

BEFORE THE SECRETARY OF INTERIOR

**EMERGENCY PETITION TO LIST THE BORNEAN EARLESS MONITOR LIZARD
(*Lanthanotus borneensis*) AS ENDANGERED UNDER THE ENDANGERED SPECIES
ACT**



Chien C. Lee, Wild Borneo Photography
[CC BY-SA 4.0](https://creativecommons.org/licenses/by-sa/4.0/)

CENTER FOR BIOLOGICAL DIVERSITY

NOVEMBER 2, 2022

Notice of Petition

Honorable Deb Haaland
Secretary of the Interior
1849 C Street, N.W.
Washington, DC 20240
exsec@ios.doi.gov

Martha Williams
Director
U.S. Fish and Wildlife Service
1849 C Street, N.W.
Washington, DC 20240
martha_williams@fws.gov

Elizabeth Maclin
Chief, Branch of Delisting and Foreign Species
U.S. Fish and Wildlife Service
5275 Leesburg Pike, MS: ES
Falls Church, VA 22041
elizabeth_maclin@fws.gov

Petitioner

The Center for Biological Diversity (Center)
378 N Main Avenue,
Tucson, AZ 85701

The Center is a non-profit, public interest environmental organization dedicated to the protection of native species and their habitats. The Center works through science, law, and creative media to secure a future for all species, great or small, hovering on the brink of extinction. The Center is supported by more than 1.7 million members and activists throughout the United States. The Center and its members are concerned with the conservation of endangered species and the effective implementation of the Endangered Species Act. The Center's International Program works to protect global biodiversity by using U.S. and international law to hold governments accountable for threatening imperiled species wherever they are found.

Submitted this 2nd Day of November, 2022

Pursuant to Section 4(b) of the Endangered Species Act (ESA), 16 U.S.C. § 1533(b), Section 553(e) of the Administrative Procedure Act, 5 U.S.C. § 553(e), and 50 C.F.R. § 424.14(a), Petitioner, the Center for Biological Diversity hereby petitions the Secretary of the Interior and the U.S. Fish and Wildlife Service (FWS or the Service) to protect the Bornean earless monitor lizard (*Lanthanotus borneensis*), referred to in this Petition as the earless lizard, as an endangered species under the ESA, 16 U.S.C. §§ 1531-1544.

As described in this Petition, the earless lizard is an island endemic species with five known subpopulations that are expected to be small and declining. The species' limited range and life history make it particularly susceptible to the threats it faces, most notably demand for the international pet trade, including to the United States, and habitat loss. In a report published in 2021, the earless lizard was assessed as Endangered by the International Union for Conservation of Nature. Existing regulatory mechanisms have not adequately protected this species, as trade has increased in recent years along with laundering and smuggling of wild-caught specimens. A recent article documenting an earless lizard in Brunei Darussalam may lead to higher demand and increased poaching in coming months, a trend that has been observed in the past with this species after it has received media attention. As a leading importer for the pet trade, the United States could be a destination for these illegally harvested earless lizards. Given the species' limited range and the susceptibility of subpopulations to overcollection, we request that the Service immediately protect the earless lizard using its emergency listing authority under the ESA. 5 U.S.C. §§ 553(e), 555(b); 16 U.S.C. § 1533(b)(7).¹

This Petition presents substantial scientific and commercial information indicating that the earless lizard is in danger of extinction throughout all of its range.² See 50 C.F.R. § 424.14(h)(1)(i) (“substantial scientific or commercial information” refers to credible scientific or commercial information in support of the Petition’s claims such that a reasonable person conducting an impartial scientific review would conclude that the action proposed in the Petition may be warranted). Therefore, the Secretary of the Interior, through the Service, should emergency list the species or at the very least make an initial finding “that the petitioned action may be warranted” within 90 days of receiving this Petition and make a subsequent finding that listing is warranted within 12 months receiving this Petition. 16 U.S.C. § 1533(b)(3)(A), (B).

The best available information indicates that the earless lizard is rare throughout its range and continues to decline due to collection for trade and loss of suitable habitat. The Service has a duty to protect the earless lizard by listing the species as endangered under the Endangered

¹ Where there is “any emergency posing a significant risk to the well-being of any species of fish or wildlife or plants,” the Service need not comply with the regular listing process including notice and comment before issuing an emergency rule, so long as the agency publishes detailed reasons why such regulation is necessary and if the regulation applies to resident species of fish or wildlife, or plants, it gives actual notice of the regulation to the State agency of each State where the species is believed to occur. 16 U.S.C. § 1533(b)(7). The emergency listing takes effect after being published in the Federal Register. *Id.* Emergency listing is a temporary measure that ensures immediate protection in an emergency and expires 240 days following the date of publication unless the rulemaking procedures that apply for making a non-emergency listing determination were complied with during that time. *Id.*

² Because this species does not occur within the United States, the Center is not required to send notification to any U.S. state agency. 50 C.F.R. § 424.14(b).

Species Act, which would meaningfully contribute to conservation of the earless lizard by strictly regulating the import, export, and interstate commerce of the species. *See* 16 U.S.C. § 1538(a)(1) (prohibiting the import, transport, and sale of endangered species with narrow exemptions).

Respectfully submitted,

Dianne DuBois

Dianne DuBois
Staff Scientist
Center for Biological Diversity
ddubois@biologicaldiversity.org
828-774-5637

Sarah Uhlemann
International Program Director and Senior Attorney
Center for Biological Diversity
suhlemann@biologicaldiversity.org
206-327-2344

Table of Contents

I. Introduction	7
II. Natural History	7
A. Taxonomy	7
B. Description	8
C. Life Cycle	9
D. Behavior	9
E. Habitat	9
III. Distribution	10
A. Historic Distribution	10
B. Current Distribution	10
IV. Conservation Status and Warranted Endangered Species Act Protection	12
V. Current Threats	12
A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range	12
B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes	13
C. Disease	17
D. Other Natural or Manmade Factors	18
1. Climate Change	18
E. The Inadequacy of Existing Regulatory Mechanisms	19
1. Domestic Protections in Malaysia	19
a. Wildlife Conservation Act 2010 and Wildlife Protection Ordinance of 1998	19
2. Domestic Protections in Indonesia	20
a. Government Regulation No. 7/1999 on Preserving Flora and Fauna Species	20
3. Domestic Protections in Brunei Darussalam	21
4. International Protections	22
a. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	23
VI. Conclusion	24
VII. References	26

Executive Summary

The earless lizard, *Lanthanotus borneensis*, is a semiaquatic species endemic to the island of Borneo where it inhabits areas with clear, rocky streams in lowland rainforests. Earless lizards are recognized by their brown, cylindrical bodies, marble-patterned dorsal side, translucent eyelids, and their characteristic lack of an external ear opening. Despite their cryptic life habits, earless lizards are believed to be very rare and only five subpopulations are known with a total area of occupancy of 52 km².

One of the biggest threats earless lizards face is targeted collection for the international pet trade. Called the “Holy Grail” by reptile keepers, earless lizards are in demand as pets across a wide geographical range, including in the United States. Earless lizards have been actively traded in the United States for several years despite range countries having banned exports of the species for four decades. Collection from the wild for the illegal trade has contributed to the species’ decline.

Among species in the pet trade, earless lizards are particularly vulnerable to overexploitation as an island endemic with a limited range. Additionally, the number of specimens taken from the wild is likely to be much higher than the number recorded in trade due to mortality along the trade chain and lacking data on trade within national borders. For the specimens that reach their destination, mortality in captivity may also be high due to the species’ specific habitat requirements. Finally, rare species are sought after in the trade and can be sold at high prices, which further incentivizes collection from the wild population.

In addition to being threatened by the international pet trade, earless lizards are losing suitable habitat. Wildlife habitat in Borneo has been declining over the last five decades. Over 30 percent of forests in Borneo were lost from 1973-2010 because of logging, fires, and land conversion to plantations. Not only does losing forests eliminate the tree cover that earless lizards require, but it also impacts the health of the streams the species depends on and the abundance and diversity of some of its prey. Experts have concluded that “the Borneo Earless Monitor has undoubtedly suffered declines and likely local extinctions as a result of forest clearance.”

The earless lizard is unquestionably at risk of extinction. The International Union for Conservation of Nature (IUCN) assessed the species as Endangered in 2021, concluding that earless lizards are facing a very high risk of extinction in the wild. The remaining wild population is expected to have declined more than 30 percent over the last three generations and continues to decline. Of the five known extant subpopulations, one is in an area where logging has begun and at least one other has been targeted by traders for the pet trade. Experts have indicated that collection for the trade “represents a severe threat to any viable subpopulations that are discovered.”

Under the Endangered Species Act, the Service is required to list a species as “endangered” if it “is in danger of extinction throughout all or a significant portion of its range.” 16 U.S.C. § 1532(6). There are five statutory listing factors that the Service must analyze for the species: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or

predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence. *Id.* § 1533(a)(1). Based upon the following analysis of these factors, we petition the Service to emergency list or list the earless lizard as endangered under the Endangered Species Act.

I. Introduction

We are in the midst of a spiraling wildlife extinction crisis, and reptiles are declining globally (Gibbons et al., 2000 pp. 653-655). It is estimated that 21.1 percent of reptiles are threatened with extinction (Cox et al., 2022 p. 286). The International Union for Conservation of Nature (IUCN) has assessed 433 Critically Endangered, 783 Endangered, and 623 Vulnerable reptile species (IUCN, 2022 unpaginated). These assessments likely underestimate the actual number of imperiled reptiles (Gibbons et al., 2000 p. 653). An additional 21 percent have not been researched enough to make an assessment but may be deemed at risk of extinction if more data become available (Böhm et al., 2013 p. 20; Borgelt et al., 2022 p. 3). Gibbons et al., (2000 p. 655) states that given the global declines in reptiles, if there is no intervention, species will continue to face declines, extirpations, and extinctions.

