made up for 86% of all Union Island Gecko advertisements. The remaining 14% of advertisements were posted by sellers from Spain (6%), United Kingdom (6%) and Switzerland (3%). Only seven out of 19 advertisements reported the origin of the animals, of which five advertisements (eight animals) were reportedly bred in captivity, while two advertisements (five animals) reported wild-origin.

The LEMIS database contained a single documented import of Union Island Geckos into the United States. In 2015, 12 reportedly captive-bred animals were imported from Sint Maarten - a constituent country of the Kingdom of the Netherlands. Price data was obtained for 8 advertisements originating from Germany, France, Netherlands and United Kingdom. On average, Union Island Geckos were advertised for USD 488 per animal. The lowest reported price was constituted USD 150 for a reportedly captive bred male gecko by a German seller in 2017. The highest price was reported for a reportedly captive bred male advertised in the United Kingdom in 2016. Prices for wild caught geckos ranged between USD 617 and 750 per animal (quoted as USD 1500 per pair).

### 4. Discussion

In 2016, a conservation action plan for the Union Island Gecko was developed in partnership between the Saint Vincent and the Grenadines Forestry Department, Fauna & Flora International, Union Island Environmental Attackers and the Virginia Zoo ([Daltry et al., 2016](#)). Illegal collecting was cited as one of the primary threats to the species, and stated that, “*An online search conducted ... in December 2015 found more than a dozen dealers openly offering geckos for sale, from website addresses in the USA, UK, the Netherlands and Germany.*” Our findings support those of [Daltry et al. \(2016\)](#), and it is clear that Union Island Geckos are available throughout Europe and have also been imported into the United States ([Noseworthy, 2017](#)). In addition, Japanese buyers expressed interest in this species ([Noseworthy, 2017](#)). The overwhelming presence of males (compared to females) in international trade is of potential conservation concern as it could provide evidence of sex-biased harvesting, which is interesting considering the Union Island Gecko in essence is not sexual dimorphic. While this could be merely an observation of male-surplus in captive populations, it could have detrimental consequences for the wild population if it is evidence of sex-biased harvesting ([Coltman, 2008](#)).

Although the Union Island Gecko is granted domestic protection from export, reportedly wild-caught animals were offered for sale in several European Countries (this study, [Noseworthy, 2017](#)). As the species is not yet listed in the Appendices of CITES, there are no instruments in place to aid in preventing international trade in illegally-sourced specimens. As such, there is strong justification for listing of the Union Island Gecko in Appendix I, and in the meantime, it could be listed in Appendix III which could be done unilaterally by the government of Saint Vincent and the Grenadines as the only native range state of the species (in contrast with listing a species in Appendix I or II by a vote of the Parties). Proposals for a CITES Appendix I listing have been known to trigger a so called “gold rush” among collectors, to get as many animals into the captive population as possible ([Janssen and Krishnasamy, 2018](#)). An interim Appendix III listing would provide law enforcement with the necessary legal tools to seize smuggled animals before a CITES Appendix I listing would come into effect. Appendix III contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade. An export permit or re-export certificate issued by the Management Authority of the State of export or re-export is required for species listed in Appendix III. Appendix I is far stricter and requires an import permit be issued by the Management Authority of the State of import or are covered by a certificate of captive breeding (Resolution Conf. 10.16) and an export permit or re-export certificate issued by the Management Authority of the State of export or re-export ([CITES](#)



**Fig. 1.** Number of observed Union Island Gecko advertisements (line) and number of individuals advertised (bars) online between 2014 and 2018.

Secretariat, 2019). Listing in Appendix III does require the Union Island Gecko be classified as a protected species in Saint Vincent and the Grenadines – a process that is currently underway. Expediting this process would ensure Saint Vincent and the Grenadines receives international cooperation in controlling trade in the species, allowing export only with CITES documents, and would provide a means of gathering trade data to assist the CITES Management Authority (Ministry of Agriculture, Forestry, Fisheries, Rural Transformation, Industry and Labour).

Organisations monitoring the trade in wildlife are encouraged to watch out for and report incidents of trade in Union Island Geckos to the CITES Management Authority of Saint Vincent and the Grenadines, as well as the country in which the observation was made. Only through international and inter-agency collaboration will the threat of commercial trade to the Union Island Gecko be prevented.

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## References

Altherr, S., 2016. Stolen Wildlife II - Why the EU Still Needs to Tackle Smuggling of National Protected Species, Report by Pro Wildlife. Pro Wildlife, Munich, Germany.

