TRAFFIC

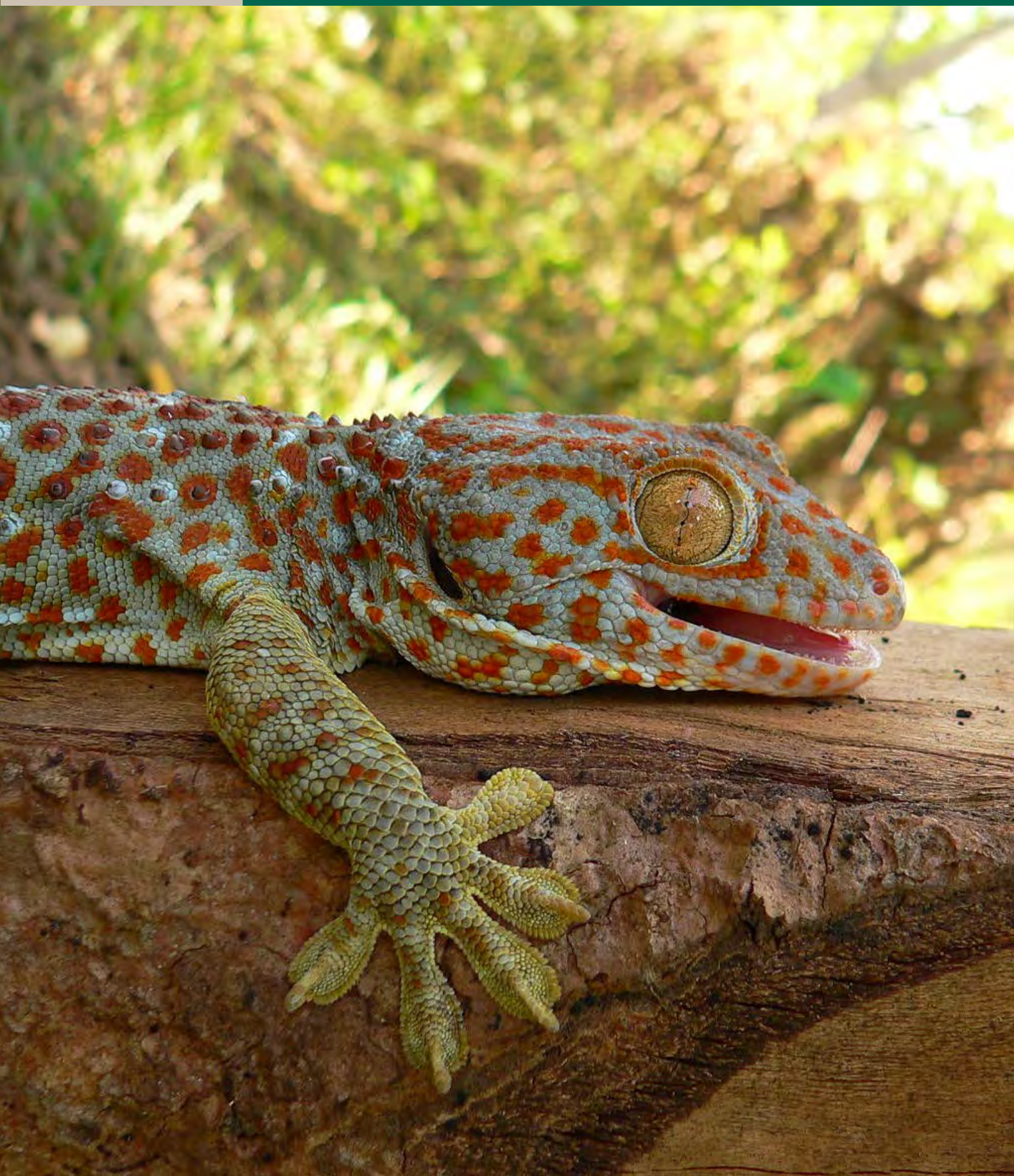
REPORT

ADDING UP THE NUMBERS

An investigation into commercial breeding of Tokay Geckos in Indonesia

OCTOBER 2015

Vincent Nijman and Chris R. Shepherd



TRAFFIC REPORT

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Front cover photograph: Portrait of a Tokay Gecko. Photo Credit: Mark Auliya/TRAFFIC

ADDING UP THE NUMBERS

An investigation into commercial breeding of Tokay Geckos in Indonesia

Vincent Nijman and Chris R. Shepherd

Portrait of a Tokay Gecko.

