CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Seventeenth meeting of the Conference of the Parties
Johannesburg (South Africa), 24 September – 5 October 2016

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Transfer of *Shinisaurus crocodilurus* from Appendix II to Appendix I according to the criteria A i), ii), iv) and v); criteria B i), iii) and iv) and criteria C i) and ii) of Resolution 9.24 (Rev. CoP16), Annex 1.

Qualifying Criteria (Conf. 9.24 (Rev. CoP16))

Annex 1 A: *The wild population is small, and is characterised by* ***at least one*** *of the following:*

i) an observed, inferred or projected decline in the number of the individuals or the area and quality of habitat;

ii) each subpopulation being very small;

iv) large short-term fluctuations in population size;

v) a high vulnerability to either intrinsic or extrinsic factors

The wild population of *Shinisaurus crocodilurus* with an inferred small size (according to the CITES' guidelines) of about 1050 individuals (China: 950 + Viet Nam: 100; Huang *et al.* 2008; van Schingen *et al.* 2014b) experienced marked historic declines, that were observed as ongoing (van Schingen *et al.* 2015; Zollweg 2011). Each of the subpopulations is very small, qualifying for a listing in Appendix I (section 4.2). In Viet Nam subpopulations undergo large short-term fluctuations of up to 200% within few years, which can quickly cause local extinction (van Schingen *et al.* 2014b + 2015). The wild population is additionally highly vulnerable to both, intrinsic factors (specialised niche requirements, high age at first maturity, strong sedentarism and low migration ability) and extrinsic factors (habitat degradation, loss and fragmentation) (Huang *et al.* 2008; Huang *et al.* 2014; van Schingen *et al.* 2014a, b + 2015).

Annex 1 B: *The wild population has a restricted area of distribution and is characterised by* ***at least one*** *of the following:*

i) fragmentation or occurrence at very few locations;

iii) a high vulnerability to either intrinsic or extrinsic factors;

iv) an observed, inferred or projected decrease in any one of the following:

- *the area of habitat;*
- *the number of subpopulations;*
- *the number of individuals;*
- *the quality of habitat*

The area of distribution is restricted to few very small and fragmented locations in Guangxi Autonomous region and Guangdong Province, China and Quang Ninh and Bac Giang Provinces, which prevents genetic exchange between subpopulations (Huang *et al.* 2008; Le and Ziegler 2003; Annex I, Fig. 1). *Shinisaurus crocodilurus* has vanished from several former localities, amongst others from all former sites in Hunan Province, China (Huang *et al.* 2008). In addition it was projected that all original habitats in China will be vanished by 2100 (Li *et al.* 2012). In Viet Nam a drastic decrease in habitat quality was observed during the last recent years (van Schingen *et al.* 2015).

Annex 1 C: *A marked decline in the population size in the wild, which has been:*

i) observed as ongoing or as having occurred in the past (but with potential to resume)

ii) inferred or projected on the basis of any of the following:

- *a decrease in area or habitat;*
- *a decrease in quality of habitat;*
- *levels or patterns of exploitation;*
- *a high vulnerability to either intrinsic or extrinsic factors*

Based on population estimations a marked historic decline in the wild Chinese subpopulation to about 15% of the baseline was inferred (Huang *et al.* 2008, section 4.4). Recent monitoring activities in China and Viet Nam describe an ongoing population decline (van Schingen *et al.* 2015; Zollweg 2011). Currently, detrimental levels of exploitation for the international pet trade and local consumption were observed, which are not sustainable for the wild population and trigger the species' consideration for Appendix I.

B. Proponents

China, the European Union and Viet Nam [*]

C. Supporting statement

1. Taxonomy

1.1 Class: Reptilia

1.2 Order: Sauria

1.3 Family: Xenosauridae

***Figure 1. Crocodile Lizard* Shinisaurus crocodilurus**

1.4 Genus, species or subspecies, including author and year: *Shinisaurus crocodilurus* Ahl, 1930

1.5 Scientific synonyms: -

1.6 Common names:
English: Crocodile Lizard, Chinese Crocodile Lizard
Chinese: 鳄蜥
Viet Namese: Thằn Lằn Cá Sấu
German: Krokodilschwanzechse, Krokodilschwanzhöckerechse
French: Lézard crocodile de Chine
Spanish: Lagarto cocodrilo chino

Trade Name: -

1.7 Code numbers:

[*] *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

2. Overview

A transfer from Appendix II to Appendix I is proposed for the Crocodile Lizard (*Shinisaurus crocodilurus*) in accordance with Article II.1 of the Convention and Res. Conf. 9.24 (Rev. CoP16). At the 7th meeting of the Conference of the Parties of CITES (CoP7; Lausanne, 1989), *Shinisaurus crocodilurus* was listed in Appendix II. Only recently the species has been classified as Endangered B1ab (ii, iii, iv, v), ver 3.1 in the IUCN Red List (Nguyen *et al.* 2014.).

Shinisaurus crocodilurus is the only living representative within the family of the Xenosauridae and was described in 1928 by Ahl (1930) from Guangxi (Kwangsi) Zhuang Autonomous Region, southern China. In 2002 it was discovered to also occur in North Viet Nam (Le and Ziegler 2003). First morphological and molecular comparisons revealed no significant taxonomic separation between the two extant subpopulations (Ziegler *et al.* 2008).

The total wild population size (~1050 individuals), as well as very small sizes of each subpopulation significantly fall below the qualifying criteria A for listing in Appendix I (section 4.2). The very small subpopulations in Viet Nam meet criteria A iv) in experiencing large short-term fluctuations, which make them especially prone to extinction.

The area of distribution is restricted to few very small and fragmented sites in southern China and Northern Viet Nam, meeting criteria B. Most of the remaining habitats are unmanaged and situated outside of protected areas (van Schingen *et al.* 2014a). In China, all original habitats are projected to vanish by 2100 as consequence of climate change (Li *et al.* 2012). As the result of recent field surveys in Viet Nam, a drastic decrease in habitat quality was observed by expanding mining areas, pollution of streams, increasing forest clearance, opening and fragmentation (van Schingen *et al.* 2014b + 2015). These remaining habitats are meanwhile entirely surrounded by cultivated and agricultural land, preventing genetic exchange between subpopulations (Annex I, Fig. 1).

