



Canada's Role in the International Trade in Live Monitor Lizards: An Examination of CITES Trade Data with Notes on Illegal Trade

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Abstract.—Monitor lizards (*Varanus* spp.) are heavily traded internationally to supply demand for their skins, meat, parts used in medicines, and as pets. We analyzed ten years (2011–2021) of CITES trade data and additional documentation to understand Canada's role as an importer of live monitor lizards for the pet trade. Challenges with analysis arose due to substantial gaps in Canada's reporting. These gaps highlight critical deficiencies in Canada's CITES records and pose challenges for identifying the true number of monitor lizards imported to Canada. Despite these limitations, the records list more than 14,000 monitor lizards imported commercially to Canada during that timeframe. Some species imported to and exported from Canada are protected in their countries of origin (over and above international CITES listings), which makes their appearance in international trade questionable. Dedicating more resources to implementing Canada's prohibitions on the import of animals taken in contravention of foreign state laws could strengthen Canada's response to illegal trade. Ensuring accurate recording of the number of animals that are actually imported into Canada also would provide a more precise account of the total trade volume. Improving record keeping and timely reporting is fundamental to Canada meeting its reporting obligations under CITES.

Among the many reptilian species in the international wildlife trade are the monitor lizards (*Varanus* spp.), with 88 currently recognized extant species (Uetz et al. 2024) in Africa, the Arabian Peninsula, the Middle East, South and Southeast Asia, and Indo-Australia, including Australia and several remote Pacific Island groups (Auliya and Koch 2020). As many of these species have been described only recently based largely on genetic divergences, more species will likely be described as many of those currently recognized are complexes of species (Auliya and Koch 2020). Most monitor lizards are opportunistic carnivores and scavengers; however, three endemic Philippine species are frugivorous (Koch et al. 2013). Monitor lizards range in size from the small Dampier Peninsula Goanna (*Varanus sparnus*) (total length 23 cm, weight < 17 g) to the well-known Komodo Dragon (*V. komodoensis*) (total length ~ 3 m, weight to 100 kg (Auliya and Koch 2020).

Of the 88 species, 74 have been assessed for the IUCN Red List; of these, 12 are listed in threatened categories (Vulnerable, Endangered, Critically Endangered) (IUCN 2024). Trade is a major threat to many of these species. Monitor lizards are among the most heavily traded reptiles (Crook and Musing 2016) for their skins (Soehartono and

Mardiastuti 2002; Crook and Musing 2016; Auliya and Koch 2020), meat (Koch et al. 2013; Nijman 2015; Arida et al. 2020), use in traditional medicine (Baird 1993; da Nóbrega Alves et al. 2008; Uyeda et al. 2014), use in ceremonies, rituals and as amulets (Prasetyo 2023), and as pets (Koch et al. 2013; Arida et al. 2021). Some species, such as the Common Water Monitor (*V. salvator*), are widely distributed and relatively common regionally (Bennet 2015), whereas others, such as the Blue Tree Monitor (*V. macraei*) from Indonesia, are very rare and have restricted distributions, in some cases endemic to just a few small islands (Auliya and Koch 2020). For such species, even the removal of only a few individuals can have a deleterious impact on natural populations and threaten their long-term survival (Bennett 2015; Auliya and Koch 2020; Shepherd 2022).

All species have been listed in the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 1975 (CITES 2021a); consequently, international trade is regulated and must be reported to and made available in the Convention's Trade Database (CITES 2025). Of the 88 species, 83 are listed in Appendix II and five (Bengal Monitor, *V. bengalensis*; Yellow



Figure 1. A Clouded Monitor (*Varanus nebulosus*) (left) from Tioman Island, Malaysia; this species, native to Southeast Asia from Myanmar and China south through the Malaysian Peninsula to Indonesia, is listed in Appendix I of CITES (2025) (at the time of the most recent assessment for the IUCN Red List of Threatened Species [Cota et al. 2021], *V. nebulosus* was considered a synonym of *V. bengalensis*). A juvenile Rough-necked Monitor (*Varanus rudicollis*) (right) held by a trader in Java; this species, native to Southeast Asia from Myanmar and China south through the Malaysian Peninsula to Indonesia, is listed as Data Deficient (DD) on the IUCN Red List of Threatened Species (Phimmachaket al. 2021) and in Appendix II of CITES (2025) (under “*Varanus* spp.”). Photographs by Mark Auliya.

Monitor, *V. flavescens*; Desert Monitor, *V. griseus*; Komodo Dragon, *V. komodoensis*; Clouded Monitor, *V. nebulosus*; Fig. 1) are listed in CITES Appendix I. Despite these international regulations and some additional protections by national legislations, illegal trade is common and widespread (Nijman and Shepherd 2009; Auliya and Koch 2020), and the laundering of wild-caught reptiles fraudulently declared as captive-bred is commonplace (Nijman and Shepherd 2009).

