

# Valuable Varanoids: Surveys of Reptile Traders in Japan Reveal Monitor Lizards Without Import Records

JORDI JANSSEN

*Emoia Consultancy, Johannes Poststraat 108, Gouda, Netherlands*  
E-mail: j.janssen88@gmail.com

**Abstract - Reptiles are one of the most heavily harvested terrestrial faunas in the world, with varanoid lizards (*Varanus* and *Lanthanotus*) as some of the most sought-after reptiles. Where previous studies have looked solely at official import and export records, such records provide little information on illegal trade in varanoid lizards. In the present study, covert surveys were used to detect varanoid lizards with a likely illegal origin and compare the species observed with legal import records. Data on the availability of live *Varanus* and *Lanthanotus* in Japanese reptile shops were gathered during surveys of 16 reptile shops in the districts of Tokyo, Kanagawa and Osaka and at the winter edition of Reptile Fever, a reptile fair in Osaka. A total of 221 live varanoid lizards, of 40 taxa, which included four subspecies, were documented. Prices were obtained for 26 taxa and ranged from \$149 USD for *V. gilleni* to \$53,100 USD for *V. giganteus*. For five of the observed taxa (*V. giganteus*, *V. marmoratus*, *V. nuchalis*, *V. obor* and *V. semiremex*) no legal import records could be found, suggesting these specimens entered Japan illegally. Trade in violation of national or international legislation is often carried out covertly without trade records, and creates a challenge for monitoring species' conservation status. The lack of trade records may allow overexploitation of species to go unnoticed, resulting in underestimations of threats.**

## Introduction

Reptiles are among the most heavily harvested terrestrial faunas in the world, with 152 million reptiles traded between 1975 and 2014 (Harfoot *et al.*, 2018). Varanoid lizards, which include the monitors (*Varanus*) and earless monitor (*Lanthanotus borneensis*) are some of the most sought-after reptiles (Weissgold, 2000; Pernetta, 2009; Nijman, 2010; Koch, 2013) and are traded both legally and illegally for a wide range of purposes including for their skins (Shine *et al.*, 1996), meat (Bifarin *et al.*, 2008), traditional medicine (da Nóbrega Alves *et al.*, 2008) and as pets (Pernetta, 2009; Bennett, 2015).

Varanoid lizards are popular pets because of their often-bright colors, unique behavioral complexity and intelligence, and often have a high value attached (Koch *et al.*, 2013; Bennett, 2015). Smaller-sized varanoids such as *Varanus indicus*, *V. prasinus* and *V. macraei* are of particular interest to wildlife traders, as they require less space to maintain in captivity and are in high demand by the international pet trade (Auliya, 2003; Bennett, 2015). Many of these species are endemic to remote

areas or small islands. Access to these areas created for other purposes (*e.g.*, logging) can allow traders to more easily obtain rare varanoids (Wilkie *et al.*, 2000; Suarez *et al.*, 2009), increasing the number of species available in the global pet trade.

Although the volume of commercial trade in *Varanus* skins far outnumbers the trade in varanoids for pets, far more species are represented in the global pet trade (Auliya, 2003; Koch, 2013). Yet, the impact of the global trade in live *Varanus* and *Lanthanotus* remains poorly understood due to a lack of basic biological information and status in the wild for many species (Koch *et al.*, 2013). For several species of range-restricted monitors, their harvest from the wild in combination with their restricted distributions, were found to be of conservation concern, leading the European Union to impose import restrictions (*i.e.*, *V.d umerilii*, *V. jobiensis*, *V. beccari* and *V. salvadorii*; Engler & Parry-Jones, 2007). Since 2017, with the addition of *Lanthanotus borneensis*, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) lists all varanoid lizards, with the majority of species listed in Appendix II. CITES Appendix II includes species that

are not necessarily threatened with extinction but may become so if the trade in these species is not regulated. Trade in these species is only allowed with CITES documents from participating export countries.

Even though all varanoid lizards are now listed on the CITES Appendices, there is a growing body of evidence that these animals are illegally traded across international borders (Welton *et al.*, 2013; Bennett, 2014; Jimenez-Bustamante & Rentería, 2018). Previous studies on the trade in live *Varanus* (*e.g.*, Pernetta, 2009; Bennett, 2015) mainly focused on official import and export records, allowing only for the detection of discrepancies in transactions with legal paperwork. Utilizing a different methodology, the present study used physical surveys of Japanese reptile traders to detect specimens with a likely illegal origin, including those not identified in the transactions recorded by CITES. In order to assess the legality of the observed specimens, observed species were compared with import records for Japan.