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Tokay Geckos can easily be found for sale in markets in Indonesia, such as this one in Jogjakarta.

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ABBREVIATIONS AND ACRONYMS

CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
BKSDA	Regional Natural Resource Management Office
PHKA	Forest Protection and Nature Conservation
USD	US Dollar

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EXECUTIVE SUMMARY

Commercial captive breeding of wildlife is sometimes viewed as a method to remove or reduce pressures of overexploitation on wild populations. But captive breeding can also be used as a mechanism to launder wild-caught specimens. This report provides evidence that laundering of wild-caught Tokay Geckos *Gekko gecko* through legally registered captive-breeding facilities in Indonesia is taking place on a large scale.

Although Tokay Geckos are not on Indonesia's list of protected species, trade in wild-caught specimens is subject to an annual harvest and export quota system. Commercial breeding of Tokay Geckos is also permitted in Indonesia and in March 2014 the Indonesian Ministry of Forestry announced that they had given permission to six companies to export a total of over three million live captive-bred Tokay Geckos for the pet trade.

The logistics involved in breeding millions of Tokay Geckos for the export market are considerable. In order to produce one million adult-sized geckos a facility would require 140 000 breeding females, 14 000 breeding males, 30 000 incubation containers in continuous use year-round, and some 112 000 rearing cages. Basic care of these Tokay Geckos would require hundreds of staff to be employed and a constant supply of food, all of which would have significant additional costs.

Of equal importance is that the exporting companies involved are not known to ever have bred this species in commercial numbers, and are known to supply the trade in wild-caught reptiles for the medicinal and meat trade, not for pets. It is therefore suspected that the majority of Tokay Geckos are intended to be exported dried and prepared for use in traditional medicines.

We argue that the investments in terms of infrastructure, space, financial commitments and staff are not matched by the amount of money that can be made from the export of Tokay Geckos, especially if they are indeed intended for use in traditional medicines. In the authors' view it is impossible to maintain and breed these animals year-round and make a profit.

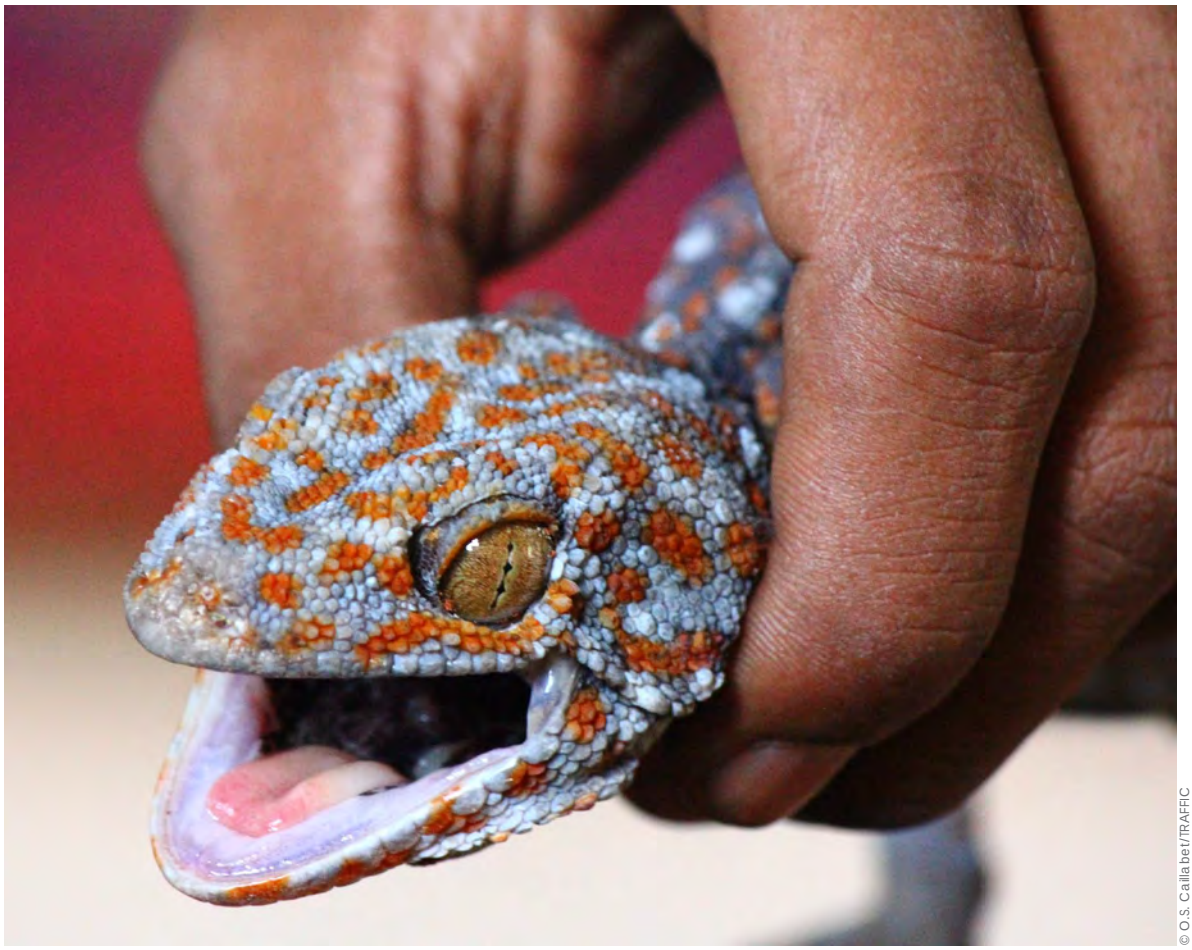
The inescapable conclusion is that if the quantities reported in trade are accurate, they can only be sustained through the routine laundering of wild-caught individuals and their export as dead specimens, rather than live for the pet trade. There is no legal trade in dead Tokay Geckos from Indonesia.