Endemic to Borneo, the earless lizard is a rare, semi-aquatic species with five known subpopulations. The species has been assessed as Endangered by IUCN, and populations are declining. The primary threats earless lizards face include habitat loss and demand for the international pet trade. Of the five known subpopulations, one is in a site where logging recently began, and another has been actively targeted by traders. The 2021 IUCN assessment on the species concluded that collection for the pet trade “represents a severe threat to any viable subpopulations that are discovered.”

Earless lizards have been actively traded in the United States for several years, despite range countries having banned the species’ export for the last four decades and the species being listed under Appendix II of the Convention on International Trade of Endangered Species (CITES) with a zero-export quota. Called the “Holy Grail” by reptile keepers, earless lizards have been increasingly seen in trade and sold in the United States in recent years following the discovery of subpopulations in West Kalimantan, Indonesia. Evidence of laundering and smuggling attempts, along with the continued decline of the species, indicate that existing regulatory mechanisms are not adequately protecting earless lizards. As the popularity of this species continues to increase, the United States must take responsibility as a consumer country and extend protections to the earless lizard by promptly listing it as an endangered species under the Endangered Species Act.

II. Natural History

A. Taxonomy

The earless lizard was first described in 1878 by Franz Steindachner and is the only known extant member of the family *Lanthanotidae* (Das and Auliya, 2021 p. 1; Maisano et al., 2002 p. 678). In 1980, Rieppel (1980 p. 110) found that the *Lanthanotus* genus is the sister-taxon of *Varanus*. *Varanus* and *Lanthanotus* make up the sister-taxon of the New World *Heloderma* (Das & Auliya, 2021 p. 1).

Table 1. Taxonomy of *Lanthanotus borneensis*.

Kingdom	<i>Animalia</i>
Phylum	<i>Chordata</i>
Class	<i>Reptilia</i>
Order	<i>Squamata</i>
Family	<i>Lanthanotidae</i>
Genus	<i>Lanthanotus</i>
Species	<i>borneensis</i>

B. Description

Earless lizards have long, cylindrical bodies with a muscular snout and head and six longitudinal dorsal rows of enlarged scales that run from the neck to the tail-base (CITES, 2015 p. 5; Harrison & Haile, 1961 p. 1213; Pianka & Vitt, 2003, as cited in Yaap et al., 2012 p. 3070; Steindachner, 1877 p. 160). The dorsal side of the body exhibits a marble pattern that is dark brown with white or yellow coloration (De Rooij, 1915 p. 139; Yaap et al., 2012 p. 3070). The species is characterized by its lack of an external ear opening (Steindachner, 1877 p. 160). Earless lizards also have a forked tongue and small eyes with a translucent eyelid (CITES, 2015 p. 5). The species exhibits sexual dimorphism, with males having broader heads and a broadened tail base (Langner, 2017 p. 5). Two morphs are now recognized in trade, including a gray-ish brown morph and a darker morph that is almost black and very rare (Nijman, 2021 p. 72).

Similar to other anguimorphs, earless lizards have osteoderms under almost every scale on their bodies (Maisano et al., 2002 p. 681). However, there are no osteoderms present around most of the snout, the margins of the mouth, the area around the ears, and in some areas of the skull. Also similar to other anguimorphs, earless lizards have a palpebral bone above the upper eyelid (Maisano et al., 2002 p. 681).

Information on the size of earless lizards is limited in the literature. The average size of specimens collected before 1961 was about 33 cm (Harrison & Haile, 1961 p. 1213). Arroyan et al. (2021 p. 108) found the mean SVL for ten confiscated Borneo earless lizards was $17.45 \text{ cm} \pm 0.95$ and the mean body mass was $68.11 \text{ g} \pm 17.38$. The sex of the individuals was unknown, but they were assumed to have reached adult size (Arroyan et al., 2021 pp. 104-105).



Figure 1. The cranial and mandibular morphology of an earless lizard specimen. Extracted from McCurry et al. (2015 p. 11).

C. Life Cycle

Earless lizards are oviparous. There is about a 6-month period between egg fertilization and hatching, with the gestation period taking about 130 days and the incubation period lasting between 70-80 days (Das & Auliya, 2021 pp. 4-5). Clutches of 4-6 eggs have been reported (Das & Auliya, 2021 p. 4). Information on maturity is not available as there has not been an F2 generation of earless lizards reported (Das & Auliya, 2021 p. 5).

D. Behavior

Earless lizards are nocturnal and cryptozoic (Das & Auliya, 2021 p. 4; Harrison & Haile, 1961 p. 1213). They are semiaquatic, spending time both underground and underwater (Harrison & Haile, 1961 p. 1213). They can remain dormant underground for extended periods with little air (Harrison & Haile, 1961 p. 1213). During collection efforts in the early 1960's, Harrison (1963 p. 408) indicated that all 25 individuals collected were either found in the water, in fish traps, or in holes in the ground. The species can carry mud stuck to its nodular skin, which is even more conducive to camouflage (Harrison & Haile, 1961 p. 1213).

Due to the limited documented observations of wild populations of earless lizards, more information is needed about the species' natural prey. Earless lizards are durophagous, having the ability to consume hard prey such as crabs (McCurry et al., 2015 p. 16). Prey items that have been confirmed in wild populations include freshwater shrimp and catfish (Langner, 2017 p. 7). Other possible prey items include fish, shrimp, tadpoles, small frogs, earthworms, snails, and several insect species (Arida et al., 2018 p. 88). To kill prey, captive earless lizards have been observed gripping the prey in their upper and lower jaws and then shaking their head to the left and right (Arroyan et al., 2021 p. 111). The species is not venomous (Mebs et al., 2021 pp. 75-76).

More information is needed about the species' behavior and interactions in the wild. Langner (2017 pp. 5-6) found all but one male observed in a 2014 survey showed evidence of healed injuries that was attributed to territorial aggressive behavior among males. Upon being detected by humans, earless lizards in the wild usually freeze (Langner, 2017 p. 6). In captivity, the species has been reported as extremely lethargic (Harrison, 1963 p.408; Mendyk et al., 2015 p. 46). Captive earless lizards are rarely seen active and tend to be burrowed under substrate or submerged in water (Mendyk et al., 2015 p. 46).

E. Habitat

While limited, some observations of earless lizards in the wild give insight into the species' habitat preferences. Harrison (1963 p. 407) indicated that 25 individuals collected near the Niah River and Rejang delta in Malaysia from 1960-1963 were found in the coastal plain that was flat and had sandstone and clay soils. A single earless lizard was found in 2008 under leaf litter in a shallow, rocky creek in a mature fruit tree garden that is part of a larger forest block with natural forest, secondary forest, and isolated bamboo clusters (Yaap et al., 2012 p. 3069). Interviews with community members in the Landak District of West Kalimantan around this time indicated

that earless lizards are mostly known from immature forest, mature fruit tree gardens, and river edges (Yaap et al., 2012 p. 3071).

Today, primary forests or forests with sufficient canopy cover and freshwater are considered an indispensable requirement for the species, and recent observations have shown that the species prefers undisturbed forests with clear, rocky streams (Das & Auliya, 2021 p. 4). In 2014, 19 earless lizards were observed in a slow flowing stream habitat with low, clear water, moss covered rocks, and a sandy surface with some pebbles (Langner, 2017 pp. 3-4). Water temperature of the stream in the survey area was 26.1° C (Langner, 2017 p. 4). This habitat was not far from oil palm plantations, as well as rice, manioc, and taro fields, with larger swaths of pristine primary rainforest in adjacent hills (Langner, 2017 p. 3).