Canada is a destination for wildlife sourced from around the world, including monitor lizards; it also is a source and (re)exporting nation (Hamers et al. 2023). However, little has been done to understand the scale or legality of Canada’s role or the composition of species involved (Boratto et al. 2024). Canada has been a party to CITES since 1975, so trade records of monitor lizards are available from the CITES Trade Database. Based on those records, Canada was among the top ten importing countries for monitor lizards between 1975 and 2005 (Pernetta 2009), but no recent studies have assessed Canada’s role in the trade.

Methods

To better understand Canada’s role in the international trade in live monitor lizards, we examined trade records from the CITES Trade Database for the years 2011–2021 (downloaded September 2023). We did not include 2022 or 2023 as the dataset in the CITES Trade Database for those years was likely not complete at the time of this analysis. We extracted records of *Varanus* spp. for all exporting countries with Canada as the importing country from all sources for commercial (code T) and personal (code P) purposes and for live specimens only (code LIV).

We followed the taxonomy used in the CITES Trade Database, which matched that of the Reptile Database (Uetz et al. 2024), with the exception of the Ornate Monitor (*V. ornatus*), which is not recognized on the checklist as a separate species (Uetz et al. 2024). The Ornate Monitor is sometimes considered conspecific with the Nile Monitor (*V. niloticus*) or part of the *V. nilcotus* complex with *V. stellatus*, and systematists disagree whether it should be treated as a distinct species (Böhme and Ziegler 1997; Dowell et al. 2015). Because this taxon is listed as a species on the CITES lists, we tentatively treat it as such in our analysis.

For data analysis, we used R (v. 4.3.0) and R-Studio (2023.03.1 + 446) with the packages dplyr (Wickham et al. 2023) and ggplot2 (Wickham 2016). To analyze missing data in the variables “unit,” “importer-reported quantity,” and “exporter-reported quantity,” we used the *nanian* package in R (Tierney and Cook 2023). The unit variable provides information on the measure used for the reported quantity and was missing for 89.9% of entries. When the unit was reported, it was given as the “number of specimens.” We acknowledge that knowing what unit was used when these data are missing is impossible (e.g., it could have been the number of boxes). For our analysis, we assumed that the volume of animals refers to the number of live specimens. We also acknowledge the limitations of this assumption when interpreting our results and note that if the unit were something other than an individual animal, this would, in most circumstances, mean we would be undercounting animals; for example, a box is likely to contain at least one animal. As such, our interpretation of quantity is bounded by this limitation. Exporter-reported quantities were also missing

for a few entries (5.9%), but importer-reported quantities were overwhelmingly absent without explanation (82.8%). When narrowing the data to only imports into Canada, the importer-reported quantity was missing 100% of the time, but the exporter-reported quantity was always reported. That importer- and exporter-reported values occasionally differ from each other in the CITES Database is well documented, and no standard method is currently available for determining whether to use importer- or exporter-reported quantity (Berec et al. 2018). Consequently, we used importer-reported quantity, unless those data are missing, in which case we use the exporter-reported value and acknowledged these and other limitations of CITES data in our analysis (see Berec et al. 2018)¹.

After accounting for missing data, we used the same codes as the CITES Trade Database to examine the exports of monitor lizards from Canada. Additional information on the trade in these species was obtained from published and unpublished literature. We herein report the species involved and the quantities and sources of the monitor lizards imported to and exported from Canada. We also looked at the conservation status of these species in the IUCN Red List, the CITES Appendices, and, when possible, the legal status of these species in their countries of origin (as recorded in December 2023). We then looked at pertinent Canadian legislation to better understand how the import, export, and domestic trade of these species are regulated. Finally, we analyzed these data to present an image of Canada's role in the trade in monitor lizards.

Results

Canada as an Importer.—According to the CITES Trade Database, Canada imported 14,102 live monitor lizards (31 species) from countries in Europe, Africa, and Southeast Asia between 2011 and 2021 for commercial purposes (none for personal purposes) (Table 1, see Appendix 1 for a full list of species). Monitor lizards were imported from 11 countries, five of which (Germany, The Netherlands, United Kingdom, USA, and Ukraine) are not range countries (Fig. 2). The greatest number of lizards imported from a single country were Savannah Monitors (*V. exanthematicus*) ($n = 6,715$) and Nile Monitors (*V. niloticus*) ($n = 205$) from Ghana ($n = 6,920$, imports = 15)². However, the greatest number of imports were from Indonesia ($n = 3,053$, imports = 150),

Table 1. Live monitor lizard imports and exports of live monitor lizards (*Varanus* spp.) in Canada reported in 2011–2021. The top three importers and exporters are in bold type. If importer-reported quantity was missing, we used exporter-reported quantity.

Country	Imports into Canada No. Animals (%)	Exports from Canada No. Animals (%)
Benin	813 (5.77)	—
Germany	5 (0.03)	28 (1.73)
Ghana	6920 (49.07)	—
Indonesia	3053 (21.65)	—
Japan	—	199 (12.27)
Netherlands	51 (0.36)	59 (3.64)
Paraguay	—	4 (0.25)
Philippines	—	12 (0.74)
South Korea	—	713 (43.96)
Spain	—	57 (3.51)
Taiwan	—	10 (0.62)
Tanzania	229 (1.62)	—
Togo	2231 (15.82)	—
Ukraine	2 (0.01)	—
United Kingdom	163 (1.16)	42 (2.59)
USA	620 (4.40)	—
Vietnam	15 (0.11)	—
TOTAL	14,102 (100)	1,622 (100)

followed by the United States of America (USA) ($n = 620$, imports = 53).