Based on the findings of this report, TRAFFIC makes the following recommendations:

- Permission for commercial captive breeding of Tokay Geckos should not be issued, as such an enterprise is clearly not feasible or economically viable. Given that captive breeding permits are currently used to avoid quota restrictions on wild-caught geckos, current permits for breeding Tokay Geckos should be revoked to prevent further laundering.
- Methods to conduct Non-detriment Findings should be developed and carried out for Tokay Gecko to determine the current status of the species in the wild and to assist in determining realistic harvest and trade quotas that would not have a negative impact on the wild populations.
- There is a strong justification to include Tokay Geckos in Appendix II of CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora), which would allow the international trade to be regulated and monitored. We urge Indonesia to develop a proposal to list this species in CITES Appendix II in time for submission at the next CITES Conference of

the Parties.

- The Government of Indonesia is encouraged to list Tokay Gecko in Appendix III of CITES immediately, to allow for the international trade of this species to be better monitored through the co-operation of all CITES Parties. Such a move does not require a vote at a CITES Conference of the Parties.



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Although Tokay Geckos are commonly bred in captivity in Southeast Asia, captive breeding can also be used as a mechanism to launder wild-caught specimens.

INTRODUCTION

Regulating the trade in wildlife is one of the major challenges in contemporary conservation biology, and arguably nowhere more so than in Asia (McNeely *et al*., 2009). Captive breeding is sometimes perceived as a way to alleviate pressure on wild populations, by sourcing individuals from captive populations instead of directly from the wild. However, it has become clear that commercial captive breeding often has no conservation benefit and may even be counterproductive, being misused used as a laundering mechanism (Nijman and Shepherd, 2009; Lyons and Natusch, 2011; Shepherd *et al*., 2012; Nijman 2014). Many countries treat the export and/or import of captive-bred individuals differently than that of their wild counterparts, for instance by legalising trade in captive-bred individuals but not in their wild counterparts or by not including the number of captive-bred individuals in export quotas. This report shows that systems allowing trade in captive-bred species are being used to launder large volumes of wild-caught specimens.

Although Tokay Geckos *Gekko gecko* is not on Indonesia's list of protected species, trade in wild-caught specimens is subject to an annual quota system, which covers both harvest and export for non-protected species to supply both domestic and international markets (Shepherd and Nijman, 2007). The Indonesian Institute for Sciences, as the national CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) Scientific Authority, is responsible for setting the quota, and the Directorate General of Forest Protection and Nature Conservation (PHKA), as the national CITES Management Authority, is responsible for the regulation and enforcement of the quota.