According to criteria C, population analyses describe a marked historic decline of the subpopulation from China to about 15% of the baseline (section 4.4), while recent studies revealed an ongoing decrease in individual numbers in both range states (Huang *et al.* 2008; van Schingen *et al.* 2015; Zollweg 2011). Former localities in Hunan Province, China have already being extirpated (Huang *et al.* 2008). The major causes of the dramatic historic declines were attributed to detrimental levels of exploitation for the international trade and local consumption (Huang *et al.* 2008; Huang *et al.* 2014)

Shinisaurus crocodilurus has appealing characters that makes it extremely attractive for the pet market viz. its resemblance to a crocodile, its diverse colour pattern, its semiaquatic lifestyle and convenient size. Since 1985, a conspicuous and alarming rise in the international trade in the species and numerous illegal exports of the species were recorded (CITES 1990). Recent evidence and publications have shown that this species is offered on the international pet market in numbers that are not sustainable for the extremely small wild population (Facebook 2014; Huang *et al.* 2008; Huang *et al.* 2014; van Schingen *et al.* 2015).

The specific traits of *Shinisaurus crocodilurus* such as a high ecological specialization to remote mountainous forest streams, a relatively high age at first maturity, its strong sedentarism, as well as extrinsic factors namely forest clearance, opening and substitution, mining, pollution of streams and dam construction make the species highly vulnerable, referring to criteria A v), B iii) and C ii).

3. Species characteristics

3.1 Distribution

Shinisaurus crocodilurus occurs in the eastern part of the Guangxi (Kwangsi) Zhuang Autonomous Region, the western and northern parts of Guangdong Province in southern China and Bac Giang and Quang Ninh provinces in northern Viet Nam (Annex I, Fig. 1). The type locality is in Guangxi Province, China. *Shinisaurus crocodilurus* has an extremely restricted distribution, there are mainly two extant populations which are severely fragmented into multiple small areas. The following habitat sites with more than 10 km distance from each other are known for *Shinisaurus crocodilurus*:

1) Yen Tu Nature Reserve (NR) Uong Bi, Quang Ninh, Viet Nam (Le & Ziegler 2003)

2 Tay Yen Tu NR Son Dong, Bac Giang, Viet Nam (Hecht *et al.* 2013)

3) Dong Son-Ky Thuong NR, Hoanh Bo, Quang Ninh, Viet Nam (van Schingen *et al.* 2014)

4) Luoxiang, Dayaoshan NR, Jinxiu County, Guangxi Province, China (Huang *et al.* 2008)

5) Sanlian and Luoyi, Guiping County, Guangxi Province, China (Huang *et al.* 2008)

6) Datunxia and Bitan, Guiping County, Guangxi Province, China (Hunag *et al.* 2008)

7) Guxiu NR, Mengshan County, Guangxi Province, China (Huang *et al.* 2008)

8) Jiulong, Zhaoping County, Guangxi Province, China (Huang *et al.* 2008)

9) Dacaichong, Hezhou, Guangxi Province China (Huang *et al.* 2014)

10) Chishuichong, Hezhou, Guangxi Province China (Huang *et al.* 2014)

11) Deshengchong, Hezhou, Guangxi Province China (Huang *et al.* 2014)

12) Yusanchong, Hezhou, Guangxi Province China (Huang *et al.* 2014)

13) Miaobei chong, Luokeng, Guangdong Province, China (Huang *et al.* 2014)

14) Chishuikeng, Luokeng, Guangdong Province, China (Huang *et al.* 2014)

15) Dabeitou, Luokeng, Guangdong Province, China (Huang *et al.* 2014)

16) Shenkeng, Luokeng, Guangdong Province, China (Huang *et al.* 2014)

17) Luokeng NR, Quijang County, Guangdong Province, China (Huang *et al.* 2008)

18) Linzhouding NR, Maoming, Guangdong, China (Huang *et al.* 2014)

19) Luhunding NR, Maoming, Guangdong, China (Huang *et al.* 2014)

Furthermore, five subpopulations in China have apparently already being extirpated (Huang *et al.* 2008):

1) Guposhan in Jianghua County in Hunan Province

2) Hema, Wuxan County, Guangxi Province

3) Xiayi, Mengshan County. Guangxi Province

4) Guaon, Pignan County, Guangxi Province

5) Beituo and Yianhui, Zhaoping County

The area of occupancy (AOO) of the species was estimated to be 457 km² in China with a total density of 2.08 individuals per km² (Huang *et al.* 2008). In Viet Nam the extent of occurrence (EOO) is approximately 1500 km² (Nguyen *et al.* 2014).

3.2 Habitat

Shinisaurus crocodilurus inhabits tropical evergreen broadleaf lowland forests in southern China and northern Viet Nam at elevations between 180 to 1500 m above the sea level (Le and Ziegler 2003; Ning *et al.* 2009; van Schingen *et al.* 2014a; Wu *et al.* 2007; Zhao *et al.* 1999; Ziegler *et al.* 2008). This forest type has been substantially cleared in the region (Ziegler *et al.* 2003; Annex I, Fig. 1). *Shinisaurus crocodilurus* is a strict habitat specialist and lives in close association with pool sections of shallow and densely vegetated rocky streams with good water quality (Ning *et al.* 2006, van Schingen *et al.* in prep.). These specific streams are not evenly distributed throughout the last remaining forests, thus reduce the area available for *Shinisaurus crocodilurus* and effectively inhabited by it is therefore limited. The climate is characterized as monsoon tropical with annual

temperature ranges of 5-32°C in China and 12-30°C in Viet Nam (van Schingen *et al.* in prep.; www.wordclim.org). Species distribution modelling (SDM's) by van Schingen *et al.* (2014a) revealed that the extent of suitable habitats throughout the distribution range of the species is minor and suitable habitats are often situated outside protected areas.