The majority (69%) of monitor lizards imported to Canada were declared to be from the wild ($n = 9,777$), ranched ($n = 2,482$), or first-generation (F1) bred in captivity or later (i.e., farmed) ($n = 372$) (Fig. 3). During this period, 1,456 monitor lizards of 26 species declared captive-bred were imported to Canada. Of these, 750 live monitor lizards were imported from Ghana (all originated in Benin), two from Ukraine, five from Germany, 23 from the USA (all of which originated in Indonesia), 40 from The Netherlands (21 of which originated in other European Union countries and two from Canada), 151 from the United Kingdom, and 485 from Indonesia. The greatest diversity of species imported to Canada was from Indonesia ($n = 16$), including some species not native to Indonesia.

During this same period, a total of 372 monitor lizards were imported to Canada and declared as farmed (source code F), representing 15 species. Of these, one individual was imported from the Netherlands, although it originated in the USA (and was an Australian endemic species), 12 from the United Kingdom (two species), 30 from the USA, although

¹ In 21 entries of export data, the importer-reported quantity and the exporter-reported quantity were both reported but the values were unequal. The difference ranged from 1–100 (mean = 18). The importer-reported quantity was less than the exporter-reported quantity for all but two of these entries.

² Import totals refer to the number of discrete entries in the CITES Trade Database.