In an effort to relieve pressure on wild stocks, captive breeding of wildlife is encouraged by the PHKA in Indonesia. All breeders wishing to export wild-caught or captive-bred animals must be registered with PHKA. Breeders supplying exporters, but not themselves exporting, must be registered with the Regional Natural Resource Management Office (BKSDA) offices at a provincial level. Parent stock obtained by companies breeding wildlife for commercial purposes remains the property of the government, but offspring can be exported. The harvest and export quotas therefore do not include captive-bred specimens.

Large-scale illicit export of Tokay Geckos from Indonesia for purposes that were not stipulated on the permits (Nijman *et al*., 2012) has been reported in the past; with volumes of wild-caught specimens grossly exceeding agreed quota. Set quotas allowed 24 000 wild-caught Tokay Geckos to be exported only alive as pets annually from the island of Java. However, in 2006 three traders from the eastern part of the island exported an estimated 1.2 million wild-caught geckos, slaughtered and kiln-dried to be used in traditional Asian medicine (Auliya and Shepherd, 2007; Nijman *et al*., 2012). This figure of 1.2 million does not include numbers from two additional companies, which were not surveyed, and therefore actual volumes exported during this year would have been considerably higher.

Commercial captive breeding of Tokay Geckos

In March 2014 the Indonesian Ministry of Forestry announced that they had given permission to six companies to export a total of over three million live captive-bred Tokay Geckos (Partono, 2014). As clearly indicated on the announcement, the purpose of these captive-bred geckos was to supply the demand for the pet trade; trade for any other purposes (skins, meat, etc.) was not allowed under this permission (cf. Shepherd and Nijman, 2007). The four companies with the largest quotas were PT Manta Pratama Unggul Perkasa in Semarang, Central Java (1 000 000 geckos), UD Andira Alternatif in Probolinggo, East Java (980 000 geckos), CV Karya Abadi Reptil Mulia (750 000 geckos), and UD Karya Reptil Sentosa (250 000 geckos), the latter two both based in Sitoarjo, East Java. [1]

6	Biawak gouldi/Biawak coklat	*Varanus panoptes horni (Varanus panoptes gouldi)*	112														70	15	85	12
7	Biawak timor	*Varanus timorensis*	258															527	140	10
8	Biawak Kordensis (hijau)	*Varanus kordensis*																	89	2
9	Kura-kura Irian	*Carettochelys insculpta*																		2
MAMALIA																				
1	Tarsius	*Tarsius spectrum*	80																	
2	Jelarang hitam	*Ratufa bicolor**																23		
3	Kus-kus Totol	*Spilocuscus maculatus*	31																	
II. Dilindungi UU dan termasuk Non Appendix CITES																				
REPTIL																				
1	Soa-Soa Payung	*Chlamydosaurus kingii*	1.106							780							600	2.225	1.689	2.00
2	Kadal Panana	*Tiliqua gigas*								460							175	530	265	30
3	Kura leher panjang	*Chelodina novaeguineae*																153		
4	Soa ambon	*Hydrosaurus amboinensis*															40	476	192	50
5	Kura Beo Irian	*Elseya novaeguineae**	1.452															161	483	
MAMALIA																				
1	Bajing terbang merah	*Petaurista petaurista*	63																	
III. Tidak Dilindungi dan termasuk Appendix CITES																				
REPTIL																				
1	Ular Sanca biasa	*Broghammerus reticulatus (Python reticulatus)*	402								200	30		150				129	430	42
2	Ular Sanca coklat	*Leiopython albertisi*	209								10	6					45	122	71	7
3	Ular sanca patola	*Morelia amethystina*	255								15						50	82	101	10
4	Ular sanca air	*Liasis mackloti mackloti (Liasis mackloti)*	145															92	46	3
5	Ular sanca karpet	*Morelia spilota harrisoni (Morelia spilota variegata)*	315								20						150	163	128	4
6	Ular sanca bulan	*Morelia boeleni*	170														16	6	53	4
7	Ular sanca darah hitam	*Python curtus*	257											150					104	17