III. Distribution

A. Historic Distribution

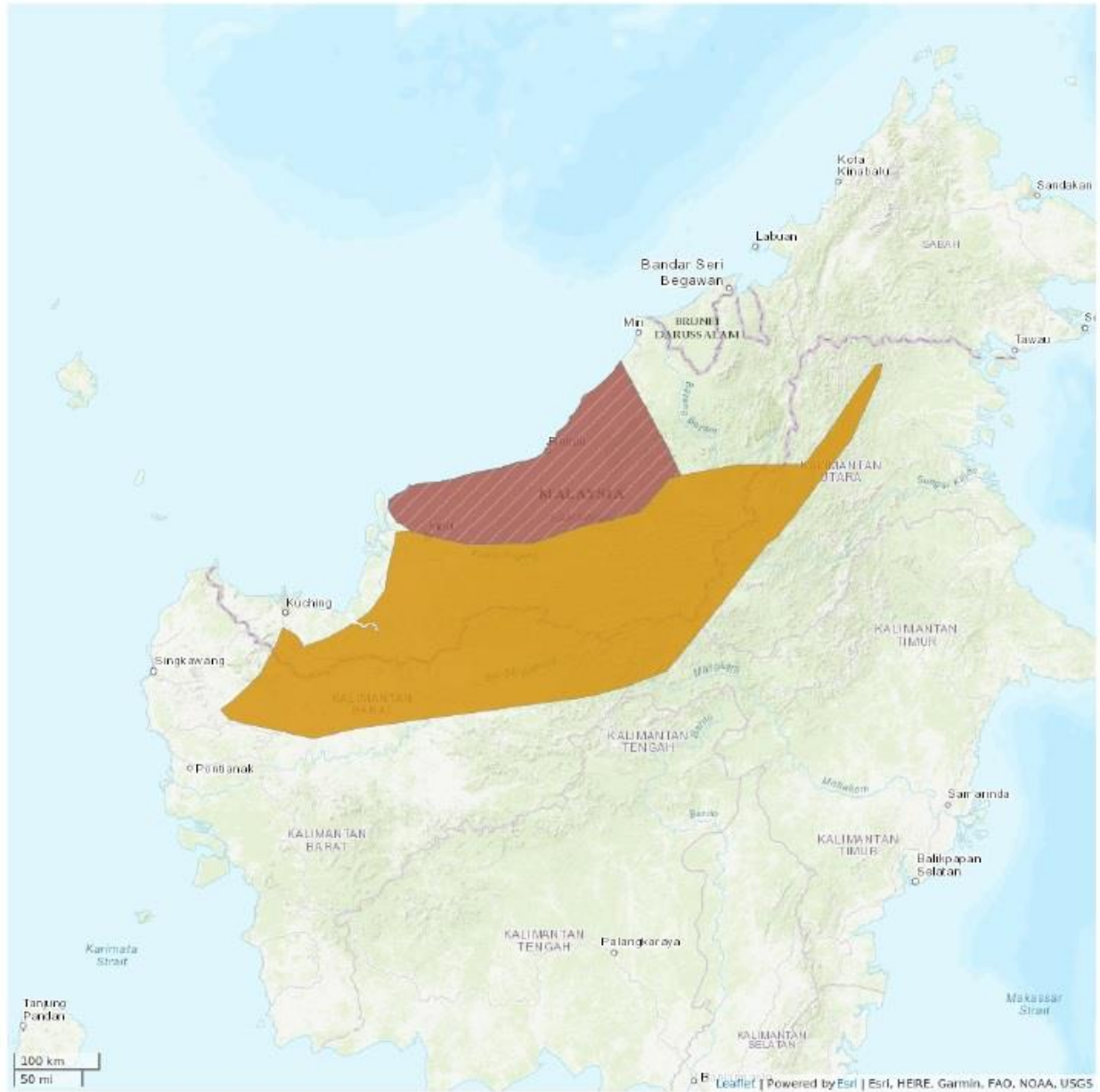
Earless lizards are considered endemic to Borneo and have been found in very small numbers there over the last 150 years (Das & Auliya, 2021 p. 6). Initially the species was primarily known from the coastal lowlands of Sarawak, Malaysia (Harrison & Haile, 1961 p. 1213; Yaap et al., 2012 p. 3068). However, in 2008, a discovery of a single earless lizard on an oil palm estate development site during a biodiversity survey expanded its known distribution south from Sarawak to Kalimantan. In 2008, community interviews indicated that the earless lizard was distributed broadly in the Landak District and also could be found in the neighboring Sanggau District (Yaap et al., 2012 p. 3071).



B. Current Distribution

The current distribution of earless lizards is unknown, as there have not been any comprehensive population surveys, though experts suggest the rate of decline in the species' suitable habitat may have exceeded 30 percent in three generations (Das & Auliya, 2021 p. 2). In 2014, Langner (2017 p. 2) conducted a survey looking for earless lizards in northeast Kalimantan, Indonesia, and did not find any. However, the researchers then surveyed an area in the central northern part of the province Kalimantan Barat, Indonesia, near the Malaysian border and found 19 earless lizards over a period of 3 nights (Langner, 2017 p. 4). Arida et al. (2018 pp. 86-88) conducted population and habitat surveys in an area that is a likely source for local actors in the earless lizard trade in West Kalimantan, Indonesia and did not find any individuals. One specimen was reported from northeastern East Kalimantan, now the province "North Kalimantan" (Vergner 2013). In October 2022, a single earless lizard was reported for the first time in Brunei Darussalam in a primary forest in Ulu Temburong (Borneo Bulletin, 2022 unpaginated). While additional surveys and DNA tests are needed to confirm whether this individual is part of a subpopulation in the country, the discovery could mean that the species' distribution extends into Brunei Darussalam.

Earless lizard populations continue to decline, and individual subpopulations are likely small (Das & Auliya, 2021 pp. 4-6). There are five subpopulations that are either confirmed or expected to be extant (Das & Auliya, 2021 p. 2). These remaining subpopulations are vulnerable

to overexploitation and habitat loss. One subpopulation is in a site where logging recently started and at least one other subpopulation has been targeted by traders (Das & Auliya, 2021 p. 2). Das and Auliya (2021, p. 6) concluded that collecting pressure for the trade “represents a severe threat to any viable subpopulations that are discovered.”



Legend
 EXTANT (RESIDENT)
 POSSIBLY EXTINCT

Compiled by:
 IUCN 2020

Figure 2. Range of the earless lizard. Extracted from Das and Auliya (2021).

IV. Conservation Status and Warranted Endangered Species Act Protection

The Endangered Species Act (ESA) is a “comprehensive scheme with the ‘broad purpose’ of protecting endangered and threatened species.” *Ctr. for Biological Diversity v. U.S. Bureau of Land Mgmt.*, 698 F.3d 1101, 1106 (9th Cir. 2012) (quoting *Babbitt v. Sweet Home*, 515 U.S. 687, 698 (1995)). Congress’ plain intent in enacting the ESA was “to halt and reverse the trend toward species extinction” *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 184 (1978). In doing so, the ESA requires that “all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of [these] purposes.” 16 U.S.C. § 1531(c)(1). Endangered and threatened species are “afforded the highest of priorities.” *Tenn. Valley Auth.*, 437 U.S. at 174. Endangered species are species that are “in danger of extinction throughout all or a significant portion of its range,” and threatened species and species that are “likely to become endangered species within the foreseeable future” throughout all or a significant portion of range. 16 U.S.C. §§ 1532(6), (20), 1533. As demonstrated by the best available science on the species, the earless lizard meets the definition of endangered.

In 2019, the earless lizard was evaluated Endangered in the Red List of Threatened Species of the International Union for Conservation of Nature (IUCN). It is also listed under Appendix II of CITES, which is reserved for species that may become threatened with extinction without controls on trade. The remaining wild population is expected to have declined more than 30 percent over the last three generations and continues to decline. Of the five known extant subpopulations, one is in an area where logging has begun and at least one other has been targeted by traders for the pet trade.

V. Current Threats

Under the ESA, the Service is required to list a species as “endangered” if it “is in danger of extinction throughout all or a significant portion of its range” or as “threatened” if it “is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range” based upon one or more threats or factors. 16 U.S.C. § 1532(6), (20). There are five statutory listing factors that the Service must analyze for the species: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence. *Id.* § 1533(a)(1). Based upon an analysis of these factors, the earless lizard should be protected as an endangered species under the ESA.

A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Habitat loss is one of the leading threats to earless lizards (Das & Auliya, 2021 p. 6). The species is presumed to be lost from areas where forest has been cleared (Das & Auliya, 2021 p. 6). As noted above, primary forests or forests with sufficient canopy cover and freshwater are considered a requirement for earless lizards, and recent observations have shown that the species prefers undisturbed forests with clear, rocky streams (Das & Auliya, 2021 p. 4). Of the five known extant subpopulations of earless lizards, one subpopulation is known to be in a site where

logging recently started (Das & Auliya, 2021 p. 2). Das and Auliya (2021 p. 4) concluded that “the Borneo Earless Monitor has undoubtedly suffered declines and likely local extinctions as a result of forest clearance.”

Wildlife habitat in Borneo has declined over the last five decades. Old growth forests made up about 76 percent of Borneo in 1973 (Gaveau et al., 2014 p. 5). Over 30 percent of forests in Borneo were lost from 1973-2010 because of logging, fires, and land conversion to plantations (Gaveau et al., 2014 p. 5). Almost all of this deforestation (97 percent) occurred in coastal lowlands. In the same time period, Gaveau et al. (2014 p. 5) estimated that 271,819 km of primary logging roads were opened, with the highest concentration being in Sarawak, where most observations of earless lizards have been made. As a result of forest loss, functionally connected wildlife habitat reduced by an average of 35 percent from 1973-2015, with many species losing more than 50 percent of their habitat (Ocampo-Peñuela et al., 2020 p. 5).

Earless lizard habitat continues to decline, as both Malaysia and Indonesia have experienced high deforestation rates. Malaysia has seen a 29 percent loss in tree cover since 2000 (Global Forest Watch, 2022 unpaginated). From 2002-2021, the total area of humid primary forest in Malaysia decreased by 17 percent (Global Forest Watch, 2022 unpaginated). Most of the tree cover loss occurred in Sarawak. In Malaysia, the expansion of industrial plantations has been consistent over time, but in Indonesia, the conversion of land for oil palm plantations has steeply increased since 2005 (Gaveau et al., 2016 p. 4). Indonesia has experienced the highest deforestation rate in the world (Newman and Valentinus, 2005 p. 1). From 2000 to 2012, the country is estimated to have lost 157,850 km² of tree cover (Hansen et al., 2013 supplementary text, Table S1).

Not only does losing forest eliminate the tree cover that earless lizards require, but it also impacts the health of the streams the species depends on and the abundance and diversity of some of its prey. Iwata et al. (2003 pp. 466-467) found that deforestation in riparian communities in Borneo had long-term negative impacts on stream health. Deforestation led to an increase in sedimentation in streams, and a subsequent loss in abundance and/or diversity in aquatic insects, shrimps, crabs, and benthic fishes, which are likely food sources for earless lizards (Iwata et al., 2003 pp. 466-467; Jinggut et al., 2012 p. 86). Deforestation can also cause changes in stream width, water velocity, and nutrient cycling within the ecosystem (Sweeney et al., 2004 p. 14,134). Continued deforestation and stream degradation in the earless lizard’s habitat threatens the species with extinction.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

1. Earless lizards are in Demand for the Pet Trade

Overcollection from the wild to meet the demand for the pet trade is a major threat to earless lizards (Das & Auliya, 2021 p. 6). Called the “Holy Grail” by reptile keepers, there is interest in earless lizards as pets across a wide geographical range that includes the United States, and the species is in high demand (Nijman & Stoner, 2014 p. 12). In the 1960’s, some earless lizards were kept in zoos and museums, but they were rare (Mendyk et al., 2015 p. 45). In the several decades to follow, earless lizards were generally not kept in zoos or private collections (Mendyk et al., 2015 p. 45). However, the species began to reappear in the reptile trade in 2012 following

the discovery of subpopulations in West Kalimantan, Indonesia, and trade and interest in the species has increased since then (Nijman & Stoner 2014 p. 12). A Wikipedia page on the species was created in 2003 and had about 20 views per day in 2014 (Nijman, 2021 p. 71). By 2020, the average number of daily views increased to 200 and occasionally reached as high as 2,000 views per day (Nijman, 2021 p. 71).