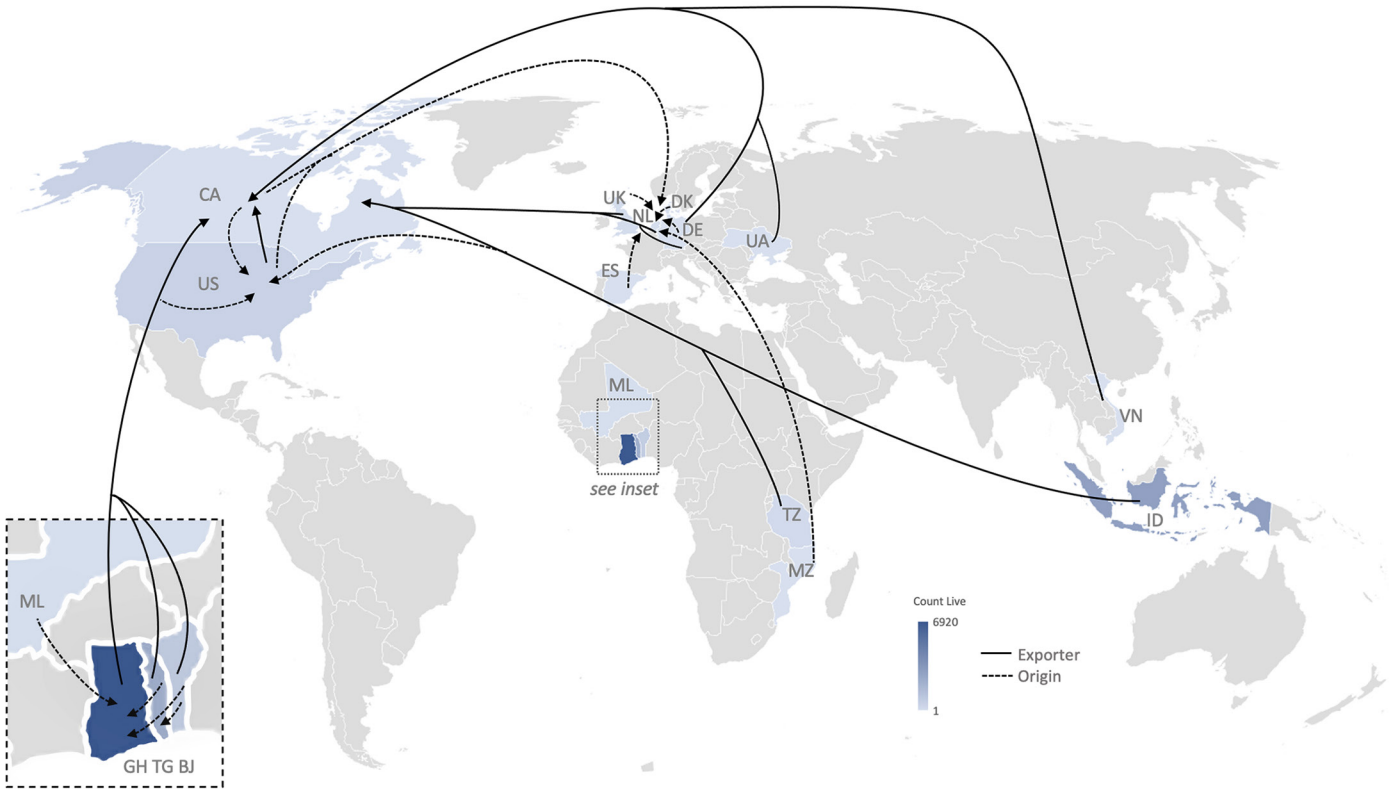


Figure 2. Countries exporting monitor lizards (*Varanus* spp.) to Canada in 2011–2021 listed in order of the number of live animals. Countries are: BJ = Benin, CA = Canada, DE = Germany, DK = Denmark, ES = Spain, GH = Ghana, ID = Indonesia, ML = Mali, MZ = Mozambique, NL = The Netherlands, TG = Togo, TZ = Tanzania, UA = Ukraine, UK = United Kingdom, US = United States of America, VN = Vietnam. Counts are based on importer-reported quantity unless that value is missing from the data, in which case we used exporter-reported quantity.



Figure 3. Imports of monitor lizards (*Varanus* spp.) to Canada in 2011–2021 reported to the CITES Trade Database (exporter-reported quantity). The species traded in the largest volume (*V. exanthematicus*) is highlighted in purple (note scale is different). Source codes: C = captive-bred; F = F1 or greater born in captivity (farmed); R = ranch; W = wild-caught; NA = missing. IUCN Red List categories: LC = Least Concern; VU = Vulnerable; EN = Endangered; DD = Data Deficient; NE = Not Evaluated.

all originated in Indonesia (except one from Canada), and 329 from Indonesia, representing 14 species, including those that first went to the USA.

According to the IUCN Red List, 20 of the species imported into Canada were assessed as Least Concern (LC), one as Vulnerable (VU), three as Endangered (EN), and five as Data Deficient (DD) (Fig. 2). Of the four threatened species, three (Blue Tree Monitor, *V. macraei*, EN – population status unknown; Banggai Island Monitor, *V. melinus*, EN – population status declining; Tricoloured Monitor Lizard, *V. juwonoii*, VU – population status unknown) are endemic to Indonesia and one (Mertens' Water Monitor, *V. mertensi*, EN – population status declining) to Australia. According to the IUCN Red List, all three Indonesian endemics are range-restricted species and are threatened by illegal and unsustainable trade; commerce is not listed as a threat to the Australian species. All 20 species are in CITES Appendix II.

The most commonly imported species was the Savannah Monitor (*V. exanthematicus*) ($n = 9,567$, imports = 43). Savannah Monitors (99%) were imported to Canada from (or originated in) West Africa (Benin, Togo, Ghana) and declared as ranched or wild-caught, except for two imports ($n = 750$ animals) that were declared as captive-bred in Benin (Fig. 2). Also of note, Tanzania, a non-range country, exported 71 Savannah Monitors in two imports that listed the sources as wild.

The Common Water Monitor (*V. salvator*) was the second most frequently imported species ($n = 1,209$, imports = 24), with more than 98% of imports to Canada coming directly from Indonesia (a range state) or sent from Indonesia via the USA. Of the Common Water Monitors, 97% of imports were declared as wild. Nile Monitors (*V. niloticus*) ($n = 1,135$, imports = 20) were the third most commonly imported species, all imported directly to Canada from range states in Africa, with the exception of 50 animals that came from Togo via the USA. Most of these were declared as ranched ($n = 955$), with the remainder declared as wild ($n = 180$).

Canada as an Exporter.—During this same period, 122 exports of monitor lizards from Canada totaled of 1,622 live animals in 21 species. The top three countries importing monitor lizards from Canada by number of animals were Republic of Korea ($n = 713$, exports = 28), followed by the USA ($n = 486$, exports = 35), and Japan ($n = 199$, exports = 26) (Fig. 4, Table 1). The majority of those were for commercial purposes ($n = 29$), but a few were for personal purposes ($n = 8$).

The top three exported species were Savannah Monitors ($n = 590$, incidents = 5), Glauert's Monitors (*V. glauerti*) ($n = 448$, incidents = 27), and Northern Pilbara Rock Monitors (*V. pilbarensis*) ($n = 265$, incidents = 26) (Fig. 5). Of the species exported from Canada, 33% were wild-caught ($n = 541$, incidents = 11). Wild-caught animals exported from Canada