			Jayatama		Mandiri					Lestari		Fauna		Mulia	Unggul Perkasa					Alam Nusa	
1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	2
I. Dilindungi UU dan termasuk Appendix CITES																						
REPTIL																						
1	Ular sanca bodo	*Python bivittatus (Python molurus bivittatus)*	220								30							77	194			
2	Ular Sanca Hijau	*Morelia viridis*	4.129						875	100	90						350	1.068	1.137	2.000		1
3	Ular Sanca Timor	*Broghammerus timorensis (Python timorensis)*	51								10						6	171	61	50		
4	Biawak Hijau	*Varanus prasinus*	209														12	230	187	175		
5	Biawak indicus	*Varanus indicus*															30	406	152	25		
6	Biawak gouldi/Biawak coklat	*Varanus panoptes horni (Varanus panoptes gouldi)*	112														70	15	85	125		
7	Biawak timor	*Varanus timorensis*	258															527	140	100		
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Figure 1. Captive-breeding production plan for reptiles, amphibians and mammals for pets for the year 2014, as produced by the Ministry of Forestry, Jakarta. Pages 3 and 4 of the document confirming potential production of over three million Tokay Geckos from six companies, for export as live pets, signed by the Directorate General of PHKA, S. Partono, 2014.

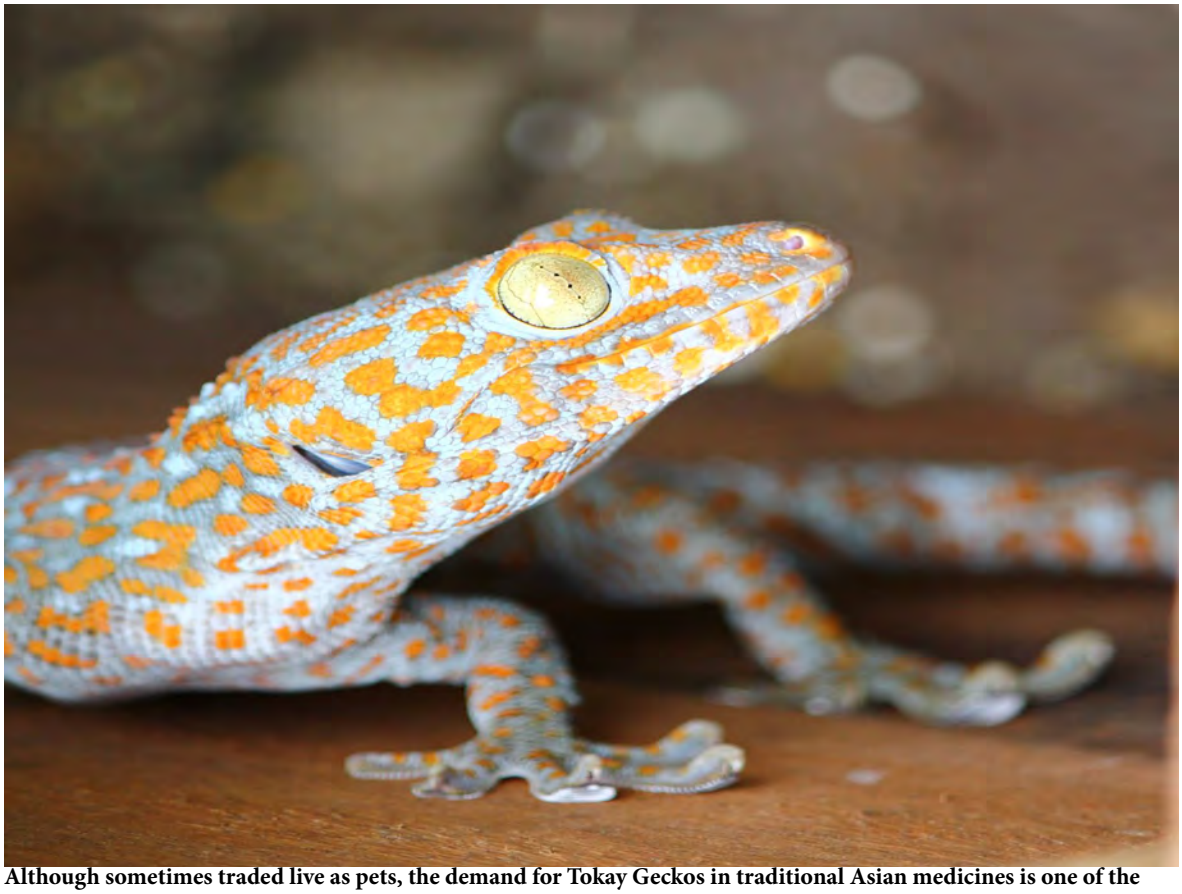
The large-scale trade in Tokay Geckos outside of Indonesia's laws and regulations has been taking place for some time. Manta Pratama Unggal Perkasa was one of three companies included in an earlier study, conducted in 2006, when it was estimated that it exported some 390 000 wild-caught dried geckos a year, in violation of the agreed purpose (for pets only) and in violation of the national allocated quota of 50 000 wild-caught live geckos (Nijman *et al*., 2012). According to its website, viewed in 2014, it is a trading company specialising in the export of frozen snake meat, kiln-dried Tokay Geckos, snakes, tortoise and freshwater turtle shells and cardamom to mainland China, Hong Kong and Taiwan. In addition, it exports high-value wildlife derivatives such as ambergris, castoreum and civet bile. The other three companies were all registered as Tokay Gecko breeders with the East Java Regional Natural Resource Management Office in 2008 and have been involved in the large-scale export of dried geckos (Andira Alternatif and Karya Reptil Sentosa) and dried geckos and snakes (Karya Abadi Reptil Mulia) to mainland China. In 2013 it was reported that Andira Alternatif exported 300 000–400 000 dried Tokay Geckos per year; all said to be wild-caught with no mention made of breeding of Tokay Geckos (Anonymous, 2013). Given that in 2013 no quota was allocated for the export of dried Tokay Geckos this would have been in violation of the national quota system implemented by the PHKA. There are no indications that any of these four companies are, or have ever been, involved in the live pet trade.