Earless lizards are in demand around the world and have been sold globally. At least 16 zoos outside of range countries now display earless lizards (Nijman, 2021 p.73). Between October 2015 and February 2017, Janssen and Krishnasamy (2018 p. 3) found 31 online advertisements for at least 108 earless lizards on social media and reptile classified websites in 13 countries. The researchers note that the searches were done in an opportunistic matter and therefore the actual number of advertisements is likely higher (Janssen & Krishnasamy, 2018 p. 4). Of the 108 earless lizards offered for sale, 41 were advertised as captive-bred and 61 had no source listed (Janssen & Krishnasamy, 2018 p. 4).

Earless lizards have been actively traded in the United States for several years, despite all range countries having banned exports of the species for four decades. From 2014-2015, a minimum of 22 earless lizards were offered for sale in the United States by nine traders (Stoner & Nijman 2015, p. 55). In July of 2015, a trader based in the United States was selling earless lizards that supposedly were imported from Germany and bred in captivity there (TRAFFIC, 2015). Janssen and Krishnasamy (2018 p. 3) found three online advertisements for six earless lizards for sale in the United States in 2015 with prices ranging from US \$6,500-7,000. One of these advertisements claimed that the two individuals were F2 generation offspring and the other two had no listed source (Janssen & Krishnasamy, 2018 p. 3). Another online advertisement in the United States for two earless lizards with no listed source was recorded in 2016 (Janssen & Krishnasamy, 2018 p. 3). Finally, ten earless lizards were imported to the United States in February 2021 from the Czech Republic (Nijman et al., 2021 p. 74; Table 2).

At least four zoos in Japan, Austria, Czech Republic, and Russia and several hobbyists have successfully bred earless lizards in captivity, though F2 generation offspring has not been verified (Mendyk et al., 2015 p. 45; Nijman, 2021 pp. 73-74, 77). The parent stocks may have been illegally acquired since exports from range states had not been allowed prior to the species being listed under Appendix II of CITES (Janssen & Krishnasamy, 2018 p. 4). Critically, to our knowledge, there are no commercial breeding facilities supplying the trade in earless lizards. Therefore, pressure to supply the trade likely remains on the wild populations of earless lizards.

Table 2. Trade in live earless lizards in the CITES Trade Database from the species' Appendix-II listing in 2017 to 2021 (data from 2021 may not be complete due to reporting delays). Accessed September 20, 2022.

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Purpose	Source
2021	United States	Czech Republic			10	Zoo	Animals bred in captivity in accordance with Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof
2021	Switzerland	Austria	Austria		4	Commercial	Animals bred in captivity in accordance with Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof
2021	Switzerland	Austria			3	Personal	Animals bred in captivity in accordance with Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof
2021	Switzerland	Austria			3	Commercial	Animals bred in captivity in accordance with Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof
2018	Canada	Czech Republic	Austria		12	Commercial	Animals bred in captivity in accordance with Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof
2017	Czech Republic	Hong Kong	XX	1		Educational	Confiscated or seized specimens

2. Earless Lizards are Vulnerable to Trade

Among species in the pet trade, earless lizards are likely particularly vulnerable to overexploitation. First, the number taken from the wild is likely to be much higher than the number found in trade due to high mortality along the trade chain. Data from the Forestry Office of Papua Province, Indonesia, in 1998 showed that 35 percent of reptiles captured from the wild were traded (Marshall and Beehler, 2007, as cited in Koch et al., 2013 p. 48). This aligns with Natusch and Lyons (2012 p. 2902) who witnessed large numbers of monitor lizards that could not be exported from Indonesia as a result of injury and death. This is likely due to unsuitable living conditions along the trade chain. Koch et al. (2013 pp. 4, 48) stated that pet trade species often are kept in unsuitable and unhygienic conditions.

The life history of earless lizards also makes them more vulnerable to trade. Due to the habitat requirements of the species, mortality may be high even among the individuals that survive until they reach their destination. Harrison (1963 p. 208) noted that earless lizards sent from Malaysia to the United States did not survive more than a few days. Although more is known today about proper husbandry practices for earless lizards, the longest recorded lifespan of an individual in captivity is 7.5 years, and most do not live long in captivity (Mendyk et al., 2015 p. 46). The species' short lifespan further promotes trade as specimens that die in captivity are replaced.

As a rare species, the earless lizard is particularly at risk from trade. Altherr and Lameter (2020 p. 6) found that reports of new species or new records of species that have already been described tend to lead to media articles or hobbyist magazines highlighting the species' unique characteristics and rarity. Rare species can be sold at higher prices, which further incentivizes collection from the wild (Altherr and Lameter, 2020 p. 6). Earless lizards have been offered for sale for as much as US \$15,500 (Auliya et al., 2016 p. 8). Of the countries where earless lizards have been sold, they tend to be worth the most money in the United States (Janssen & Krishnasamy, 2018 p. 4). Being able to sell earless lizards at such a high price incentivizes collection from the wild, as the financial gain for smuggling the species likely significantly outweighs the risk getting caught and potentially facing penalties (Nijman & Stoner, 2014 p. 12).

3. Illegal Trade is an Ongoing Threat to Earless lizards

Illegal trade continues to be a threat to earless lizards. Earless lizards exported from Malaysia and Indonesia are sourced illegally, as harvest is prohibited in both nations (see Section E below). Despite exports of the species being banned from range countries, researchers found Malaysian companies and Indonesian individuals offering a total of 30 earless lizards for sale (Janssen & Krishnasamy, 2018 p. 4). Additionally, a 2018 study found that there was no breeding stock for earless lizards present at any of the breeding facilities in Indonesia, and yet a quota of 20 earless lizards had been allocated to one company, raising concerns that individuals labelled as captive-bred are being taken from the wild (Janssen & Chng, 2018 p. 5). This aligns with Nijman and Shepherd (2009, p. 7), who found that captive breeding facilities in Indonesia appear unsuitable for captive breeding and are rarely used for this purpose. Furthermore, staff at captive breeding facilities often lack the knowledge to breed reptiles (Nijman and Shepherd, 2009 p. 7).

Laundering is common in the trade of earless lizards. In November 2016, Janssen and Krishnasamy (2018 p. 3) found advertisements on several European classified websites for captive-bred earless lizards that stated that the parents were legally imported from Malaysia. In 2017, however, Malaysia confirmed that it had never issued any export permits (Janssen & Krishnasamy, 2018 p. 3). In fact, no evidence of legal export from any of the earless lizard's range countries exists (Nijman, 2021 p. 72).

Demand for earless lizards in the United States further incentivizes laundering and overcollection from the wild. Traders in the European Union (EU) often supply the United States' market for earless lizards (Auliya et al., 2016 p. 8). With no Lacey Act-equivalent, the EU is a major destination for species that are protected in their range states yet are collected and traded illegally (Altherr, 2014 full paper). Traders target gravid females and, once in the EU, species are marked as captive-bred and traded (Altherr, 2014 p. 7). Species that are not listed under CITES are particularly at risk because of a lack of other enforcement regulations in the EU. While the earless lizard was listed under Appendix II of CITES in 2017, as discussed below, the listing is not adequately protecting the species from laundering and overcollection in the wild.

In addition to laundering, there have been several incidents of smuggling of earless lizards. In October 2015, a German national was arrested for trying to smuggle eight earless lizards on his body (TRAFFIC, 2015 unpaginated). The eight individuals were purchased in Kalimantan, and one had already died before the person was arrested (TRAFFIC, 2015 unpaginated). In December 2015, another 10 specimens were confiscated at the airport in Jakarta (Das & Auliya, 2021 p. 5). In March 2016, a package marked as ramen noodles containing 17 earless lizards was intercepted in West Kalimantan (Das & Auliya, 2021 p. 5; Irawan, 2016 unpaginated). Finally, during their research in Serimbu Village in 2018, Arida et al. (2018 p. 88) noted that a guide informed them that several earless lizards were available for market and that the guide himself was previously involved in wildlife smuggling (Arida et al., 2018 p. 88). Seizures have also been reported in Hong Kong and London (Nijman, 2021 pp. 73-74). According to Nijman and Stoner (2014 p. 12) there is a small group of collectors using trusted couriers to smuggle reptiles out of Borneo which is actively targeting earless lizards. Two individuals in this group have been previously convicted for reptile smuggling (Nijman & Stoner, 2014 p. 12). In sum, overcollection from the wild to meet the demand for the pet trade is a major threat to earless lizards.

C. Disease

There is currently no information available about diseases among the wild populations of earless lizards given the very limited observations and studies on the species. However, the pattern of increased development and human encroachment on the species' habitat is likely increasing the risk of disease among wild populations. Additionally, there is one report of a captive earless lizard developing hookworm in captivity (Mendyk et al., 2015 p. 46). The specimen had been in captivity for almost a year, so it was unclear whether this infection came from its time in the wild or captivity (Mendyk et al., 2015 p. 46).