3.3 Biological characteristics

Shinisaurus crocodilurus is a diurnal semiaquatic lizard species that generally shows few activities, according to Zhang (2006) taking up only 1.5% of the day. Crocodile Lizards usually spend most of the time resting motionless on tree branches above the water level from where they can be easily collected. If disturbed, the species escapes into the water, where it can remain up to 30 minutes without breathing (Ning *et al.* 2006; van Schingen *et al.* in prep.; Zollweg and Kühne 2013). Territory sizes were reported to range only from 6.5 – 11.6 m² and daily distances covered by the lizards are around 5.74 m, thus migration ability of the species to alternative sites is very limited (Long *et al.* 2007). *Shinisaurus crocodilurus* generally reaches maturity at two to four years (Zollweg and Kühne 2013), while cases of only 13 months had been observed in captivity (Yoshimi and Uyeda 2011). The species is lecithotrophic viviparous and gives birth to 2-12 juveniles after a period of pregnancy of about 9-11 months, which occurs within the water (D. Doelle, pers. comm., 2013; Z. Wu in litt., 2014; Zhang 2006; Zollweg and Kühne 2013). In China, birth takes place in April or May (Zollweg and Kühne 2013; Z. Wu in litt., 2014), while gravid females were still observed in July in Viet Nam (van Schingen *et al.* in prep). In China the species hibernates from October to March, when temperatures drop to 5-13°C (Zhao *et al.* 1999). In Viet Nam temperatures remain moderate (11-18°C) during winter and hibernation of the species was not observed, yet.

3.4 Morphological characteristics

The species' epithet is related to two rows of enlarged tubercles on the dorsal tail surface, resembling a crocodile. These tubercles, present on the whole dorsal body surface are osteoderms, which are also found in crocodiles giving *Shinisaurus crocodilurus* a very primeval appearing and unique look. Furthermore Crocodile Lizards can be identified by the following diagnostic characters: 16–21 supralabials, 1–2 bordering scales; dorsal surface of head covered with several small and rough or keeled scales; supraorbitals 1–2 rows of larger and 2–3 rows of smaller scales; supraciliars small, but distinct; bilateral, sharp ridge at the head; 10–16 enlarged infralabials, 3–5 bordering scale rows; distinct collar scales of 9–12 smooth or hardly keeled scales; ventrals large, smooth and rhombic in 12–15 longitudinal and 31–42 transversal rows (26–27 after Ahl 1930 and 28 after Fan 1931); enlarged precloacal scales; tail with 36–45 whorls (Ahl 1930; Fan 1931; Ziegler *et al.* 2008). Adult animals reach lengths of about 40 cm, in exceptional cases up to 50.5 cm (Zhao *et al.* 1999; Wölfel 2003). Field surveys in the natural habitat in Viet Nam revealed an average adult total length of 34.6 cm (n = 29; max = 42 cm; van Schingen pers. obs. 2013). Based on field observations, body weights of wild individuals were in general lower than those of captive ones (79-154 g vs. 100-400 g; van Schingen pers. obs. 2013; Wölfel 2003). At birth juveniles are weigh three to five grams and have a total length of 10–13 cm (Zollweg and Kühne, 2013). Concerning coloration Crocodile Lizards exhibit diverse patterns ranging from cream or yellow to light red, vivid red, vivid blue or grey. Juveniles generally have a triangular yellowish coloured dorsal snout surface, which gets lost after some month. The combination of various colour patterns and its primeval morphological traits make the species very attractive for the pet market.

3.5 Role of the species in its ecosystem

Shinisaurus crocodilurus feeds on diverse terrestrial and aquatic invertebrates including worms, caterpillars, insects, spiders and crustaceans, but also on small lizards, seeds, tadpoles and frogs (Brever *et al.* 2005; Huang *et al.* 2008; Zhao *et al.* 1999; Ziegler *et al.* 2008; Zollweg and Kühne 2013). Although *Shinisaurus crocodilurus* will take mice and frogs in captivity (D. Doelle pers. comm. September 2014) and is able to catch small fish (van Schingen, pers. obs; Zollweg and Kühne, 2013), the preferred prey organisms within its natural habitat are invertebrates of low trophic levels, such as worms and larvae (Le and Ziegler 2003; van Schingen 2014). According to preliminary stable isotope analyses, *Shinisaurus crocodilurus* occupies a relatively low trophic level, compared to sympatric vertebrates (van Schingen 2014), accordant to its passive foraging mode: Crocodile lizards are "sit and wait" predators, reacting mainly to visual triggers (Zollweg and Kühne 2013). *Shinisaurus crocodilurus* co-occurs with other water associated lizards (e.g., *Physignathus cocincinus* or *Tropidophorus* spp.) (van Schingen pers obs. 2014; Zollweg and Kühne 2013). Towards conspecifics it is reported to be territorial and aggressive in captivity (Zollweg and Kühne 2013). Due to the strict association to streams with good water quality, *Shinisaurus crocodilurus* might serve as a bioindicator

species for ecosystem health and its presence can be relevant for the identification of priority areas for conservation.

4. Status and trends

4.1 Habitat trends

Habitats of *Shinisaurus crocodilurus* are continuously declining in both range states, China and Viet Nam (Huang *et al.* 2008; Huang *et al.* 2014; van Schingen *et al.* 2014b). Due to timber logging, forest fires and substitution of forest with more profitable plants the preferred forest type has been extensively cleared and fragmented throughout the species distribution range (Huang *et al.* 2008; Huang *et al.* 2014; van Schingen *et al.* 2014b). In Viet Nam the subpopulations are entirely surrounded by cultivated land, prohibiting the migration of the species to other sites (van Schingen *et al.* 2014b). Mining, small-scale dam constructions and pollution are adding to the degradation of the species' habitats (Huang *et al.* 2008; Huang *et al.* 2014; Tordoff *et al.* 2000; van Schingen *et al.* 2014b; Annex I, Fig. 3). Touristic and religious sites situated close to some of the habitats are rapidly developing and contribute to the destruction of (e.g., by building roads) and a more easy accessibility to (e.g., by cable cars to the top of the mountains) the once remote habitats of *Shinisaurus crocodilurus* in Yen Tu NR, Viet Nam (van Schingen *et al.* 2015). According to a niche model approach, suitable habitats were found to be small, isolated and fragmented (van Schingen *et al.* (2014a; Annex I, Fig. 2), while only a minor portion (1.74% in China and 0.15% in Viet Nam) lies within designated protected areas (van Schingen *et al.* 2014a; Annex I, Fig. 2). A future projection by Li *et al.* (2012) revealed that all original habitats of *Shinisaurus crocodilurus* in China will be lost in the period of 2081–2100 as consequence of climate change.