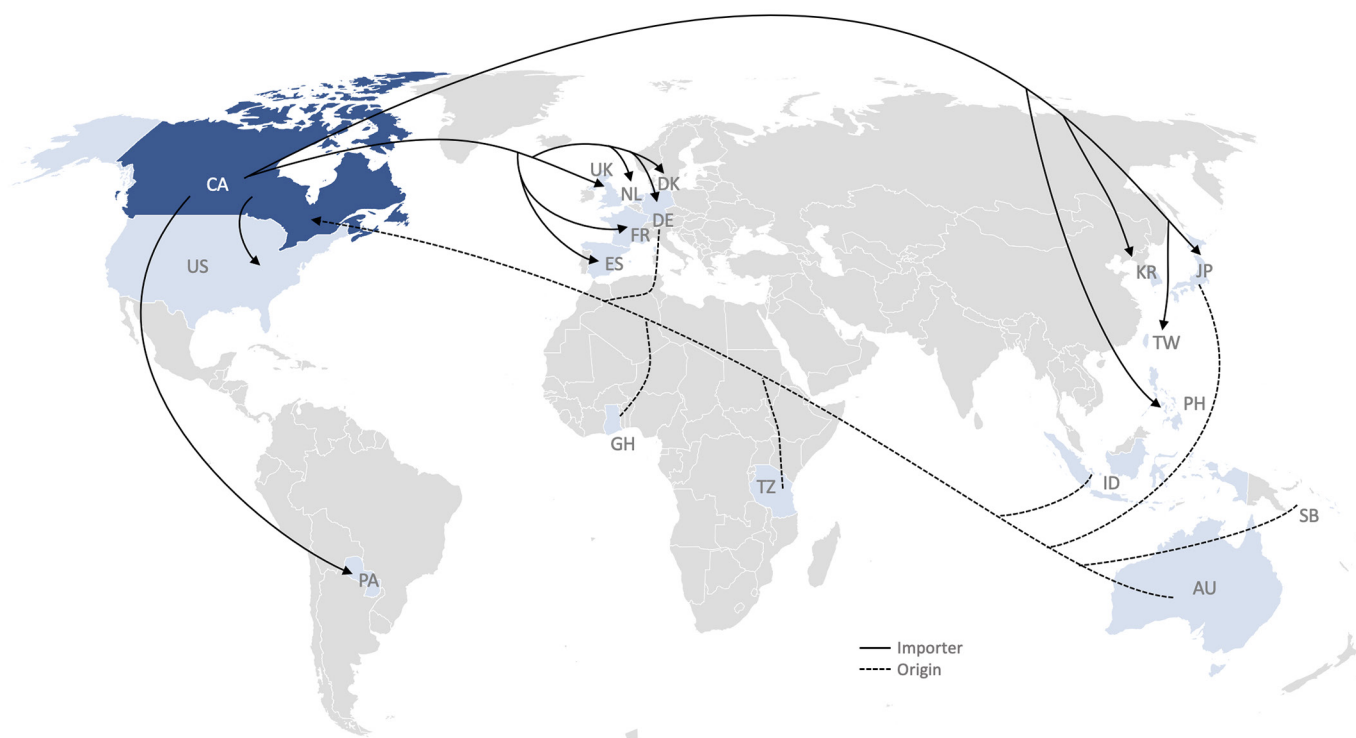


Figure 4. Countries and Territories importing monitor lizards (*Varanus* spp.) from Canada, with listed origin countries indicated. Countries: AU = Australia, CA = Canada, DE = Germany, DK = Denmark, ES = Spain, FR = France, GH = Ghana, ID = Indonesia, JP = Japan, KR = Republic of Korea, NL = The Netherlands, PA = Paraguay, PH = Philippines, SB = Solomon Islands, TW = Taiwan, TZ = Tanzania, UK = United Kingdom, US = United States of America.



Figure 5. Exports of monitor lizard (*Varanus* spp.) from Canada in 2011–2021 reported to the CITES Trade Database. Species most frequently exported (*V. exanthematicus* and *V. glauerti*) are highlighted in purple (note scale is different). Source codes: C = captive-bred; F = F1 or greater born in captivity (farmed); U = unknown; W = wild-caught. IUCN Red List: LC = Least Concern; EN = Endangered; DD = Data Deficient.

originated in Ghana, Indonesia, the Solomon Islands, and Tanzania and were later exported via Canada to Korea, Japan, the USA, and Paraguay.

The majority of species exported are currently listed as Least Concern on the IUCN Red List; however, three species, including the Blue Tree Monitor (*V. macraei*), which continued to be traded until the end of the study period, are listed as Endangered (Fig. 4). Three species in trade are considered data deficient (i.e., conservation status has not been fully assessed). Notably, one of these, the Black Tree Monitor (*V. beccarii*), which is native to Indonesia with a population status listed as decreasing (Shea et al. 2016), emerged as an export from Canada in 2020.

Discussion

International trade in monitor lizards in Canada is ongoing and includes a number of animals declared as captive-bred and wild-caught. Of the 88 described monitor lizard species (Uetz et al. 2024), our analysis revealed that 39% were reported as either imported into or exported from Canada³. Canada imports large numbers of wild-caught and captive-bred animals, but both raise numerous questions about the sustainability and legitimacy of trade. Given that trade recorded in the CITES Trade Database is, for the most part, considered

legal (except for records that indicate it was a seizure or confiscation), our analysis focused on legal trade recorded by parties and submitted to the CITES Secretariat. Yet the analysis of CITES records revealed some areas of concern that warrant further investigation. Several species found in trade with Canada are illegal to export from their country of origin over and above CITES restrictions, which most often renders their import prohibited under Canada's *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act* (S.C. 1992, c. 52) (WAPPRITTA, which also implements the CITES in Canada). In addition, large numbers of exports to Canada have been recorded from countries, such as Indonesia, with numerous documented cases of illegally-sourced wildlife being laundered through breeding facilities into the legal trade (Lyons and Natusch 2011; Nijman and Shepherd 2015). Severely compounding these issues are gaps in Canada's reporting to CITES, which means the true volume of trade remains unclear.