Practicalities of breeding Tokay Geckos

What are the logistics involved in breeding such large quantities of Tokay Geckos for the export market? Based on Tokay Gecko breeders' manuals and forums, and on discussions with experts on captive breeding of Tokay Geckos, the following key reproductive parameters and housing conditions were extracted, selecting values that give the highest yields (youngest age for reproduction, maximum longevity, largest clutch sizes, etc.) at the lowest costs, ignoring any welfare issues, and assuming zero mortality of young:

- female Tokay Geckos become reproductively active after 18 months and here it is assumed that they remain reproductively active up until the age of 10 years;
- each clutch contains two eggs and females produce four clutches a year;
- eggs hatch after three months, assuming here that all eggs are successfully hatched;
- geckos grow to adult size in 18 months, but are large enough to be harvested after 12 months;
- males and females are housed in individual cages measuring 60 x 40 x 40 cm (length x height x width);
- males are introduced to females for short periods to allow mating;
- a male: female ratio of 1:10 is maintained for breeding;
- eggs are removed and put into incubation containers;
- once hatched, hatchlings are housed in groups of 10 in slightly larger rearing cages measuring 60 x 40 x 50 cm.

[1]PT = Perseroan Terbatas [Indonesian] = Limited Liability Company; UD = Usaha Dagang [Indonesian] = Trading Company; CV = Commanditaire Vennootschap [Dutch] = Limited Partnership.



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Although sometimes traded live as pets, the demand for Tokay Geckos in traditional Asian medicines is one of the greatest threats to this species.

The amount of staff time needed to maintain this operation is impressive: the geckos need to be fed hundreds of millions of crickets a year; if a feeding session takes just 15 seconds to complete, then some 50 people/staff need to be employed, working 10 hour non-stop shifts, without having a single day off. If the cages are cleaned once a month and the whole cleaning process, including temporary removal of the geckos, takes just 10 minutes, then some 150 people/staff need to be employed, working 10 hour non-stop shifts, without having a single day off.

Under this scenario, a breeding facility aiming to export 1 million Tokay Geckos would need to produce 1.12 million adult-sized geckos per year. This would require 140 000 breeding females, each producing eight fertile eggs a year, and 14 000 breeding males. To incubate these they need some 30 000 incubation containers, all in continuous use year-round, with a 100% hatchling survival rate. Once hatched the geckos would need to be housed in approximately 112 000 rearing cages.