4.2 Population size

Due to the species strong association to specific streams, population estimates can be conducted pointedly using a modified capture recapture method (Huang *et al.* 2008; van Schingen *et al.* 2014b). In China, the last population estimation based on eight subpopulations in 2004 revealed a number of 950 individuals (Huang *et al.* 2008). In Viet Nam, van Schingen *et al.* (2014b) estimated a population size of less than 100 individuals split into three subpopulations in 2013, indicating a total population size of around 1000 individuals. Subpopulations in China were estimated to comprise 10-350 individuals (in average 119 individuals per subpopulation), respectively (Huang *et al.* 2008). The last recent estimate of a single Chinese subpopulation in 2009 in Daguishan NR revealed 150-200 individuals (Zollweg 2011), while numbers of mature individuals were ranging from 17 to 22 individuals within the subpopulations from Viet Nam (van Schingen *et al.*, 2014b). In China, *Shinisaurus crocodilurus* was found in densities of 1.04-10.29 individuals per km² (Huang *et al.* 2008). Densities in Viet Nam were ranging from 1-28 individuals per km² of eight inhabited streams (van Schingen *et al.* 2014b).

4.3 Population structure

The wild subpopulation of *Shinisaurus crocodilurus* in Viet Nam consists of relatively high numbers of juveniles and young adults, but only of few old adults. Juveniles represent with 47.6% the highest portion of the subpopulation (van Schingen *et al.* 2014b). However, abundances of offspring are varying significantly among the three investigated sites (57.5%, 8.3% and 9.1%, respectively). Since *Shinisaurus crocodilurus* reaches sexual maturity only after three years in the wild, the survival during this period is crucial for the maintenance of its wild population (Zhang 2006; Yu *et al.* 2009). Even though reproduction occurs still successfully, the survival rate of *Shinisaurus crocodilurus* seems to be restricted, accordant with capture recapture data (van Schingen *et al.* 2014b).

The age structure of the subpopulations in China might be similar, for example approximately 50% of observed animals in the Daguishan NR were younger than two years (Zollweg 2011).

4.4 Population trends

People's Republic of China

Estimated total population densities in China were about 6,000 individuals in 1978 and dramatically decreased to about 2,500 individuals in 1990, when the species was included in CITES Appendix II (Huang *et al.* 2008). Subsequently, the legal exports of *Shinisaurus crocodilurus* dropped drastically

(Mägdefrau 1997). Nevertheless the estimated size of the Chinese population decreased to only 950 individuals in 2004, even though two newly discovered sites in 2004 were included in this estimation (Huang *et al.* 2008). In total, population reductions of 70%, 80% and 90% were recorded between 1978 and 2004 at single sites in China and five subpopulation even vanished completely (Huang *et al.* 2008, see section 3.1). Recent research revealed that *Shinisaurus crocodilurus* is facing extinction at most sites, except of the monitored population in Daguishan NR in China (Zollweg 2014).

Socialist Republic of Viet Nam

Regarding the subpopulations in Viet Nam, van Schingen *et al.* (2014b) estimated a total number of 100 individuals and a number of nearly 60 mature individuals, distributed at three sites in 2013. At one of these sites a 73% decrease of encountered individuals to only one adult per stream was recorded from 2013 to 2014 by van Schingen *et al.* (2015). Since *Shinisaurus crocodilurus* is strongly sedentary further reproduction and maintenance of the species is assumed to be constrained at this site. Drastic short term fluctuations in magnitudes up to 200% were recently also recorded single sites (van Schingen *et al.* 2014b + 2015). Especially in extremely small subpopulations such high fluctuations can promptly cause local extinction. The known subpopulations are severely fragmented due to the lack of connecting suitable habitats (Annex I, Fig. 1) and genetic exchange is thus limited.

Local villagers reported that *Shinisaurus crocodilurus* was found in large abundances until some years ago, while they meanwhile did not observe any individuals any more at some places in China (Huang *et al.*, 2008) and Viet Nam (van Schingen *et al.* 2015).

4.5 Geographic trends

5. Threats

Shinisaurus crocodilurus populations suffer serious threats from commercial harvest, consumption and habitat loss, while illegal international and national trade is regarded as the greatest threat to the species (Huang *et al.* 2008; van Schingen *et al.* 2014b + 2015).

People's Republic of China

In China, *Shinisaurus crocodilurus* is exploited for the pet trade, but also for the use in the traditional Chinese medicine and as food (Herpin and Zondervan 2006; Huang *et al.* 2008; Nguyen *et al.* 2014; www.torontozoo.com, assessed 12 October 2014). Poaching for the pet trade is regarded a major cause of dramatic population declines and is still relevant (Huang *et al.* 2008; Lau *et al.* 1997; van Schingen *et al.* 2015; Zollweg 2014). Live animals are frequently recorded to be sold on Chinese pet markets or shops, while the selling of dried specimens is only reported sporadically (Huang *et al.* 2008; Kadoorie farm and Botanic garden, 2004; Lau *et al.* 1997; Li and Wang 1999; Zollweg 2014). Local villagers commonly caught about 50 specimens per day to make money, until the population declined too much (Huang *et al.* 2008). The increasing application of electro-fishing, as well as the use of poison for fishing, is also threatening *Shinisaurus crocodilurus* (Huang *et al.* 2008). Specimens, inadvertently caught during electro-fishing are regularly sold on Chinese markets (Zollweg 2011). In addition, ongoing habitat destruction due to the substitution of broadleaf forest by more profitable plants for agricultural purpose, timber logging, water pollution caused by mining and small-scale dam construction are further severe threats to *Shinisaurus crocodilurus* in China (Huang *et al.* 2008; Huang *et al.* 2014).