Wild-caught Monitor Lizards.—The CITES trade database import and export records documented 10,318 wild-caught (W) monitor lizards in trade to or from Canada. Notably, Canada imported wild-caught monitor lizards from West Africa, with Ghana being a major source. Previous research on CITES trade data also highlighted the role of these countries in trade. In an analysis of the global monitor lizard trade (1975–2005), Pernetta (2009) found Benin, Ghana, Togo, and Tanzania were some of the top exporters. A similar trade study on trade into France found that most monitor

³ Some species were exported from Canada but were not imported to Canada during the study period. This could be due to species being imported to Canada prior to our study period or imported illegally during the study period.

lizard imports were from Togo, Ghana, and Benin (Affre et al. 2005). With little research characterizing the nature of the trade from West Africa, assessing the sustainability of this trade is difficult. However, D'Cruze et al. (2020) raised questions and concerns about the volume of trade in monitor lizards from Togo and the need for further inquiry. Further research on trade patterns and wild population trends in these regions would help identify potential threats to ensure that Canadian commerce is legitimate and sustainable.

Australian Endemics in Canadian Trade.—Under the *Environment Protection and Biodiversity Act 1999* (Cth) s 303CC(1) (Australian Government 2025), all native monitor lizards are prohibited from being exported outside Australia. Yet monitor lizards from Australia continue to appear in international trade, including in Canada. Although some species of Australian monitor lizards are widely kept and are genuinely bred in captivity (Retes and Bennett 2001; Janssen 2018), many species still enter the international pet trade illegally (Janssen 2018).

A total of 15 species native to Australia were imported into Canada in 2011–2021, nine of which are Australian endemic species (Appendix, Table A1). According to the CITES Trade Database, only six of these nine endemic species have ever been reported as exported from Australia, all in very low numbers and largely for scientific purposes (purpose code S) or zoos (purpose code Z). Only one species (Pygmy Mulga Monitor, *V. gilleni*; $n = 4$) was ever exported for commercial purposes (purpose code T), to Germany in 2000. Since 1975, the CITES Trade Database shows only three of these species being exported directly from Australia to Canada. In 1985, two live Ridgetail Monitors (*V. acanthurus*), a Pygmy Mulga Monitor, and a Sand Monitor (*V. gouldii*) were exported for scientific purposes (purpose code S). How so many Australian species of monitor lizards entered the international trade is unclear, and we do not know from where the animals (or their parent stock) imported to Canada originated. Given the very low numbers of legal monitor lizard exports from Australia, these animals (or parent stock) likely originated from illegal sources. None of the Australian endemic species imported into Canada were imported directly from Australia during our study period, but their origins should be investigated further to ensure all were sourced legally in compliance with both Australian and Canadian laws.

Indonesian Species in Canadian Trade.—Indonesia was the source of the most species of monitor lizards imported by Canada. Imports of 23 species were reported as captive-bred (C) and farmed (F), totaling 2,808 animals. While commercial captive-breeding is sometimes touted as a conservation solution, it also has been used as a mechanism to launder illegally-sourced wild-caught reptiles into international trade under the guise of being captive-bred (Nijman and Shepherd 2009; Schoppe 2009; Outhwaite et al. 2014; Auliya and

Koch 2020). Indonesia has been identified as a source of wild-caught reptiles laundered as captive-bred (Lyons and Natusch 2011; Nijman and Shepherd 2015), including monitor lizards (Bennett 2015). In Indonesia, trade in certain protected species is permitted only for captive-bred specimens (e.g., Emerald Monitor, *V. prasinus*; Blue Tree Monitor, *V. macraei*), thus creating an incentive for unscrupulous traders to declare wild-sourced specimens as captive-bred (Janssen and Chng 2018), which causes obvious challenges for regulatory and enforcement officers charged with proving or disproving these claims. Given the prevalence of laundering, some animals imported to Canada from Indonesia likely were falsely declared as being captive-bred in violation of Canadian law.

The removal of some species, such as the Blue Tree Monitor (*V. macraei*), from the wild has had very detrimental impacts. Recent work (Del Canto 2013; Arida et al. 2021; Shepherd 2022) found the Blue Tree Monitor (Shea et al. 2017) to be in serious decline and that it has vanished from a large part of its range due to illegal collection for the international pet trade, despite being protected by law in Indonesia. Under Indonesian law, no wild-caught Blue Tree Monitor may be traded or kept, yet illegal capture and trade are rife (Shepherd 2022). This is very likely the same for other monitor lizards sourced from Indonesia, where illegal trade is widespread (Nijman et al. 2012). During this period, 69 Blue Tree Monitors were imported into Canada, and 54 were exported (Appendix 1).

The Blue Tree Monitor has been proposed for listing in the USA under the Endangered Species Act (USFWS 2023), which would provide strict protection for the species and prevent opportunities for illegal trade into the USA. While Canada does not have adequate legislation that specifically protects non-native species within Canada, we strongly recommend that such legislation be established where not present and standardized across all provinces and territories.