## Methods

Data on the availability of varanoid lizards in Japanese reptile shops were gathered during covert surveys of 16 reptile shops in the districts of Tokyo, Kanagawa and Osaka as part of a wider TRAFFIC (wildlife trade monitoring network) market survey in February 2017 (Wakao *et al.*, 2018). Each reptile shop was visited either once or twice, and a full inventory of all reptiles available was made. Shops were revisited if the first survey was unsuccessful (*e.g.*, shop was closed) or did not result in a full inventory. A full inventory was defined as when all enclosures in the shop could be observed. Besides specialized reptile shops, a second covert market survey was conducted at the winter edition of Reptile Fever, a reptile fair in Osaka. All varanoid lizards present were recorded and vendors were opportunistically questioned about the origin of their specimens to compare with import data and relevant legislation. Price data were gathered opportunistically and converted to USD using the average conversion rate for February 2017, (100 JPY = 0.88514 USD). Species observed were compared with Japanese import records obtained from the CITES Trade Database (available at <http://www.cites.org/eng/resources/trade.shtml>). The database was searched for any live *Varanus* imported by Japan (importer-reported quantity) for commercial purposes (code 'T'), including both range states and non-range states. As *Lanthanothus* was only added to the CITES

Appendices in February 2017; subsequently, no trade records were available for this species.

## Results

A total of 221 live varanoid lizards of 40 taxa were recorded, which included four subspecies (Table 1). The three most common species encountered were *V. exanthematicus* (n = 59), *V. melinus* (n = 18), and *V. salvator* (n = 17). Single specimens were observed for 14 out of 40 taxa, and only seven taxa averaged more than two specimens per shop. Prices were obtained for 26 taxa, ranging from \$149 USD for *V. gilleni* to \$53,100 USD for *V. giganteus*. For four species, price tags of over \$10,000 USD were observed, with the total combined quoted value for all varanoids observed in the surveys reaching \$231,274 USD.

Origins were obtained for only six individuals, comprising five taxa. Only for *Varanus salvator bivittatus* was a captive-bred origin reported. Two observed *V. melinus* were reportedly born in captivity, while a wild-caught origin was reported for single specimens of *V. macraei*, *V. niloticus* and *V. salvator salvator*.

## CITES Trade Data

Between 2000 and 2017, Japan reported the commercial import (purpose code 'T') of 35 *Varanus* taxa, comprising a total of 41,702 live specimens. The most common taxa were *V. exanthematicus* (n = 15,849) and *V. salvator* (n = 12,382) as well as 155 specimens imported as *Varanus* spp. Based upon the CITES Trade Data, the number of *Varanus* imported was relatively stable until 2016, when imports suddenly increased to 8,432 live specimens, four times the annual average between 2000 and 2015 (Fig. 1). In particular, in 2016, the number of wild caught (source code 'W') *Varanus* (n = 6271) increased by almost fivefold when compared to the previous year (n = 1485). Between 2000 and 2017, wild caught *Varanus* comprised on average 63% (range 46%-83%) of *Varanus* imported by Japan. Indonesia was the most important exporter of *Varanus* to Japan, with 16,725 live *Varanus* reportedly imported from Indonesia between 2000 and 2017 (Fig. 2). Ghana (n = 8,562) and Togo (n = 7,698) were also important exporters of live *Varanus* to Japan (Fig. 2).

The CITES Trade Database does not contain import records for 5 species observed in Japanese reptile shops and at the reptile fair. No import records

Table 1. Observed number of live varanoid lizards in the districts of Tokyo, Kanagawa and Osaka in February 2017. Price in USD is average price converted using the exchange rate of 100 JPY = 0.88514 USD. Minimum and maximum price and number of specimens per shop are presented in brackets. Quantity imported refers to the importer reported quantity of live varanoids with purpose code ‘T’, as mentioned in the UNEP-WCMC CITES Trade Database over the period 2000-2017.