Socialist Republic of Viet Nam

In Viet Nam, overharvesting of *Shinisaurus crocodilurus* for the pet trade is currently regarded as the major threat, while there is few evidence for the sporadic local use of the species in the traditional medicine (Le and Ziegler 2003; T.Q. Nguyen pers. obs. 2008; van Schingen *et al.* 2014b + 2015, see section 6.4). Based on field observations by van Schingen *et al.* (2014b) habitat destruction, alteration and pollution due to timber logging, forest burning and substitution for commercial use are additional major threats, which are constantly increasing (Annex I, Fig. 3). Meanwhile remaining habitats are entirely surrounded by agricultural or cultivated land (Annex I, Fig. 1), limiting the migration of *Shinisaurus crocodilurus* to alternative sites. Furthermore, coal-mining activities are degrading core habitats of the Crocodile Lizard in Tay Yen Tu NR (van Schingen *et al.* 2014b). Moreover, the application of electro-fishing by local villagers in habitats of *Shinisaurus crocodilurus* was recorded for the first time in 2014 by van Schingen *et al.* (2015),

while encounter rates with the lizards at respective sites dropped about 73% from 2013-2014 (see section 4.4). Habitats that were once remote became easy accessible due to the building of roads or cable cars.

6. Utilization and trade

6.1 National utilization

People's Republic of China

The use of *Shinisaurus crocodilurus* in the traditional Chinese medicine can likely be traced back for several hundred years (Nguyen *et al.*, 2014; torontozoo.com, assessed 12 October 2014). Due to its low activity pattern, *Shinisaurus crocodilurus* was traditionally believed to act as a cure for insomnia (Herpin and Zondervan 2006; Hoffmann 2006; Nguyen *et al.* 2014). The selling of dried specimens on Chinese markets was recorded by Li and Wang (1999). The consumption of *Shinisaurus crocodilurus* as food was reported for China (Herpin and Zondervan 2006; Huang *et al.* 2008; Zollweg 2009).

Socialist Republic of Viet Nam

In Viet Nam *Shinisaurus crocodilurus* was sold soaked in alcohol and there is evidence for the sporadically use of the species for traditional medicine and as potency remedy (van Schingen *et al.* 2014b; van Schingen *et al.* 2015). The consumption of *Shinisaurus crocodilurus* as food has not been reported for Viet Nam, so far (Herpin and Zondervan 2006; Huang *et al.* 2008; Zollweg 2009).

6.2 Legal trade

Trade in *Shinisaurus crocodilurus* on a regional scale took frequently place in the range countries until quite recently, while the international pet trade in the species likely started in Hong Kong (CITES 1990; Huang *et al.* 2008; Huang *et al.* 2014; Kadoorie Farm and Botanic garden 2004, Lau *et al.* 1997, Li and Wang 1999; Le and Ziegler 2003; van Schingen *et al.* 2015; Zollweg 2012). Between 1985 and 1987 a number of 342 individuals were re-exported from Hong Kong to Europe and the USA (CITES 1990). When first specimens officially entered the trade in Germany in 1985 they were still sold for relatively high prices of DM995 ~ $595.63 (CITES 1990), while rather cheap prices of $25 were recorded from a pet shop in the USA in 1987 (Hoffmann 2006). After being included in CITES Appendix II in 1990 the international trade in *Shinisaurus crocodilurus* switched almost entirely (~97%) to allegedly captive-bred specimens (UNEP-WCMC 2013; van Schingen *et al.* 2015; see Annex II, Fig. 1). Since then international trade in a scale of 39 ± 87 living individuals per year was recorded (Annex II, Fig. 1). Of 850 recorded animals the majority (97%) were traded for “commercial” and only 2% and 1% for “personal” and “zoo” purposes, respectively (UNEP-WCMC 2013; Annex II, Fig. 1). According to the LEMIS Database of the U.S. Fish & Wildlife Service, imports to or exports from the USA constantly increased from zero to 32 specimens between 2010 and 2013 (M. Auliya, in litt. 2015).

In non-range states the trade in *Shinisaurus crocodilurus* currently has shifted almost entirely to internet platforms (van Schingen *et al.* 2015; Annex II, Tab. 1, Fig. 2). Simultaneously, an increasing demand, which is meanwhile exceeding the supply of *Shinisaurus crocodilurus* is recorded and currently even experienced wholesalers reportedly undergo extreme difficulties to obtain specimens (Annex II Tab. 1, Fig. 2; van Schingen *et al.* 2015). Pet shop prices from 2014 were ranging from €250-499 ~ $230-560 per specimen in Europe and $650-1125 in the USA (Annex II, Fig. 3). Frequently *Shinisaurus crocodilurus* is found on reptile fairs e.g., offered for €150 (juvenile) - €600 (adult) on the reptile fair in Hamm, Germany in 2014 (BfN in litt. 2014; www. terraristik.com; see Annex II, Tab.1).

No legal pet trade in *Shinisaurus crocodilurus* has been reported from Viet Nam, yet (UNEP-WCMC 2013).

6.3 Parts and derivatives in trade

Shinisaurus crocodilurus have been traded mostly as living specimens. However, there is evidence of trade in dried animals as well as with specimens soaked in alcohol (Li and Wang 1999; van Schingen *et al.* 2014b + 2015).

6.4 Illegal trade

People's Republic of China

In China, concrete evidence exists that poaching for the trade is still the most serious threat to *Shinisaurus crocodilurus* (Huang *et al.* 2014; Zollweg 2011). Illegal collectors frequently encouraged local people to hunt *Shinisaurus crocodilurus* for about RMB10-1000 ~ $1.61-161.25 per specimen (Huang *et al.* 2008). Illegal exports were recorded for the first time during the 1980s to Taiwan (Huang *et al.* 2008), while the first illegal export of *Shinisaurus crocodilurus* to Europe is reported from 1982 from Hong Kong to Germany. According to oral communication, another organization shortly afterwards exported a further 400 individuals from Hong Kong and sold them for $15.000 each. Between 1984 and 1986 the illegal sale of 3.300 animals from Guangxi Autonomous Region, China was reported (CITES 1990). Even though the international trade in *Shinisaurus crocodilurus* shifted to allegedly captive bred individuals after the species' inclusion on CITES Appendix II in 1990, it is assumable that the trade in wild caught specimens is still relevant and the mislabelling as captive bred takes place, which is a common case (Nijman and Shepherd 2009; TRAFFIC 2011; TRAFFIC 2012; van Schingen *et al.* 2015). As an example a German dealer claimed to have received three of numerous illegally imported wild caught Crocodile Lizards in 2003 (pers. comm.). Between 2007 and 2008, 104 individuals of *Shinisaurus crocodilurus* were seized at the border Japan customs (Kanari and Auliya 2011). At that time the species was also offered at three Japanese pet shops for YEN 42.000-78.000 (~ $357-662) (Kanari and Auliya 2011). *Shinisaurus crocodilurus* was further observed in pet shops in Kuala Lumpur (West-Malaysia) between 2006 and 2009, even though no export to or import from Malaysia was recorded (M. Auliya in litt., 2015; UNEP-WCMC 2013). Individuals with unknown origins were observed on the reptile fair in Hamm, Germany in November 2014 and further specimens were already announced for the next fair in 2015 by a dealer from Hong Kong (van Schingen pers. obs., December 2014; www.terraristik.com).