Closely related to earless lizards, varanids are also known to carry and be susceptible to disease in captivity. Mendyk et al. (2013 p. 2) found that leading causes of death among captive varanids

at the Bronx Zoo were infection-related, including bacterial infections and endoparasitism. Bacteria-related deaths resulted from bacterial sepsis, salpingitis, meningitis, enteritis, and pneumonia (Mendyk et al., 2013 p. 2). Neoplasia was another leading cause of death and was most common among wild-caught females (Mendyk et al., 2013 p. 3). Another study of disease in 333 varanids, including 39 different species, found that varanids are susceptible to cardiac fibrosis, chronic renal disease, chronic hepatopathies, gout, hepatocellular lipidosis, metastatic mineralization, inanition, soft tissue sarcomas, squamous cell carcinoma, lymphoma, bacterial diseases, parasitic diseases, inflammatory diseases of unknown causes, and reproductive diseases such as yolk coelomitis, oophoritis, and follicular degeneration/rupture (Garner, 2008 p. 1).

While not a direct threat to the wild population, disease in trade and captivity may increase mortality of earless lizards, therefore requiring more collection of the species from the wild to supply the trade.

D. Other Natural or Manmade Factors

1. Climate Change

Climate change is likely to be a threat to earless lizards. Reptiles are likely more susceptible to climate change than other taxa due to their limited ability to disperse to new habitats and reliance on ambient temperature to regulate body temperature (Root and Schneider, 2002 pp. 20-21). This is particularly true for the earless lizard as an island endemic with a limited range. Temperature increases, precipitation changes, and increases in natural disasters are expected within the range of the earless lizard during this century (Christensen et al., 2007 p. 879; Measey, 2010 p. 38). Any of these changes has the potential to impact the earless lizard throughout the most or all of its range.

Global surface temperature is projected to continue increasing until at least mid-century under all IPCC *Climate Change 2021* report scenarios (IPCC 2021). In Southeast Asia there is an expected median warming of 2.5°C by the end of the 21st century (Christensen et al., 2007 p. 883). As mentioned previously, earless lizards rely on ambient temperature to regulate body temperature, making them particularly vulnerable to these changes.

In addition to changes in temperature, changes in precipitation are expected to occur within the range of the earless lizard. Summer precipitation is expected to increase in South and Southeast Asia during this century and intense precipitation events are expected to occur more frequently (Christensen et al., 2007 p. 879). Changes in precipitation could have implications for earless lizard habitat due to the species' reliance on clear, low-flowing streams.

Another potential impact on the earless lizard resulting from climate change is loss of habitat due to sea level rise and increased natural disasters. Sea level rise may lead to habitat loss for the earless lizard, particularly along coastal lowlands where most reports of earless lizards have been recorded. Additionally, an increase in the intensity and frequency of natural disasters poses a threat to earless lizards given the species' limited range. Extreme rainfall and winds from tropical cyclones are expected to increase in South and Southeast Asia during this century (Christensen et al., 2007 p. 879).

E. The Inadequacy of Existing Regulatory Mechanisms

Existing national and global regulatory mechanisms are inadequate to protect the earless lizard from the threats it faces. Demand for the international pet trade is one of the biggest threats to the species, and existing regulatory mechanisms have not been sufficient to ensure that the trade does not put the wild populations of earless lizards at risk of extinction. As discussed below, despite bans on harvest and export in the species' range countries, earless lizards have been harvested from the wild at an unsustainable rate and are still being targeted for international trade. Additionally, there is a lack of enforcement of regulations throughout the trade chain further contributing to the species' decline.

The United States is a major importer of reptiles for the pet trade and is currently complicit in the overexploitation of earless lizards. Auliya et al. (2016 p. 8) stated “Despite being protected in its three potential range states of Indonesia (Kalimantan), Malaysia (Sarawak), and Brunei Darussalam, the lack of regulations protecting the species in consumer states enables international trade.” As discussed below, earless lizards were listed under CITES Appendix II in 2017, but this listing is not sufficient for protecting the species as it allows for laundering and has not resulted in accurate tracking of the trade. Endangered Species Act protections, including a ban on imports of earless lizards to the United States, are necessary to protect this species from extinction.

1. Domestic Protections in Malaysia

a. Wildlife Protection Ordinance of 1998

Earless lizards have been protected in Sarawak, Malaysia since 1971 and are currently on the “Totally Protected Species” list in Sarawak’s First Schedule [section 2(1)], part 1, of the Wildlife Protection Ordinance of 1998.³ Under Sarawak’s Wildlife Protection Ordinance, “Any person who hunts, kills, *captures*, *sells*, offers for sale or claims to be offering for sale, imports, *exports*, or is in possession of, any totally protected animal or any recognizable part or derivative thereof . . . shall be guilty of an offence,” unless they have written permission from authorities for “scientific or educational purposes or for the protection and conservation of such totally protected animal.”⁴ Moreover, “no person shall sell or offer for sale . . . any wild . . . reptile . . . other than a wild . . . reptile . . . which is bred, reared or kept in accordance with a [required] license.”⁵ To our knowledge, neither Malaysia nor the state of Sarawak has granted any permits or licenses for earless lizards.

While earless lizards are protected in Sarawak, as described in the trade section above, laundering and illegal trade of the species from that region still occurs. Researchers found Malaysian companies and Indonesian individuals offering a total of 30 earless lizards for sale despite their protected status (Janssen & Krishnasamy, 2018 p. 4). Aside from not preventing wild capture and laundering, Malaysian law does not apply to the earless lizard’s entire range,

³ Wildlife Protection Ordinance, 1998. Available at: <https://leap.unep.org/countries/my/national-legislation/wildlife-protection-ordinance-1998>

⁴ *Id.* § 29 (emphases added).

⁵ *Id.* § 33.

which extends into Indonesia and may extend into Brunei Darussalam, and therefore cannot adequately protect the species.

b. Wildlife Conservation Enactment 1997

While earless lizards have not been documented in Sabah, Malaysia, the recent discovery of an earless lizard in Brunei Darussalam, about 20km from the border of Sabah, suggests that the species' range could extend to the state. Sabah's Wildlife Conservation Enactment 1997 requires a license for hunting totally protected species listed under Schedule One. "Hunt" is defined as "to pursue, molest, wound, kill or capture any animal by any method."⁶ The list of totally protected species includes related monitor lizards (*Varanus* spp.), but it does not include the earless lizard. Therefore, if the earless lizard's range is determined to extend into Sabah, the species would not be adequately protected there.

2. Domestic Protections in Indonesia

a. Government Regulation No. 7/1999 on Preserving Flora and Fauna Species

Earless lizards have been protected under Indonesian law since 1980, first on a Decree of the Ministry of Agriculture and then on a Decree of the Ministry of Forestry. These decrees were eventually consolidated into Government Regulation No. 7/1999, which protects earless lizards today.⁷ Species that are fully protected under this regulation cannot be taken from the wild, and trade in wild-sourced protected specimen is prohibited.⁸ Indonesian law allows captive-breeding of protected species and the subsequent sale of captive-bred, protected species of F2 or subsequent generations.⁹ As of 2016, earless lizards had not been added to Indonesia's list of species permitted for captive breeding.¹⁰ Other sources indicate earless monitor lizards may have been added to the list since then but, as discussed below, there is likely no breeding stock of this species in Indonesia.¹¹

⁶ Wildlife Conservation Enactment, 1997. Available at: https://www.sabahlaw.com/WILDLIFE_ENACTMENT.pdf

⁷ CITES. (2015). Proposal for Consideration at CoP17: Proposal to List *Lanthanotus borneensis* in Appendix I in Malaysia. *See also* Regulation of the Minister of Environment and Forestry, Republic of Indonesia, Number P.20/MENLHK/SETJEN/KUM.1/6/2018, Types of Plant and Animal Protected (listing *Lanthanotus borneensis* as protected, available at: <https://leap.unep.org/sites/default/files/national-legislation/Reg%252020%25202018%2520Mi.pdf>).

⁸ Government Regulation of the Republic of Indonesia No. 8/1999 on Wild Flora and Fauna Exploitation, Art. 18. Available at https://sherloc.unodc.org/cld/uploads/res/document/regulation-8-of-1999_html/Regulation_8_of_1999.pdf; Natusch & Lyons, "Exploited for Pets"; Nijman, et al., "Disentangling the Legal and Illegal Wildlife Trade."; Shepherd, C. R., Gomez, L., & Nijman, V. (2020). Illegal wildlife trade, seizures and prosecutions: A 7.5-year analysis of trade in pig-nosed turtles *Carettochelys insculpta* in and from Indonesia. *Global Ecology and Conservation*, 24, e01249; CITES (2015) (under Indonesian regulation "trade in Earless Monitor Lizards is not permitted).

⁹ Janssen, J., & Chng, S. C. (2018). Biological parameters used in setting captive-breeding quotas for Indonesia's breeding facilities. *Conservation Biology*, 32(1), 18-25; Government Regulation of the Republic of Indonesia No. 8/1999 on Wild Flora and Fauna Exploitation, Art. 7, 10. Available at https://sherloc.unodc.org/cld/uploads/res/document/regulation-8-of-1999_html/Regulation_8_of_1999.pdf.

¹⁰ CITES, "Proposal for Consideration."

¹¹ Janssen & Chng, "Biological parameters."

Although the earless lizard is protected in Indonesia, evidence suggests that conservation laws there are not enforced and therefore authorities do not effectively manage trade or protect endangered species (Freund et al., 2016 p. 8; Maulany et al., 2021 p. 284; Natusch & Lyons, 2012 p. 2902; Nijman, 2019 p. 203; Nijman et al., 2012 p. 88; Sheperd et al., 2020 p. 8). A lack of awareness of conservation laws and policies and limited species identification training among law enforcement officials are major problems (Lee et al., 2005 p. 478; Natusch & Lyons 2012 p. 2906). Natusch and Lyons (2012 p. 2906) found that when protected reptile species were included in a shipment, officers did not have the species identification training to properly identify them. As a result, protected species were traded under the guise of color variants of other non-protected species (Natusch & Lyons, 2012 p. 2906). Additionally, Nijman et al. (2012 p. 88) found that despite Indonesia having regulations and guidelines in place to regulate reptile trade, few collectors, middlemen, and smaller traders act in accordance with these rules. In fact, illegal trade was conducted openly (Nijman et al., 2012 p. 88).