CITES Reporting.—One of the biggest challenges with analyzing Canadian CITES trade data for monitor lizards was the large volume of missing values for the importer-reported quantity. All importer-reported quantities were missing for imports into Canada, so we had to rely on the exporter-reported quantities. These are likely the values reported on the CITES permit but might not reflect the number of animals actually imported (owing to mortality in transit, false declarations, clerical errors, etc.). Discrepancies between importer- and exporter-reported quantities have been an ongoing issue with CITES trade data, and concerns have been raised about inaccurate estimates of trade (Berec et al. 2018). As a party to CITES, Canada is obligated to maintain and report trade records, including quantities (CITES 1983: Article VIII). The CITES Guidelines for Preparation and Submission of CITES Annual Reports (CITES 2021b) stipulate that reporting “should report the actual trade that took place.” The data gaps detected in this study raise important concerns about the

quality of monitoring and reporting for Canadian trade in CITES-listed species. Given that the importer-reported quantity was not included for all imports of monitor lizards in our study period, whether any shipments were inspected to confirm the accuracy of the accompanying CITES permits upon arrival is unclear. Consequently, whether the species and quantities shipped matched the contents of the CITES permits is also unclear. Without accurate monitoring, the effectiveness of Canada's implementation of WAPPRIITA comes into question. Issues with gaps in Canada's CITES reporting were noted two decades ago by Cooper and Chalifour (2004), yet gaps persist, and this situation calls for further investigation.

Canadian Regulations.—Under WAPPRIITA 6(1), the law states that “No person shall import into Canada any animal or plant that was taken, or any animal or plant, or any part or derivative of an animal or plant, that was possessed, distributed or transported in contravention of any law of any foreign state.” This means that if an animal was taken illegally abroad, import into Canada is prohibited. Possible violations of WAPPRIITA 6(1) unveiled in this CITES analysis, such as the imports of some Australian species, highlight potential areas for further investigation and raise questions about whether other taxonomic groups in trade are imported in violation of the law. If government officials reviewing imports are relying solely on paper compliance with CITES (e.g., checking that they have the correct CITES permit as required under WAPPRIITA 6(2)), they could easily miss non-compliance with WAPPRIITA 6(1) if the animal was taken or transported in violation of foreign state laws. We recommend greater resources be dedicated to identifying and investigating potential violations of WAPPRIITA 6(1), for example, by targeting species at the border for further inspection when trade is prohibited in their country of origin regardless of whether a CITES permit is present. We acknowledge that proving that something happened illegally in another country is difficult; consequently, we recommend shifting the current burden of proof that goods are not in violation of foreign legislation from the Crown (government) to the importer. This could be done, for example, by implementing a requirement for an importer's due diligence declaration at the time of import or by way of a post-audit system such as Australia's Illegal Logging Prohibition Act 2012⁴. This way, the importer would have to demonstrate that a shipment is compliant with Canadian law.

Research Gaps.—The impact of trade in live monitor lizards to meet the demand for pets remains poorly understood, largely due to a lack of field studies in range countries (Koch et al. 2013). However, studies have shown that illegal and unsustainable trade is causing serious declines in at least some spe-

cies (e.g., Arida et al. 2021). Further research also is needed to understand to what extent Canadian importers contribute to the demand that drives the laundering of wild-caught animals into legal trade and the extent to which Canada contributes to other potential harms in understudied regions, such as West Africa. More research into the effectiveness of implementing and enforcing CITES in Canada is urgently needed.

Conclusion

Thousands of monitor lizards have been imported and exported by Canada to supply demand for pets, including threatened species and species known to be heavily traded on the black market. Pet traders and keepers in Canada might well be, knowingly or unwittingly, participating in illegal trade and contributing to the decline of these species. Analysis of CITES trade data (2011–2021) indicated that the illegal trade of monitor lizards likely occurs in Canada in two ways: (1) prohibited animals likely are being brought into the country using CITES permits, with insufficient verification of their legal status at the time of import, and (2) a significant risk exists that wild-sourced animals are being passed off as ranched/farmed, for which verification is nearly impossible at the time of import. Therefore, Canadian agencies responsible for regulating wildlife trade must be aware of the risk that monitor lizards brought into Canada might have been sourced illegally or fraudulently declared. Frequent attempts to smuggle or launder monitor lizards, combined with the task of identifying the increasing numbers of newly described species, many similar in appearance to one another, poses a challenge to management authorities (Auliya and Koch 2020). Consequently, relevant identification and training opportunities should be made available to regulatory officials. Greater scrutiny is required to ensure the monitor lizards were legally sourced and comply with WAPPRIITA 6(1), as is regular communication with other CITES parties engaged in the sourcing and trade in monitor lizards and other wildlife.

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⁴ <https://www.legislation.gov.au/F2012L02404/2022-02-16/text>.