Socialist Republic of Viet Nam

In Viet Nam, the national pet trade in *Shinisaurus crocodilurus* is currently increasing (van Schingen *et al.* 2015). The local sale of the species as "baby crocodiles" for prices of $6-20 per individual was repeatedly observed at a religious site (Yen Tu temple) between 2002 and 2008 (Le and Ziegler 2003; T.Q. Nguyen pers. obs., May 2008). Since 2013, numerous adult specimens from Viet Nam have been offered on several internet platforms for $17-280 depending if offered to locals or foreigners, while proper breeding facilities are apparently lacking. One dealer reportedly had 97 individuals for sale in 2014, while local people confirmed that most of the numerous animals, which suddenly appeared in the pet market were wild caught" (van Schingen *et al.* 2015). Even though legal export permits are lacking, *Shinisaurus crocodilurus* from Viet Nam were observed to be sold under the table on the reptile fair in Hamm in 2014 (M. Zollweg pers. comm., October 2014; UNEP-WCMC 2013).

In addition, a number of 19 live *Shinisaurus crocodilurus* were seized at the border between Thailand and Cambodia in 2014. They had been caught in Viet Nam by a Vietnamese citizen, who wanted to sell them for $30 per specimen on the "Chatuchak Weekend Market" in Bangkok, Thailand (Robin des Bois 2014). Uncovered cases of smuggling are assumed to occur much more frequently.

6.5 Actual or potential trade impacts

The dramatic population decline of *Shinisaurus crocodilurus* during the last decades was attributed to excessive over-exploitation, which is exceeding the impact of habitat destruction on the species by far (Huang *et al.* 2008; Kadoorie Farm and Botanic garden 2004, Lau *et al.* 1997, Li and Wang 1999; Zhang 1987).

Between 1978 and 2004, poaching of *Shinisaurus crocodilurus* was assumed to have caused a population decline of more than 80% and the extirpation at some sites in China (Huang *et al.* 2008). In 1999 local people were still able to catch more than 50 specimens per day to make money, this has become impossible since 2004 (Huang *et al.* 2008). Meanwhile *Shinisaurus crocodilurus* is facing extinction at most sites, while poaching is still being recorded (Zollweg 2014).

A similar situation is currently going on in Viet Nam, since specimens from Viet Nam were recorded in the online trade in numbers outweighing wild population sizes (van Schingen *et al.* 2015). With the sudden appearance in the pet trade, the encounter rate of mature individuals in the natural habitats

drastically decreased from 2013 to 2014 in Viet Nam (van Schingen *et al.* 2015, see section 4.4). Regarding the slow life-history traits of *Shinisaurus crocodilurus* the populations' recovery from harvesting is rather difficult. The current high demand among hobbyists in non-range states for new "bloodlines" and wild caught individuals with the typical colour patterns of Vietnamese specimens-increases the pressure on the remaining diminished subpopulations and also strengthens the interest of locals to trade in the species internationally. There is evidence that specimens from Viet Nam already illegally entered the international pet market.

Due to an observed drastic decrease of adult individuals at some of the habitat sites in Viet Nam mentioned in scientific publications along with locality data, it can be assumed that detailed information about the species, including locality data is being misused by poachers, which makes it extremely difficult and delicate to share comprehensive information or research results.

7. Legal instruments

7.1 National

People's Republic of China

Shinisaurus crocodilurus has been listed as the first category on the "List of the Protected Species of Wildlife of China" in 1989 (Huang *et al.* 2008).

Socialist Republic of Viet Nam

At the end of 2013 the species has been proposed to the Ministry of Agriculture and Rural Development (MARD) to be also listed in the governmental decree of Viet Nam (T. Q. Nguyen pers. comm.). However, this legislative document is still under consideration for approval.

According to Decision 186/2006/QDTTg (25.09.2006: Prime Minister on Forest Management Regulations) and Decree No 117/2010/ND-CP (24.12.2010: Government on Structure, Organization and Management of specially used Forest Systems in Viet Nam) the hunting and trapping of animals – including the crocodile lizard – in core zones of protected areas is prohibited. Furthermore, the crocodile lizard is included in the management list of Circular No 47/20/12/TT-BNNPTNT of the Ministry of Agriculture and Rural Development which stipulates that any hunting, trapping or collecting activities require permission from the local Forest Ranger Department, only granted if no detrimental impact on the respective species is to be expected.

7.2 International

The species is listed in CITES Appendix II (EU-Regulation 338/97, Annex B) since 1990.

8. Species management

8.1 Management measures

People's Republic of China

Since 2009, a conservation program for *Shinisaurus crocodilurus* in China, including the establishment of a breeding station in the Daguishan NR, China, the protection of core habitats, scientific research and workshops for local residents by the Guangxi Normal University, Guilin has been supported by the "Zoologische Gesellschaft für Arten- und Populationsschutz e.V." (ZGAP) (Zollweg 2011). Collaboration projects across geo-political boundaries were planned during the first conference for the protection of *Shinisaurus crocodilurus* in 2011 in China to strengthen the success of conservation efforts. First trials of reintroduction actions took place in Luokeng NR, China and are also planned at other sites (Zhang 2006; Zollweg 2011).

A studbook for *Shinisaurus crocodilurus* to establish a genetically stable captive population exists in Europe and North America (Zollweg 2014; Zollweg and Kühne 2013).