Laundering and other illegal activities are common along the trade chain in Indonesia. Natusch and Lyons (2012 p. 2905) stated that despite Indonesia having restrictions and guidelines in place to regulate the wildlife trade, “few actors abide by these laws.” Another study found that 92 percent of python traders who were interviewed said that they could “easily circumvent laws and regulations by paying off officials” (Lyons & Natusch, 2011 p. 3), which is a common method for trading protected species and species without harvest quotas in Indonesia (Natusch & Lyons, 2012 p. 2902). Lyons and Natusch (2011, p. 6) confirmed that most green tree pythons exported annually from Indonesia as captive bred are actually wild caught. Natusch and Lyons (2012 p. 2906) found that many protected species of amphibians and reptiles are laundered, with traders stating that collected wildlife was being sent to licensed captive breeding facilities where they would then be exported as captive-bred or sold to domestic pet shops (Natusch & Lyons, 2012 p. 2902).

Other authors have frankly concluded that “[m]ost wildlife trade in Indonesia is illegal, yet enforcement is almost non-existent” (Eaton et al. 2015 p. 8). Given these shortcomings in enforcement of trade regulations, the earless lizard is not adequately protected by Indonesian regulation.

3. Domestic Protections in Brunei Darussalam

The earless lizard has been a fully protected species in Brunei Darussalam since 1978 under the Wildlife Protection Act (Mittermeier, 1981 p. 68; Nijman & Stoner, 2014 pp. 7 and 15). This listing bans hunting and export of the species without a special permit, stating “No person shall hunt, kill or capture any protected animal otherwise than under and in accordance with the conditions of a licence issued under this Act.”¹² It further states “No person shall export any animal specified in the First Schedule, except under and in accordance with the conditions of a licence issued under this Act.”¹³ The penalty for hunting, killing, capturing, or exporting the species is a fine of BND 2,000 (about US \$1,400 as of September 2022) and one year of imprisonment (Nijman & Stoner, 2014 p. 7). Until October 2022, earless lizards had not been documented in Brunei Darussalam, and more research is needed to determine whether a

¹² Wildlife Protection Act. Available at: https://www.agc.gov.bn/AGC%20Images/LAWS/ACT_PDF/cap102.pdf

¹³ Wildlife Protection Act. Available at: https://www.agc.gov.bn/AGC%20Images/LAWS/ACT_PDF/cap102.pdf

subpopulation exists in the country. Regardless, the Wildlife Protection Act does not adequately protect earless lizards across its range as it only applies to Brunei Darussalam.

4. Protected Areas

There are several protected areas that overlap with some of the earless lizard's range. However, these protected areas are unlikely to adequately protect the species. Not only do the protected areas not cover the entirety of the earless lizard's range, but they are also likely subject illegal logging and shifting designations that allow for deforestation in formerly permanently protected forests.

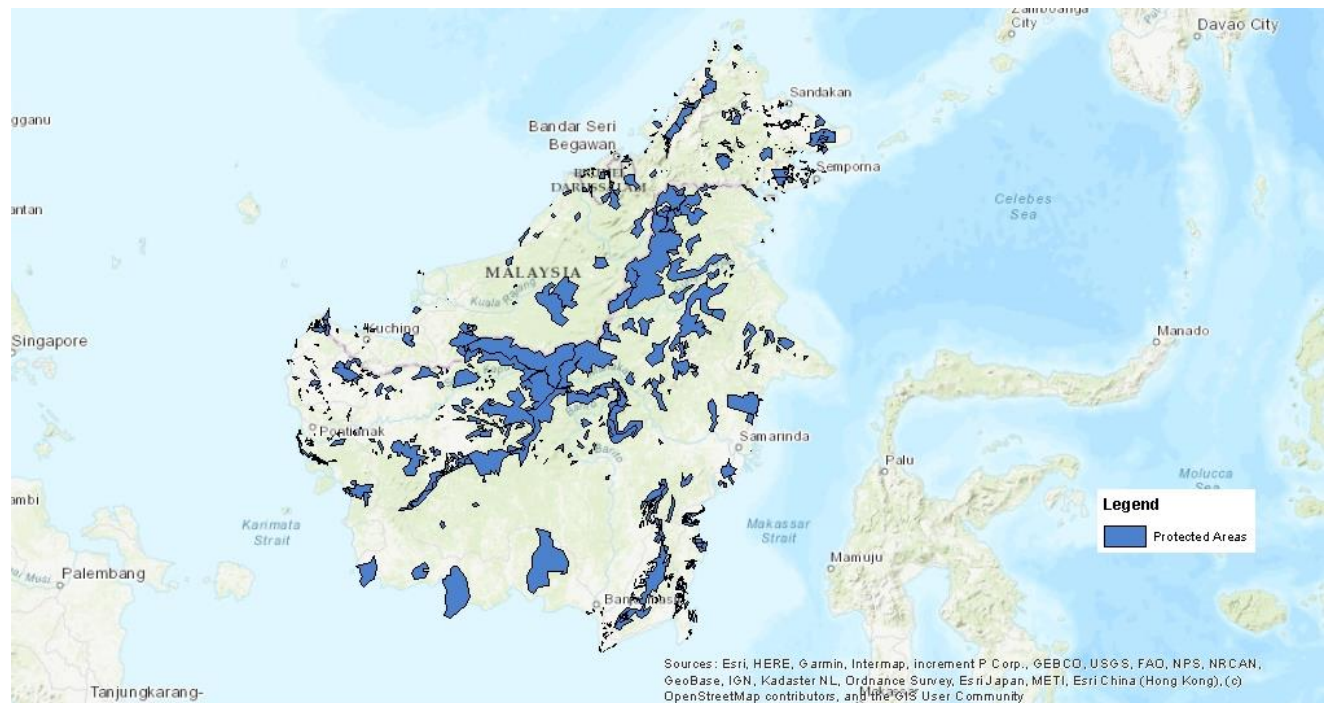


Figure 3. Protected Areas in Borneo.

Some formerly permanent forest reserves in Malaysia were recently cleared to build a gold mine and oil palm plantations (Tong, 2021 unpaginated). By 2021, deforestation had removed 21 percent of forests within the formerly protected areas and upcoming projects were projected to remove another 24 percent (Law, 2021 unpaginated). While these areas do not fall within the range of the earless lizard, this development of former forest preserves indicates that even “permanently” protected areas in Malaysia may face a shift in designation and be subject to deforestation.

In addition to the potential to lose protected status, protected areas are also threatened by illegal logging which has been observed in Borneo and throughout Indonesia. Within Gunung Palung National Park in Borneo and the park's 10km buffer, more than 70 percent of lowland forests were deforested between 1988 and 2002 as timber concessions were cleared and loggers illegally expanded into protected areas (Curran et al., 2004 p. 1,002; Figure 4). There have also been several cases of illegal logging within a protected area on Batanta Island in Indonesia, including a major operation that was financed and coordinated by an Indonesian police officer (Del Canto,

2013 p. 18; Newman and Valentinus, 2005 p. 19; Shetty, 2019 p. 23). The illegal logging activity and corruption throughout the country indicates that even the protected areas that earless lizards reside in are threatened by deforestation.

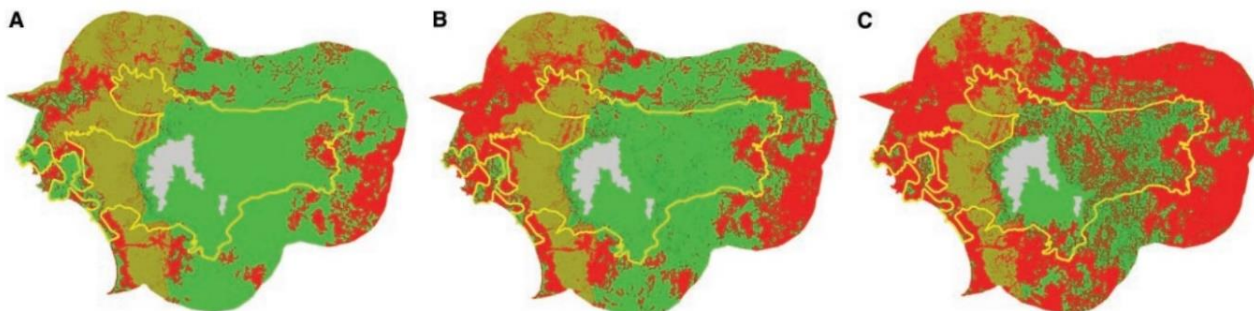


Figure 4. Cumulative forest loss within the GPNP (yellow boundary) and its 10km buffer in 1988 (A), 1994 (B), and 2002 (C). Green and olive represent lowland and peat forests and red represents non-forest. Gray areas represent montane forest. Figure extracted from Curran et al. (2004 p. 1,001).

5. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

The family *Lanthanotidae* was included in CITES Appendix II in 2017. Under Article IV of CITES, to trade an Appendix II species, exporting countries must issue an export permit, make a finding that “export will not be detrimental to th[e] species,” and be satisfied that the specimen was not obtained illegally. CITES Art. IV(2)(a), (b). A zero-export quota was also adopted for wild specimens of earless lizards for commercial purposes, and therefore CITES bans all commercial trade of earless lizards collected from the wild populations. To our knowledge, Malaysia and Indonesia have never issued CITES export permits for earless lizards.