Genus	Subgenus	Species	Quantity Imported	Shops	Quantity	Avg. Number per Shop	Average Price in USD (range)	Number of Individuals with Quoted Prices	
<i>Varanus</i>	<i>Empagusia</i>	<i>Varanus rudicollis</i>	977	1	1	1	-	-	
		<i>Euprepiosaurus</i>	33	2	3	1.5 (1-2)	-	-	
		<i>Varanus doreanus</i>	535	3	4	1.3 (1-2)	\$873 (618-1133)	4	
		<i>Varanus indicus</i>	793	5	6	1.2 (1-2)	\$264	2	
		<i>Varanus jobiensis</i>	521	2	3	1.5 (1-2)	\$381	1	
		<i>Varanus macraei</i>	236	2	5	2.5 (1-4)	\$1,328	4	
		<i>Varanus melinus</i>	480	11	18	1.6 (1-4)	\$800 (425 - 1133)	8	
		<i>Varanus obor</i>	-	2	2	1	-	-	
		<i>Varanus prasinus</i>	325	8	9	1.1 (1-2)	\$471 (441-529)	4	
		<i>Varanus spinulosus</i>	152	4	9	1.8 (1-3)	\$2,637	4	
		<i>Varanus yuwonoi</i>	23	1	1	1	\$2,301	1	
		<i>Odatria</i>	<i>Varanus acanthurus</i>	697	4	8	2 (1-5)	\$602 (425-779)	7
			<i>Varanus auffenbergi</i>	9	6	9	1.5 (1-2)	\$876 (248 -2,478)	5
			<i>Varanus gilleni</i>	53	1	1	1	\$149	1
			<i>Varanus glauerti</i>	146	2	2	1	\$3,522	1
			<i>Varanus kingorum</i>	30	1	1	1	-	-
			<i>Varanus pilbarensis</i>	76	1	1	1	-	-
			<i>Varanus primordius</i>	13	1	1	1	\$1,133	1
			<i>Varanus semiremex</i>	-	1	1	1	\$20,355	1
			<i>Varanus t. tristis*</i>	123	1	3	3	-	-
	<i>Varanus t. orientalis*</i>		-	2	4	2	\$867	2	
	<i>Papuasaurus</i>		<i>Varanus salvadorii</i>	73	1	1	1	\$3,983	1
			<i>Polydaedalus</i>	1,190	3	3	1	\$529	1
		<i>Varanus exanthematicus</i>	15,849	18	59	3.1 (1-12)	\$867	2	
		<i>Varanus niloticus</i>	4,601	2	3	1.5 (1-2)	-	-	
		<i>Soterosaurus</i>	<i>Varanus cumingi</i>	-	3	5	1.7 (1-2)	-	-
			<i>Varanus marmoratus</i>	-	2	2	1	-	-
		<i>Varanus nuchalis</i>	-	1	1	1	\$2,637	1	
		<i>Varanus salvator</i>	12,389	10	17	1.5 (1-3)	\$2,810 (1,752 - 6,018)	7	
		<i>Varanus s. bivittatus*</i>	-	3	3	1	-	-	
		<i>Varanus s. macromaculatus*</i>	-	2	2	1	\$2,213	1	
		<i>Varanus s. salvator*</i>	-	1	1	1	\$175	1	
		<i>Varanus</i>	<i>Varanus giganteus</i>	-	1	1	1	\$53,100	1
<i>Varanus gouldii</i>	36		1	5	5	-	-		
<i>Varanus mertensi</i>	53		1	1	1	-	-		
<i>Varanus panoptes horni*</i>	79		4	6	1.5 (1-2)	-	-		
<i>Varanus spenceri</i>	3		1	1	1	\$10,620	1		
<i>Varanus varius</i>	2		5	6	1.2 (1-2)	\$13,558 (1,133 - 23,010)	4		
<i>Lanthanotus</i>	-	-	-	-	-	-	-		
		<i>Lanthanotus borneensis</i>	-	5	12	2.4 (2-4)	\$8,842 (1,752 -26,550**)	10	

\*CITES Trade Data are not available to subspecies level; \*\* Price per pair.

were found for *V. giganteus* (Fig. 3), *V. marmoratus*, *V. nuchalis*, *V. obor* and *V. semiremex*. Increasing the search parameters to before the year 2000 did not reveal any import records of these species. For the Australian endemic *V. giganteus* (Pianka & King, 2004), only the export of four captive bred specimens from Australia to the United States was reported in 2008. The trader revealed that the specimen was obtained via a trader that acquired the specimen in Southeast Asia, raising concerns about how this specimen entered Japan. Southeast Asia is also mentioned in the CITES Trade

Data when it comes to the Australian endemic *V. semiremex*; this species was observed in Japan, but the only trade records reported were the export of 35 wild-caught specimens from Indonesia to the United States in 1997 (3) and 2002 (32). However, this Australian endemic (Pianka & King, 2004) is not known to occur in Indonesia, and there are no records of Indonesia legally importing this species from Australia. Another interesting observation was the presence of six sub-adult and adult *V. varius*, whereas import records only reveal the importation of two specimens between