Socialist Republic of Viet Nam

In Viet Nam, a conservation and long-term monitoring program including the establishment of a reserve population at the Me Linh station for Biodiversity and the training of keepers was initiated in 2010 by the Institute of Ecology and Biological Resources (IEBR), Vietnam and the Cologne Zoo, Germany (Ziegler 2015). In the near future, active reintroduction of *Shinisaurus crocodilurus* in Viet Nam is planned, given that respective sites are under local protection (van Schingen *et al.* in prep.). Regular monitoring activities in Viet Nam add to control poaching, while individual marking of specimens allows the identification of respective individuals, which potentially could reach the pet trade (see section 8.2). An awareness campaign in close collaboration with the Forest Protection Department (FDP) of Bac Giang Province was initiated by the Cologne Zoo and the IEBR to raise awareness also at the local-authority level (Ziegler 2015). Furthermore, the conservation program on *Shinisaurus crocodilurus* was issued during workshops at local universities, schools, museums and zoos, on a conference in Quang Ninh Province 2014 and treated in different kinds of national and international media (van Schingen *et al.* 2015).

The following further recommendations were pronounced for improved management: laws to punish the illegal collection and the consumption and use for traditional medicine; the set up of more nature reserves within the habitat range and an upgrade of existing reserves; improved ranger work and the redirection of logging roads and mining areas around the core zones of the species' habitats; a stable captive reserve population and the restocking of wild populations; the development of sustainable ecological and religious tourism in the areas of distribution and a more comprehensive genetic comparison to clarify the conservation status and importance of single and extant subpopulations (Huang *et al.* 2008; van Schingen *et al.* 2014b).

8.2 Population monitoring

People's Republic of China

In China, wild populations have been monitored intermittently since 1978 (Huang *et al.* 2008; Zollweg 2011), with the last comprehensive study in 2004 (Huang *et. al.* 2008). Since then, a managed subpopulation in Daguishan NR is regularly studied in terms of a conservation program of the Guangxi Normal University and the ZGAP (Zollweg 2011). Concrete evidence exists that the monitored site currently comprises the single relatively stable subpopulation in China (Zollweg 2014). During the first conference for the protection of *Shinisaurus crocodilurus* in China in November 2011 measures for similar monitoring activities of other Chinese subpopulations were discussed (Zollweg 2012).

Socialist Republic of Viet Nam

In Viet Nam, monitoring of *Shinisaurus crocodilurus* was initiated in 2010 in Tay Yen Tu NR. Since 2013, the species is monitored annually at all known sites in Viet Nam for a period of two to three months in the course of a conservation project of the Cologne Zoo, Germany and the IEBR, Vietnam and in the interest of the FPD of Bac Giang Province (van Schingen *et al.* 2014b; Ziegler 2015). Specimens are marked individually to capture information on abundances, long term population dynamics, demography, migration behaviour, home range and dispersal on spatial and temporal scales. Furthermore, the markings allow the potential identification of specimens, reaching the pet market.

8.3 Control measures

8.3.1 International

In addition to CITES, there are no other international control measures for the species.

8.3.2 Domestic

The species has different levels of protection in China and Viet Nam (see section 7.1. and 7.2 National and International Legal Instruments). Both countries are CITES signatories, but effective implementation of CITES provisions depends on the countries provisions and management of CITES-implementing legislation. In Viet Nam *Shinisaurus crocodilurus* is not listed in the decree yet, however the collection of the species without respective permits and

the immediate selling is illegal and fined. Strict law enforcement by the Chinese government to ban the illegal trading, consumption and the use of *Shinisaurus crocodilurus* as traditional medicine are still lacking (Huang *et al.* 2008).

Monitoring of subpopulations in both range countries is implemented and contributes to control poaching at these sites (see section 8.1 and 8.2). The marking of specimens with microchips in Viet Nam is a further control measure (see section 8.2). This action aims to monitor the collection of respective specimens from the wild. In addition, increased ranger work is planned by the FDP of Bac Giang Province, Viet Nam and awareness raising and education efforts take place in both range countries.

8.4 Captive breeding and artificial propagation

In 2012 around 70 individuals (several from zoological gardens) were registered in the European studbook for *Shinisaurus crocodilurus*, which aims to establish a genetically stable captive population, to collect and share essential information on the species and to establish collaborations with conservation projects in the range countries (www.studbooks.eu; Zollweg and Kühne 2013). In a respectively managed program of North America, 115 individuals were recorded in 22 institutions in December 2010. With respect to zoological gardens, 217 individuals are currently kept in 45 institutions, whereof two are in Asia, 16 in Europe and 27 in North America (www.zootierliste.de; assessed 18.02.2014). While only few institutions keep more than four individuals, the Philadelphia Zoo, USA and the Zoo Dresden GmbH, Germany keep the highest numbers (28 and 23, respectively) of *Shinisaurus crocodilurus*.

Artificial breeding stations for *Shinisaurus crocodilurus* in range countries were established in Luokeng NR and Daguishan NR in China and at the Me Linh Station for Biodiversity in Viet Nam (Huang *et al.* 2008; Ziegler 2015; Zollweg 2012). In non-range states, a large community of hobbyists especially from Germany and the USA is currently keeping *Shinisaurus crocodilurus* (van Schingen *et al.* 2015). The mortality rate of the species in captivity was relatively high in 1988 (CITES 1990), while difficulties in breeding the species or cases of whole litters dying are still reported, occasionally (anonymous dealer pers. comm. 2014; van Schingen *et al.* 2015). However, the breeding of *Shinisaurus crocodilurus* is globally archiving increasing success due to rising knowledge on the species' specialist ecology.

8.5 Habitat conservation

People's Republic of China

In China, only three of the known habitats of *Shinisaurus crocodilurus* are situated within protected areas (Luokeng NR, Daguishan NR and Linzhouding NR, van Schingen *et al.* 2014a). Concrete microhabitat conservation took place in Daguishan NR, where core areas were protected from commercial use via lease agreements between operators of commercial forest farms and scientists of Guangxi Normal University (Zollweg 2012). The respective site meanwhile comprises a relatively stable subpopulation (Zollweg 2011). First negotiations to also protect habitats outside of the nature reserve were recently initiated (Zollweg 2012). The implementation of similar approaches at other sites was discussed on the first conference for the protection of *Shinisaurus crocodilurus* in November 2011 (Zollweg 2012).