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Appendix 1. Number of incidents and live monitor lizards (*Varanus* spp.) imported to and exported from Canada (2011–2021). Counts are based on importer-reported quantity unless that value is missing from the data, in which case we used exporter-reported quantity. IUCN Red List categories: LC = Least Concern; VU = Vulnerable; EN = Endangered; DD = Data Deficient, NE = Not Evaluated. Note that the taxonomic status of *V. similis* is uncertain; some authors consider it a synonym of *V. scalaris* (Allison et al. 2018). We herein list it as a distinct species as this is how it was reported in import records.

Species	Imports No. Incidents (live animals)	Exports No. Incidents (live animals)	IUCN Red List Category	Countries in the Native Range
<i>V. acanthurus</i>	8 (134)	11 (87)	LC	Australia
<i>V. albigularis</i>	5 (80)	3 (12)	LC	Angola; Botswana; The Democratic Republic of the Congo; Djibouti; Eswatini; Ethiopia; Kenya; Lesotho; Malawi; Mozambique; Namibia; Somalia; South Africa; United Republic of Tanzania; Uganda; Zambia; Zimbabwe
<i>V. beccarii</i>	13 (100)	4 (14)	DD	Indonesia
<i>V. breviceauda</i>	0 (0)	3 (6)	LC	Australia
<i>V. caudolineatus</i>	0 (0)	2 (5)	LC	Australia
<i>V. cumingi</i>	1 (2)	0 (0)	LC	Philippines
<i>V. doreanus</i>	10 (150)	0 (0)	LC	Australia; Indonesia; Papua New Guinea
<i>V. dumerilii</i>	17 (436)	0 (0)	DD	Indonesia; Malaysia; Myanmar; Singapore; Thailand
<i>V. exanthematicus</i>	43 (9,467)	5 (590)	LC	Benin; Burkina Faso; Cameroon; Central African Republic; Chad; The Democratic Republic of the Congo; Côte d'Ivoire; Eritrea; Ethiopia; Gambia; Ghana; Guinea; Guinea-Bissau; Mali; Mauritania; Niger; Nigeria; Senegal; South Sudan; Togo; Uganda
<i>V. gilleni</i>	6 (31)	0 (0)	LC	Australia
<i>V. glauerti</i>	1 (3)	27 (448)	LC	Australia
<i>V. gouldii</i>	3 (38)	2 (12)	LC	Australia
<i>V. indicus</i>	3 (43)	2 (12)	LC	Australia; Indonesia; Kiribati; Federated States of Micronesia; Papua New Guinea; Solomon Islands
<i>V. jobiensis</i>	17 (210)	0 (0)	LC	Indonesia; Papua New Guinea; Papua New Guinea
<i>V. kordensis</i>	1 (1)	0 (0)	DD	Indonesia
<i>V. macraei</i>	14 (69)	12 (54)	EN	Indonesia
<i>V. melinus</i>	14 (127)	1 (2)	EN	Indonesia
<i>V. mertensi</i>	1 (3)	5 (11)	EN	Australia

(Appendix 1 continued)

(Appendix 1 continued)

<i>V. niloticus</i>	20 (1,135)	1 (1)	LC	Angola; Benin; Botswana; Burkina Faso; Burundi; Cameroon; Central African Republic; Chad; Congo; The Democratic Republic of the Congo; Côte d'Ivoire; Egypt; Eritrea; Eswatini; Ethiopia; Gabon; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Liberia; Malawi; Mali; Mauritania; Mozambique; Namibia; Niger; Nigeria; Rwanda; Senegal; Sierra Leone; Somalia; South Africa; South Sudan; Sudan; United Republic of Tanzania; Togo; Uganda; Zambia; Zimbabwe
<i>V. ornatus</i>	1 (40)	0 (0)	NE	Africa
<i>V. panoptes</i>	7 (71)	0 (0)	LC	Australia; Indonesia; Papua New Guinea
<i>V. pilbarensis</i>	2 (3)	26 (265)	LC	Australia
<i>V. prasinus</i>	13 (126)	7 (55)	LC	Indonesia; Papua New Guinea;
<i>V. reisingeri</i>	6 (37)	1 (2)	DD	Indonesia
<i>V. rudicollis</i>	18 (305)	2 (4)	DD	Indonesia; Malaysia; Myanmar; Thailand
<i>V. salvadorii</i>	15 (87)	0 (0)	LC	Indonesia; Papua New Guinea
<i>V. salvator</i>	24 (1,209)	2 (21)	LC	Bangladesh; Cambodia; China; India; Indonesia; Lao People's Democratic Republic; Malaysia; Myanmar; Singapore; Sri Lanka; Taiwan, Province of China; Thailand; Viet Nam
<i>V. similis</i>	6 (81)	0 (0)	LC	Australia; Indonesia; Papua New Guinea
<i>V. spenceri</i>	1 (2)	0 (0)	LC	Australia
<i>V. spinulosus</i>	0 (0)	2 (12)	LC	Papua New Guinea; Solomon Islands
<i>V. storri</i>	1 (5)	3 (8)	LC	Australia
<i>V. timorensis</i>	8 (80)	1 (1)	LC	Indonesia; Timor-Leste
<i>V. tristis</i>	1 (11)	0 (0)	LC	Australia
<i>V. yuwonoi</i>	5 (16)	0 (0)	VU	Indonesia