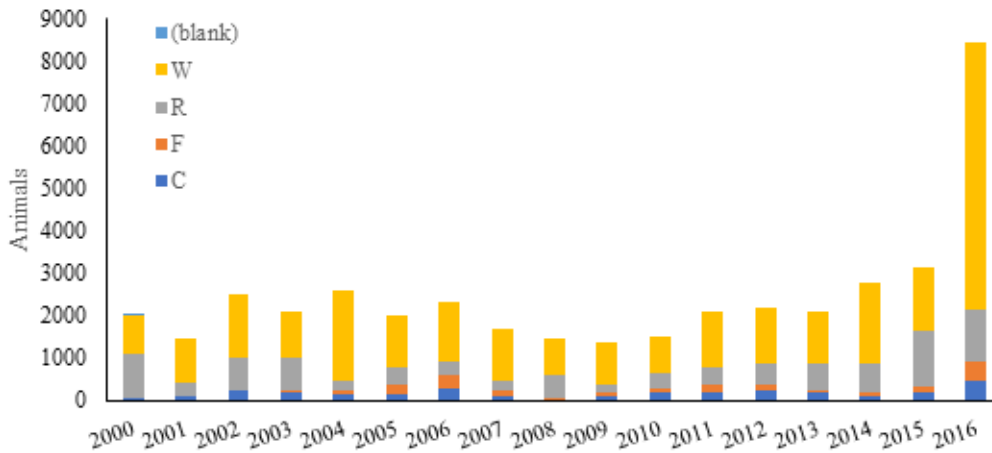


Fig. 1. Number of varanid lizards imported by Japan between 2000 and 2017, with the corresponding source codes. CITES Source Codes: C = Captive-bred, F = Born in captivity, R = Ranched, W = Wild-caught, (blank) = no source code attached. Source: UNEP-WCMC CITES Trade Database.

2000 and 2017. Similar observations were made for the two Philippine endemic species *V. marmoratus* and *V. nuchalis*, for which only a few specimens have been exported for commercial purposes to the United States (six and three, respectively), but none were ever exported to Japan.

**Discussion**

Japan is an important market for live varanid lizards. Although import records were found for most species which suggests that most lizards were likely

of legal origin, the lack of legal import records for five species suggests that those specimens entered Japan illegally. For a number of taxa, the asking prices were extraordinarily high (Table 1), suggesting that Japanese reptile keepers are willing to pay considerable money for exclusive specimens. This was further acknowledged when the seller of the *V. giganteus* told the investigators that the animal had been “spoken for” for \$53,100 USD. However, some of the average prices reported here, particularly for *V. exanthematicus*, the most commonly traded species, may not be accurate representations of the species

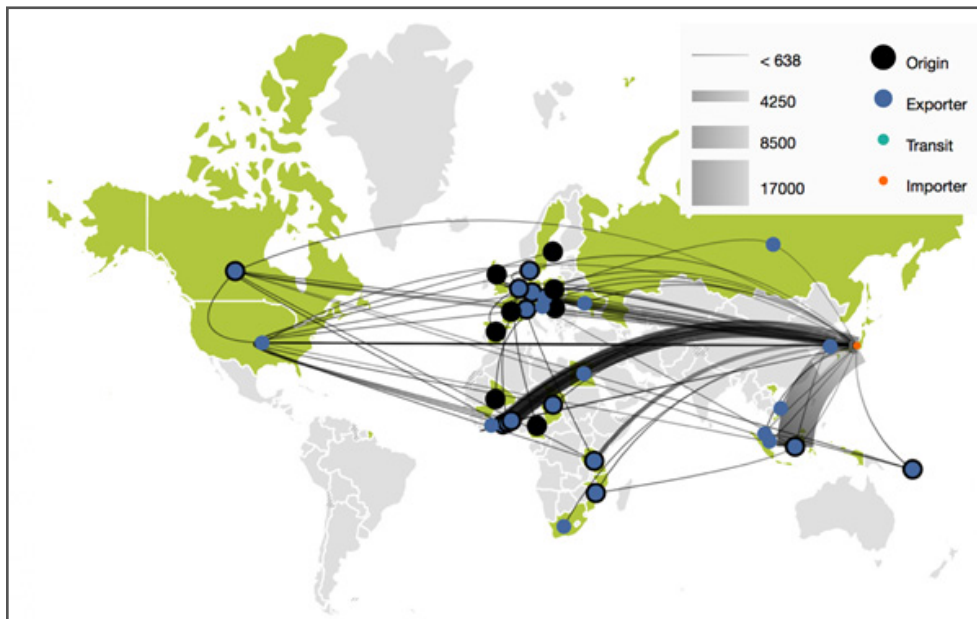


Fig. 2. Live varanid lizards imported by Japan for commercial purposes in the period 2000 – 2017. Source: UNEP-WCMC CITES Trade Database. Developed using Trade Mapper (<https://trade-mapper.aptivate.org>).