While regulation under CITES can be a powerful conservation tool, the listing under Appendix II is not sufficient to protect this species. Malaysia initially proposed an Appendix-I listing at CITES to aid in “the effectiveness of national range State legislation and to lessen any impact illegal takings may have already had on the species” (CITES, 2015 p. 3). Experts agree that an Appendix-II listing is not sufficient for the species and allows for laundering. Janssen and Krishnasamy (2018 p. 4) state that a zero-quota system “can create a loophole through which wild-caught specimens can be laundered, particularly in countries and territories that do not have robust regulatory protocols to prevent illegal and unsustainable wildlife trade.” Thus, allowing earless lizards illegally collected from the wild to be falsely passed off as captive-bred in trade. Das and Auliya (2021 p. 7) also note that the current listing of earless lizards under CITES “includes the option to launder juvenile wild-captured specimens as captive-bred to international destinations.”

Finally, the current listing under CITES has not resulted in accurate tracking of the trade in earless lizards. Reporting in the CITES Trade Database is not comprehensive. For example, the Czech Republic reported exporting 12 captive-bred earless lizards to Canada that originated from Austria (Nijman, 2021 p.73). However, Austria did not report imports or exports of the species

and Canada did not report imports (Nijman, 2021 p.73). Despite reported exports of earless lizards to Canada, Switzerland, and the United States, none of these countries have reported import quantities of the species (Table 2). Without proper monitoring of the trade, it is not possible to assess the impact that the trade is having on wild populations of earless lizards.

5. Lacey Act

The Lacey Act prohibits any person from importing or selling any wildlife “taken . . . in violation of any foreign law.” 16 U.S.C. § 3372(a)(2)(A). As described above, exports of earless lizards have been banned from each of their range states since at least 1980 and captive breeding of the species, especially for commercial purposes, is limited at best, and yet the species has been actively traded in the United States for several years. Auliya et al. (2016, p.8) explained that traders in the European Union (EU) supply the United States’ market for earless lizards (Auliya et al., 2016 p. 8). With no Lacey Act-equivalent, the EU is a major destination for species that are protected in their range states and are collected illegally (Altherr, 2014 full paper). Traders target gravid females and, once in the EU, species are marked as captive-bred and traded (Altherr, 2014 p. 7). This was likely the source for many of the earless lizards present in the United States today. The Lacey Act, therefore, has not adequately protected earless lizards because it is likely that illegally collected specimens have entered the United States marked as captive-bred.

VI. Request for Regulations

Based on the best available information presented above, the Center petitions the Service to emergency list the earless lizard (*Lanthanotus borneensis*) or list it as endangered under the Endangered Species Act. 16 U.S.C. § 1533(b). Listing is warranted, as the earless lizard “is in danger of extinction throughout all or a significant portion of its range.” *Id.* § 1532(6). Once listed as endangered, the ESA bans the import, transport, and sale of species with narrow exemptions. *Id.* § 1538(a)(1). These ESA protections are warranted to help prevent U.S. demand from driving this unique lizard’s pending extinction and to assist in the species’ ultimate recovery.

VII. Conclusion

The earless lizard is at risk of extinction throughout its range. The species is threatened by collection for the pet trade and habitat loss as the forests and healthy streams it relies on face threats from illegal logging. On top of these threats, climate change is likely to have an impact on the earless lizard because it is an island endemic with limited dispersal potential. Current regulatory mechanisms are not adequate to protect the earless lizard or its habitat, as researchers have reported population declines. Additionally, the species was assessed as Endangered by IUCN even after the species was listed under CITES Appendix II.

The United States is a driver of the market for the earless lizard and, following current trends, the species is likely to continue to gain popularity among reptile traders. The U.S. demand for exotic pets is a prominent force in the live wildlife trade, involving hundreds of millions of animals each year (Smith et al., 2017 p. 32). Some of the most imported species are reptiles, with close to 4,000 species of reptiles in the trade between 2000 and 2019 (Marshall et al., 2020 p. 2; Smith et

al., 2017 pp. 32-33). The demand for the live wildlife trade has been connected to the extirpation of reptile species from their type localities (Stuart et al., 2006 p. 1137). Experts believe the earless lizard is one species at risk of extinction and that intervention is needed to protect the species from further declines.

We are in a global extinction crisis with one million species headed toward extinction and millions more declining. Every time we lose a species, we lose the critical processes it maintains in its ecosystem and our natural systems unravel, impacting the wildlife and humans that depend on them. To lose the earless lizard would mean losing a key part of Borneo's coastal lowland ecosystems. Because protections in the range countries have not been sufficient to protect the species, consumer countries such as the United States must act to protect the species from extinction. We strongly urge the Service to swiftly list the earless lizard as endangered under the Endangered Species Act.

VIII. References

Please note that all references have been submitted on a jump drive and can also be found in this [Google Drive folder](#).

- Altherr, S., & Lameter, K. (2020). The rush for the rare: Reptiles and amphibians in the European pet trade. *Animals*, 10(11), 2085.
- Altherr, S., Schuller, A., & Fischer, A. (2016). Stolen Wildlife II—Why the EU Still Needs to Tackle Smuggling of Nationally Protected Species. *Pro Wildlife: Munich, Germany*, 36.
- Auliya, M., Altherr, S., Ariano-Sanchez, D., Baard, E. H., Brown, C., Brown, R. M., ... & Ziegler, T. (2016). Trade in live reptiles, its impact on wild populations, and the role of the European market. *Biological Conservation*, 204, 103-119.
- Irawan, Y.K. (2016). Paket Bertuliskan “Mie Ramin”, Isinya Biawak Tak Bertelinga (Packet Declared as Ramen Noodles Filled with Earless Monitor Lizards). *Kompas*.
<https://regional.kompas.com/read/2016/03/15/17180021/Paket.Bertuliskan.Mie.Ramen.Isinya.Biawak.T>. (Accessed September 21 2022).
- Arida, E., Al Ryzal, M. R., Syaripudin, M., Handayani, T. H., Amalia, R. L. R., Rachmatika, R., & Hamidy, A. (2018). Biawak Kalimantan, *Lanthanotus borneensis*: keberadaan di alam, kondisi habitat, dan pilihan pakan. In *Prosiding Seminar Nasional Konservasi dan Pemanfaatan Tumbuhan dan Satwa Liar*, Bogor, Indonesia.
- Arroyan, A. N., Arida, E., & Firdhausi, N. F. (2021). First Report on the Feeding Behavior of Earless Monitor, *Lanthanotus borneensis*, and its Predation on Rice Field Frog, *Fejervarya Limnocharis*, in a Captive Environment. *TREUBIA*, 48(2), 103-116.
- Bennett, D. (2014). A dubious account of breeding *Varanus olivaceus* in captivity at the paradise reptile zoo in Mindoro, Philippines. *Biawak*, 8(1), 12-14.
- Böhm, M., Collen, B., Baillie, J. E., Bowles, P., Chanson, J., Cox, N., ... & Mateo, J. A. (2013). The conservation status of the world's reptiles. *Biological conservation*, 157, 372-385.
- Borgelt, J., Dorber, M., Høiberg, M. A., & Verones, F. (2022). More than half of data deficient species predicted to be threatened by extinction. *Communications biology*, 5(1), 1-9.
- Borneo Bulletin (2022). Treasured Find in Green Jewel. Available at <https://borneobulletin.com.bn/treasured-find-in-green-jewel-2/>.
- Christensen, J.H., B. Hewitson, A. Busuioc, A. Chen, X. Gao, I. Held, R. Jones, R.K. Kolli, W.-T. Kwon, R. Laprise, V. Magaña Rueda, L. Mearns, C.G. Menéndez, J. Räisänen, A. Rinke, A. Sarr and P. Whetton, 2007: Regional Climate Projections. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M.

Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

CITES. (2015). Proposal for Consideration at CoP17: Proposal to List *Lanthanotus Borneensis* in Appendix I in Malaysia.

Cox, N., Young, B. E., Bowles, P., Fernandez, M., Marin, J., Rapacciuolo, G., ... & Xie, Y. (2022). A global reptile assessment highlights shared conservation needs of tetrapods. *Nature*, 605(7909), 285-290.

Curran, L. M., Trigg, S. N., McDonald, A. K., Astiani, D., Hardiono, Y. M., Siregar, P., ... & Kasischke, E. (2004). Lowland forest loss in protected areas of Indonesian Borneo. *Science*, 303(5660), 1000-1003.

De Rooij, N. (1915). The reptiles of the Indo-Australian archipelago. A. Asher.

Del Canto, Raul. (2013). Field observations on *Varanus macraei*. *Biawak*, 7(1), 18-20.

Eaton, J. A., Shepherd, C. R., Rheindt, F. E., Harris, J. B. C., Van Balen, S., Wilcove, D. S., & Collar, N. J. (2015). Trade-driven extinctions and near-extinctions of avian taxa in Sundaic Indonesia. *Forktail*, (31), 1-12.

Freund, C., Rahman, E., & Knott, C. (2016). Ten years of orangutan-related wildlife crime investigation in West Kalimantan, Indonesia. *American Journal of Primatology*, 79(11), 22620.

Gaveau, D. L., Sheil, D., Salim, M. A., Arjasakusuma, S., Ancrenaz, M., Pacheco, P., & Meijaard, E. (2016). Rapid conversions and avoided deforestation: examining four decades of industrial plantation expansion in Borneo. *Scientific reports*, 6(1), 1-13.

Gaveau, D. L., Sloan, S., Molidena, E., Yaen, H., Sheil, D., Abram, N. K., ... & Meijaard, E. (2014). Four decades of forest persistence, clearance and logging on Borneo. *PloS one*, 9(7), e101654.

Gibbons, J. W., Scott, D. E., Ryan, T. J., Buhlmann, K. A., Tuberville, T. D., Metts, B. S., ... & Winne, C. T. (2000). The Global Decline of Reptiles, Déjà Vu Amphibians: Reptile species are declining on a global scale. Six significant threats to reptile populations are habitat loss and degradation, introduced invasive species, environmental pollution, disease, unsustainable use, and global climate change. *BioScience*, 50(8), 653-666.