Auloya, M., Altherr, S., Ariano-Sanchez, D., Baard, E.H., Brown, C., Brown, R.M., Cantu, J.-C., Gentile, G., Gildenhuys, P., Henningheim, E., Hintzmann, J., Kanari, K., Kravavac, M., Lettink, M., Lippert, J., Luiselli, L., Nilson, G., Nguyen, T.Q., Nijman, V., Parham, J.F., Pasachnik, S.A., Pedronom, M., Rauhaus, A., Rueda Cordova, D., Sanchez, M.-E., Schepp, U., Schingen, M.V., Schneeweiss, N., Segniagbeto, G.H., Somaweera, R., Sy, E.Y., Turkozan, O., Vinke, S., Vinke, T., Vyas, R., Williamson, S., Ziegler, T., 2016. Trade in live reptiles, its impact on wild populations, and the role of the European market. *Biol. Conserv.* 204, 103–119.

Bentz, E.J., Rivera Rodríguez, M.J., John, R.R., Henderson, R.W., Powell, R., 2011. Population densities, activity, microhabitats, and thermal biology of a unique crevice and litter-dwelling assemblage of reptiles on Union Island, St. Vincent and the Grenadines. *Herpetol. Conserv. Biol.* 6 (1), 40–50.

CITES Secretariat, 2019. How CITES Works. <https://www.cites.org/eng/disc/how.php>. (Accessed 28 January 2019).

Coltman, D.W., 2008. Molecular ecological approaches to studying the evolutionary impact of selective harvesting in wildlife. *Mol. Ecol.* 17 (1), 221–235.

Courchamp, F., Angulo, E., Rivalan, P., Hall, R.J., Signoret, L., et al., 2006. Rarity value and species extinction: the anthropogenic allee effect. *PLoS Biol.* 4 (12), e415. <https://doi.org/10.1371/journal.pbio.0040415>.

Daltry, J.C., Adams, R., Gaymes, G., Providence, F., Sweeney, R., 2016. Union Island Gecko: Conservation Action Plan, 2016–2021. Report to the Saint Vincent & the Grenadines Forestry Department, Fauna & Flora International, Union Island Environmental Attackers and Virginia Zoo.

IRS, 2018. Yearly Average Currency Exchange Rates. Retrieved from: <https://www.irs.gov/individuals/international-taxpayers/yearly-average-currency-exchange-rates>.

Janssen, J., Krishnasamy, K., 2018. Left hung out to dry: how inadequate international protection can fuel trade in endemic species—The case of the earless monitor. *Global Ecol. Conserv.* 16, e00464.

Janssen, J., Leupen, B.T.C., 2019. Reptile Trade: the Role of the Netherlands. Monitor Conservation Research Society, Big Lake, Canada (in press).

Janssen, J., Shepherd, C.R., 2018. Challenges in documenting trade in non-CITES listed species: a case study on crocodile skinks (*Tribolonusotus* spp.). *J. Asia Pac. Biodivers.* <https://doi.org/10.1016/j.japb.2018.09.003>.

Kanari, K., Xu, L., 2012. Trade in Japanese Endemic Reptiles in China and Recommendations for Species Conservation. TRAFFIC East Asia—Japan, Tokyo, Japan, p. 31.

Nijman, V., Stoner, S.S., 2014. Keeping an Ear to the Ground: Monitoring the Trade in Earless Monitor Lizards. TRAFFIC Petaling Jaya, Selangor, Malaysia.

Noseworthy, J., 2017. Cold-blooded Conflict: Tackling the Illegal Trade in Endemic Caribbean Island Reptiles (Unpublished master's thesis). University of Cambridge, Cambridge, UK.

Powell, R., Henderson, R.W., 2005. A new species of *Gonatodes* (Squamata: Gekkonidae) from the west Indies. *Caribb. J. Sci.* 41, 709–715.

Powell, R., Henderson, R.W., 2011. *Gonatodes daudini* (errata version published in 2017). The IUCN Red List of Threatened Species 2011: e.T194258A115333400. <https://doi.org/10.2305/IUCN.UK.2011-2.RLTS.T194258A8889057.en>. (Accessed 1 October 2018).

Quinn, D.P., McTaggart, A.L., Bellah, T.A., Bentz, E.J., Chambers, L.G., Hedman, H.D., Rodríguez, M.J.R., 2010. The reptiles of union Island, St. Vincent and the Grenadines. *Reptil. Amphib.* 17, 222–233.

Shepherd, C.R., Ibarrodo, B., 2005. The Trade of the Roti Island Snake-Necked Turtle *Chelodina Mccordi*, Indonesia. TRAFFIC Southeast Asia. Petaling Jaya, Malaysia.

UNEP-WCMC, 2015. Review of Species Which May Warrant Further Consideration in Preparation, CoP17. UNEP-WCMC, Cambridge, United Kingdom.

Vinke, T., Vinke, S., 2015. May Illegal be Legal within the European Union? Schildkröten Im Fokus online, Bergheim, vol. 1, pp. 1–6. [http://www.schildkroeten-im-fokus.de/pdf/2015\\_1vinke\\_en.pdf](http://www.schildkroeten-im-fokus.de/pdf/2015_1vinke_en.pdf).