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Wild-caught Tokay Geckos are traded in large volumes throughout Asia

The space requirements for these operations, if genuine, are impressive: Manta Pratama Unggul Perkasa's 266 000 breeding and rearing cages, if stacked in rows two metres high, would require a building with a floor space of some 35 000 m^2, or piled two metres high in height, the cages would stretch over a length of almost 24 km. This is the equivalent of almost five football pitches. The values for Andira Alternatif are similar – 248 000 cages covering 4.5 football pitches, or stretching 22 km – and those for Karya Abadi Reptil Mulia and Karya Reptil Sentosa are 195 000 cages, covering 3.5 football pitches, or 17 km, and 65 000 cages, covering more than a football pitch, or 6 km, respectively.

It is clear that if Tokay Geckos were genuinely bred in captivity in Java this would require a massive investment in terms of infrastructure, space, financial commitments and staff. This, however, is not matched by the amount of money that can be made by trade in Tokay Geckos. If the Tokay Geckos are indeed all exported as pets, the wholesale price for an adult individual is USD1.00 – 1.15 (2010 prices: Nijman *et al*., 2012) to USD2.30 (2014 price obtained from an anonymous Indonesian exporter). The permit to export live reptiles requires a payment of USD0.43 to the quarantine office, leaving less than USD1.90 to maintain and breed these animals year-round, and to pay for the cost of shipping and packing for the live export.

Profit margins are even smaller when the Tokay Geckos are (illegally) exported dried. Data from one export company indicate that they buy wild-caught geckos for USD0.16 and, assuming twenty individuals make up a kilogramme of dried gecko (Caillabet, 2013), they are exported to China for USD0.20 a piece once processed (Anonymous, 2009). Another source indicates that a wholesale dealer can sell a pair of dried Tokay Geckos in good condition for USD0.40, and half that for a damaged pair (Asprihanto, 2010). These profit margins are evidently sufficient when dealing with wild-caught geckos that need to be kept in storage for no longer than a week without the need to be fed or watered, after which they are killed and kiln- or sun-dried and prepared for export. It would, however, be impossible to maintain and breed these animals and generate a profit.

According to reptile traders in Indonesia that were questioned by Nijman *et al.* (2012), prices were far too low to make captive breeding an economically viable option as the investment and scale was far too large compared to the return, and therefore it is likely there is no commercial captive breeding of this species in Indonesia. In 2014, reptile traders in Indonesia, who wish to remain anonymous, stated that viable commercial captive breeding of this species in these volumes was not possible.

CONCLUSIONS AND RECOMMENDATIONS

In agreement with the Indonesian traders' statements above, it is concluded here that captive breeding of Tokay Geckos cannot take place in Indonesia on a sufficient scale to produce the numbers of animals for which quotas exist for live exports for the pet trade. Commercial captive breeding of Tokay Geckos would not make this an economically viable option. Clearly, the overwhelming majority of claims of captive breeding of Tokay Geckos are false. Instead, this analysis strongly suggests that captive-breeding permits are instead being used to launder wild-caught Tokay Geckos by the millions into trade, for illegal export as dried specimens.

In light of these findings, TRAFFIC makes the following recommendations:

- Permission for commercial captive breeding of Tokay Geckos should not be issued, as such an enterprise is clearly not feasible or economically viable. Given that captive breeding permits are currently used to avoid quota restrictions on wild-caught geckos, current permits for breeding Tokay Geckos should be revoked to prevent further laundering.
- Methods to conduct Non-detriment Findings should be developed and carried out for Tokay Gecko to determine the current status of the species in the wild and to assist in determining a realistic harvest and trade quotas that would not have a negative impact on the wild populations.
- There is a strong justification to include Tokay Geckos in Appendix II of CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora), which would allow the international trade to be regulated and monitored. We urge Indonesia to develop a proposal to list this species in CITES Appendix II in time for submission at the next CITES Conference of the Parties.
- The Government of Indonesia is encouraged to list Tokay Gecko in Appendix III of CITES immediately, to allow for the international trade of this species to be better monitored through the co-operation of all CITES Parties. Such a move does not require a vote at a CITES Conference of the Parties.

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