Hansen, M. C., Potapov, P. V., Moore, R., Hancher, M., Turubanova, S. A., Tyukavina, A., ... & Townshend, J. (2013). High-resolution global maps of 21st-century forest cover change. *science*, 342(6160), 850-853.

Harrison, T. (1963). Earless Monitor Lizards in Borneo. *Nature*, 198(4878), 407-408.

Harrison, T., & Haile, N. S. (1961). A rare earless monitor lizard from Borneo. *Nature*, 190(4782), 1213-1213.

- Janssen, J., & Chng, S. C. (2018). Biological parameters used in setting captive-breeding quotas for Indonesia's breeding facilities. *Conservation Biology*, 32(1), 18-25.
- 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 Ecology and Conservation*, 16, e00464.
- Intergovernmental Panel on Climate Change (IPCC), Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2021)*, <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at SPM-17.
- IUCN 2022. The IUCN Red List of Threatened Species. Version 2022-1. <<https://www.iucnredlist.org>>
- Iwata, T., Nakano, S., & Inoue, M. (2003). Impacts of past riparian deforestation on stream communities in a tropical rain forest in Borneo. *Ecological Applications*, 13(2), 461-473.
- Jinggut, T., Yule, C. M., & Boyero, L. (2012). Stream ecosystem integrity is impaired by logging and shifting agriculture in a global megadiversity center (Sarawak, Borneo). *Science of the Total Environment*, 437, 83-90.
- Koch, A., Ziegler, T., Boehme, W., Arida, E., & Auliya, M. (2013). Pressing problems: Distribution, threats, and conservation status of the monitor lizards (Varanidae: *Varanus* spp.) of Southeast Asia and the Indo-Australian Archipelago. *Herpetological Conservation and Biology*, 8(3), 1-62.
- Langner, C. (2017). Hidden in the Heart of Borneo – Shedding Light on Some Mysteries of an Enigmatic Lizard: First Records of Habitat Use, Behavior, and Food Items of *Lanthanotus borneensis* Steindachner, 1878 in its Natural Habitat. *Russian Journal of Herpetology*, 24(1).
- Law, Yao-Hua. (2021). In Malaysia's Johor, Forest Reserves Are Being Replaced with Gold Mines and Palm Oil Plantations. Pulitzer Center. Available at: <https://pulitzercenter.org/id/node/23366>
- Lee, R. J., Gorog, A. J., Dwiyaheni, A., Siwu, S., Riley, J., Alexander, H., ... & Ramono, W. (2005). Wildlife trade and implications for law enforcement in Indonesia: a case study from North Sulawesi. *Biological Conservation*, 123(4), 477-488.
- Lyons, J. A., & Natusch, D. J. (2011). Wildlife laundering through breeding farms: illegal harvest, population declines and a means of regulating the trade of green pythons (*Morelia viridis*) from Indonesia. *Biological Conservation*, 144(12), 3073-3081.
- Maisano, J. A., Bell, C. J., Gauthier, J. A., & Rowe, T. (2002). The osteoderms and palpebral in *Lanthanotus borneensis* (Squamata: Anguimorpha). *Journal of Herpetology*, 36(4), 678-682.

- Maulany, R. I., Mutmainnah, A., Nasri, N., Achmad, A., & Ngakan, P. O. (2021). Tracing Current Wildlife Trade: An Initial Investigation in Makassar City, Indonesia. *Forest and Society*, 277-287.
- McCurry, M. R., Mahony, M., Clausen, P. D., Quayle, M. R., Walmsley, C. W., Jessop, T. S., ... & McHenry, C. R. (2015). The relationship between cranial structure, biomechanical performance and ecological diversity in varanoid lizards. *PLoS One*, 10(6), e0130625.
- Measey, Mariah. "Indonesia: A Vulnerable Country in the Face of Climate Change," n.d., 15.
- Mebs, D., Lomonte, B., Fernández, J., Calvete, J. J., Sanz, L., Mahlow, K., ... & Zollweg, M. (2021). The earless monitor lizard *Lanthanotus borneensis*—A venomous animal?. *Toxicon*, 189, 73-78.
- Mendyk, R. W., Newton, A. L., & Baumer, M. (2013). A retrospective study of mortality in varanid lizards (Reptilia: Squamata: Varanidae) at the Bronx Zoo: Implications for husbandry and reproductive management in zoos. *Zoo Biology*, 32(2), 152-162.
- Mendyk, R., Shuter, A., & Kathriner, A. (2015). Historical notes on a living specimen of *Lanthanotus borneensis* (Squamata: Sauria: Lanthanotidae) maintained at the Bronx Zoo from 1968 to 1976. *Biawak*, 9(2), 44-49.
- Natusch, Daniel J. D., and Jessica A. Lyons. (2012) "Exploited for Pets: The Harvest and Trade of Amphibians and Reptiles from Indonesian New Guinea." *Biodiversity and Conservation* 21, no. 11: 2899–2911. <https://doi.org/10.1007/s10531-012-0345-8>.
- Newman, J. & Valentinus, A. (2005). *The Last Frontier: Illegal Logging in Papua and China's Massive Timber Theft*. Telapak: EIA.
- Nijman, V. (2019). Wildlife trade, CITES and the protection of marine molluscs in Indonesia. *Molluscan Research*, 39(3), 195-204.
- Nijman, V. (2021). Zoos consenting to the illegal wildlife trade—the earless monitor lizard as a case study. *Nature Conservation*, 44, 69-79.
- Nijman, V., Morcatty, T. Q., Feddema, K., Campera, M., & Nekarlis, K. A. I. (2022). Disentangling the Legal and Illegal Wildlife Trade—Insights from Indonesian Wildlife Market Surveys. *Animals*, 12(5), 628.
- Nijman, V., & Shepherd, C. R. (2009). Wildlife trade from ASEAN to the EU: Issues with the trade in captive-bred reptiles from Indonesia.
- Nijman, V., Shepherd, C. R., & Sanders, K. L. (2012). Over-exploitation and illegal trade of reptiles in Indonesia. *The Herpetological Journal*, 22(2), 83-89.
- Nijman, V., & Stoner, S. (2014). *Keeping an Ear to the Ground: Monitoring the Trade in Earless Monitor Lizards: A Rapid Assessment*. TRAFFIC Southeast Asia.

- Ocampo-Peñuela, N., Garcia-Ulloa, J., Kornecki, I., Philipson, C. D., & Ghazoul, J. (2020). Impacts of four decades of forest loss on vertebrate functional habitat on Borneo. *Frontiers in Forests and Global Change*, 3, 53.
- Rieppel, O. (1980). The postcranial skeleton of *Lanthanotus borneensis* (Reptilia, Lacertilia). *Amphibia-Reptilia*, 1(2), 95-112.
- Root, T. L., & Schneider, S. H. (2002). Climate change: overview and implications for wildlife. *Wildlife responses to climate change: North American case studies*, 10(2002), 765-766.
- Shetty, S. S. (2019). *Money Does Grow on Trees: Analyzing the Nexus of Forestry Crime and Money Laundering*. Georgetown University.
- Shepherd, C. R., Gomez, L., & Nijman, V. (2020). Illegal wildlife trade, seizures and prosecutions: A 7.5-year analysis of trade in pig-nosed turtles *Carettochelys insculpta* in and from Indonesia. *Global Ecology and Conservation*, 24, e01249.
- Smith, K. M., Zambrana-Torrel, C., White, A., Asmussen, M., Machalaba, C., Kennedy, S., ... & Karesh, W. B. (2017). Summarizing US wildlife trade with an eye toward assessing the risk of infectious disease introduction. *EcoHealth*, 14(1), 29-39.
- Steindachner, F. (1877). On two new genera and species of lizards from South America and Borneo. *Journal of Natural History*, 20(116), 160-160.
- Stoner S, Nijman V (2015) The case for CITES Appendix I – listing of earless monitor lizards *Lanthanotus borneensis*. *Traffic Bulletin* 27: 55–58.
- Stuart, B. L., Rhodin, A. G., Grismer, L. L., & Hansel, T. (2006). Scientific description can imperil species. *Science*, 312(5777), 1137-1137.
- Sweeney, B. W., Bott, T. L., Jackson, J. K., Kaplan, L. A., Newbold, J. D., Standley, L. J., ... & Horwitz, R. J. (2004). Riparian deforestation, stream narrowing, and loss of stream ecosystem services. *Proceedings of the National Academy of Sciences*, 101(39), 14132-14137.
- Sy, E. Y., & Lorenzo II, A. N. (2020). The trade of live monitor lizards (Varanidae) in the Philippines. *Biawak*, 14(1&2), 35-44.
- Tong, Sheryl Lee Tian. (2021). Fate of Malaysian forests stripped of protection points to conservation stakes. Mongabay. Available at: <https://news.mongabay.com/2021/10/fate-of-malaysian-forests-stripped-of-protection-points-to-conservation-stakes/>
- TRAFFIC. (2015). German National Arrested in Indonesia on Suspicion of Smuggling Earless Monitor Lizards. <http://www.traffic.org/home/2015/10/19/german-national-arrested-in-indonesia-on-suspicion-of-smuggl.html>. (Accessed September 21 2022).

Vergner, I. (2013). První nález varanovce bornejského ve východním Kalimantanu a další setkání se vzácným ještěrem. - *Živa*, Praha, 61(3): 131 - 133.

Yaap, B., Paoli, G. D., Angki, A., Wells, P. L., Wahyudi, D., & Auliya, M. (2012). First record of the Borneo Earless Monitor *Lanthanotus borneensis* (Steindachner, 1877) (Reptilia: Lanthanotidae) in West Kalimantan (Indonesian Borneo). *Journal of Threatened Taxa*, 4, 3067-3074.