Fig. 3 Perentie (*Varanus giganteus*) for sale in a Japanese reptile shop for \$53,100 USD. Photograph courtesy of TRAFFIC.

given the limited number of individuals encountered with advertised prices (Table 1).

Where in a previous study it was observed that the source of varanid lizards is changing from wild-caught to ranches or animals born in captivity (*i.e.*, CITES Source Codes ‘C’ and ‘F’) (Pernetta, 2009), import data for Japan showed a consistently large proportion of wild-caught specimens, with a major increase observed in 2016. Although the source of these animals differs strongly between taxa and export country, it is unclear what caused this spike in the import of wild-caught specimens. The overall lack of information relating to the origins of specimens posted on their enclosures in the present study made it impossible to compare these with the reported origins of imported specimens.

The willingness of Japanese reptile keepers to pay high prices for species that are uncommon in captivity increases the incentive to smuggle species with export restrictions into the country (Courchamp *et al.*, 2006). The prices mentioned in this report are high and caution is required when publishing any information that might stimulate trade (Courchamp *et al.*, 2006). Nevertheless, for many of these species, prices were also displayed on the websites of these reptile shops (Wakao *et al.*, 2018). The desirability of varanoid lizards by Japanese reptile keepers seems to be reflected in the high number of taxa observed, including taxa that have no import records or barely any commercial trade records at all. Southeast Asia plays a significant role in this trade, both as region

of origin (*e.g.*, taxa from the Philippines) and transit (*e.g.*, taxa from Australia).

The lack of import records for five species suggests that these were illegally imported into Japan. As all varanoid lizards are now listed in CITES Appendices, all international trade must be documented. The high number of Australian endemic species is particularly interesting and of concern as only three species (*V. gilleni* [n=4], *V. varius* [n=2] and *V. giganteus* [n=4]) were legally exported from Australia for commercial trade between 1975 and 2017, with a combined total of 10 specimens (CITES Trade Database, 2018). Commercial exports of live native wildlife is prohibited in Australia (Alacs & Georges, 2008), which makes Australian monitor lizards highly desirable for the global pet trade (Alacs & Georges, 2008; Wilson-Wilde, 2010). While many Australian monitors are now widely kept by collectors and are genuinely bred in captivity (Horn & Visser, 1989, 1997; Retes & Bennett, 2001), there are still many species that enter the global pet trade illegally. Besides Australian endemics, several other species observed are subjected to trade restrictions with either a total trade ban (*e.g.*, *V. s. salvator* – Sri Lanka), or limitations to specimens bred in captivity, such as *V. cumingi*, *V. nuchalis* and *V. marmoratus* in the Philippines (E. Sy, pers. comm., 2018), and *V. indicus*, *V. prasinus*, and *Lanthanotus borneensis* in Indonesia (Government Regulation (GR) 7/1999 and Nr. P.20 1/6/20180). Especially for species that can only be traded when bred in captivity, there is a growing body of literature that suggests

wild-caught specimens are likely to be laundered to circumvent such trade restrictions (Lyons & Natusch, 2011; Bennett, 2014; Janssen & Chng, 2018; Jimenez-Bustamante & Rentería, 2018).

Trade in violation of national legislation in range states is often carried out covertly, without trade records, and creates a challenge for monitoring species' conservation status. Without this knowledge, a species might be at risk of overexploitation, but this might go unnoticed as trade records are lacking. This is of particular concern for range-restricted taxa (Kuchling, 2007; Kiester *et al.*, 2013; Meiri *et al.*, 2018), for which even low levels of harvesting might have significant impacts (Pernetta, 2009). It is therefore imperative that studies are conducted that look at the legal import and export records, in combination with physical market surveys to detect illegal trade. Documenting illegal trade in species will assist in accurately assessing the conservation status of a species and any impacts that trade might have.

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