Socialist Republic of Viet Nam

In Viet Nam all known subpopulations are situated within or in buffer regions of protected areas (Tay Yen Tu NR, Yen Tu NR, Dong Son-Ky Thuong NR), but forest clearance and coal-mining activities still take place and endanger the maintenance of the subpopulations (van Schingen *et al.* 2014b). For effective habitat conservation in Viet Nam, an awareness campaign has been initiated by the Cologne Zoo, Germany and the IEBR, Vietnam. A brochure and poster pointing to improved habitat conservation were developed and placed at the provincial FPD's, high schools, universities, ranger stations, offices of communes and villages surrounding the nature reserves (Ziegler 2015). A follow up petition letter was sent to several agencies (Ministry of Agriculture and Rural Development of Viet Nam, The Peoples's Committee of Bac Giang Province, The Peoples's Committee of Quang Ninh Province, Viet Nam Administration of Forestry, Viet Nam Environment Administration, Ministry of Natural Resources and Environment of Viet Nam, Viet Nam Academy of Science and Technology), recommending amongst others the upgrade of the protection status of Tay Yen Tu NR, the control of

coal mining activities in the core zones of the three nature reserves and the development of sustainable ecological and religious tourism in the region.

8.6 Safeguards

9. Information on similar species

Shinisaurus crocodilurus is the only recent representative within the family of the Xenosauridae. There are no similar species.

10. Consultations

Given the restricted distribution of *Shinisaurus crocodilurus* to China and Viet Nam, the two range states agreed to propose the transfer of *Shinisaurus crocodilurus* from Appendix II to Appendix I, together with the EU and its Member States.

11. Additional remarks

None.

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Status and trends

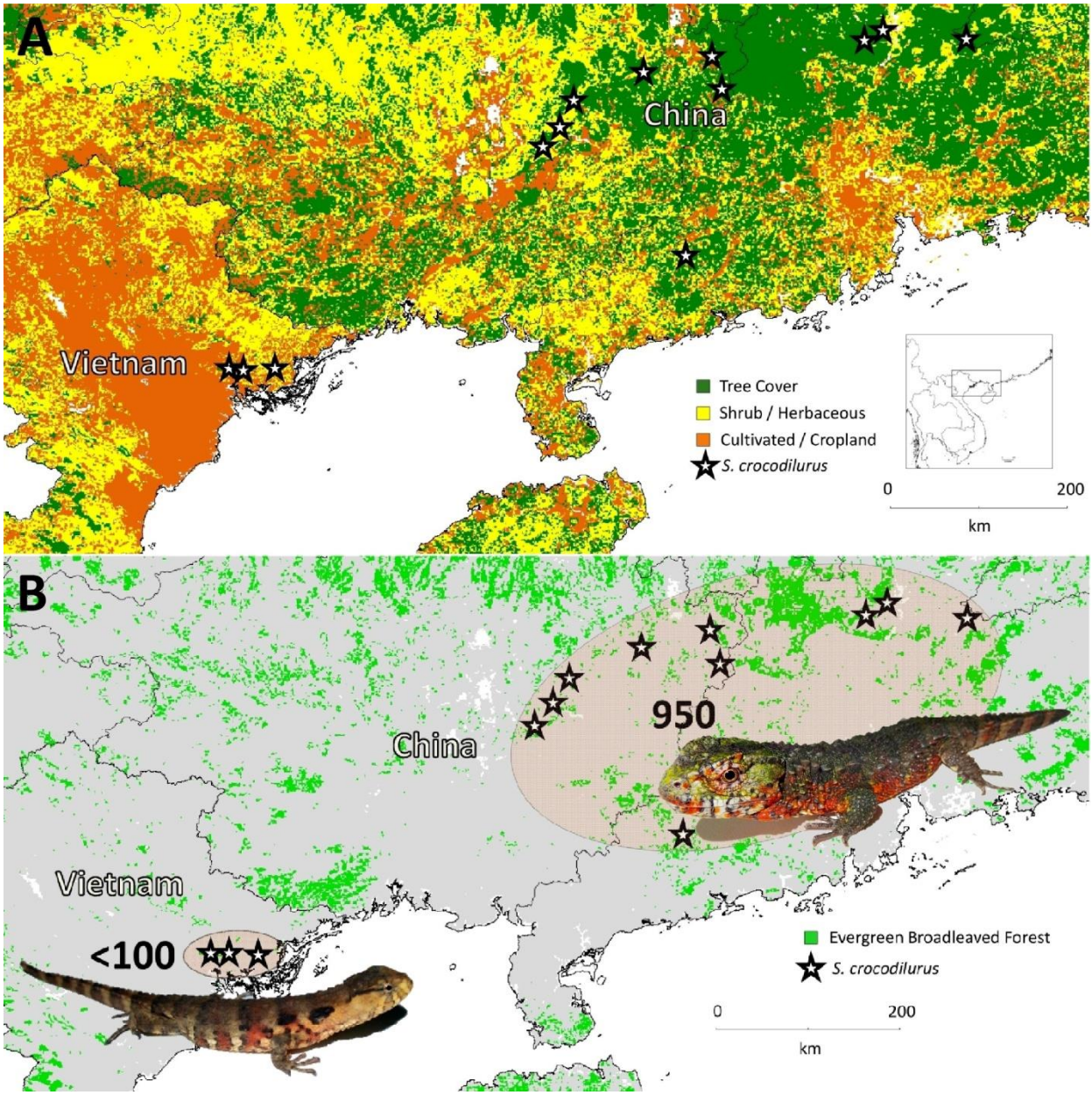

Figure 1. A: Actual occurrence records of *Shinisaurus crocodilurus* being entirely surrounded by cultivated and agricultural land in Viet Nam. Locality records derived from own field surveys and from literature (van Schingen *et al.*, 2014a, Huang *et al.*, 2014); B): Estimated wild population size of *Shinisaurus crocodilurus* in China and Viet Nam. Estimates derived from Huang *et al.* 2008 and van Schingen *et al.* 2014b, respectively. Photos M. van Schingen and T. Ziegler. Graphic obtained from van Schingen *et al.* (2015).

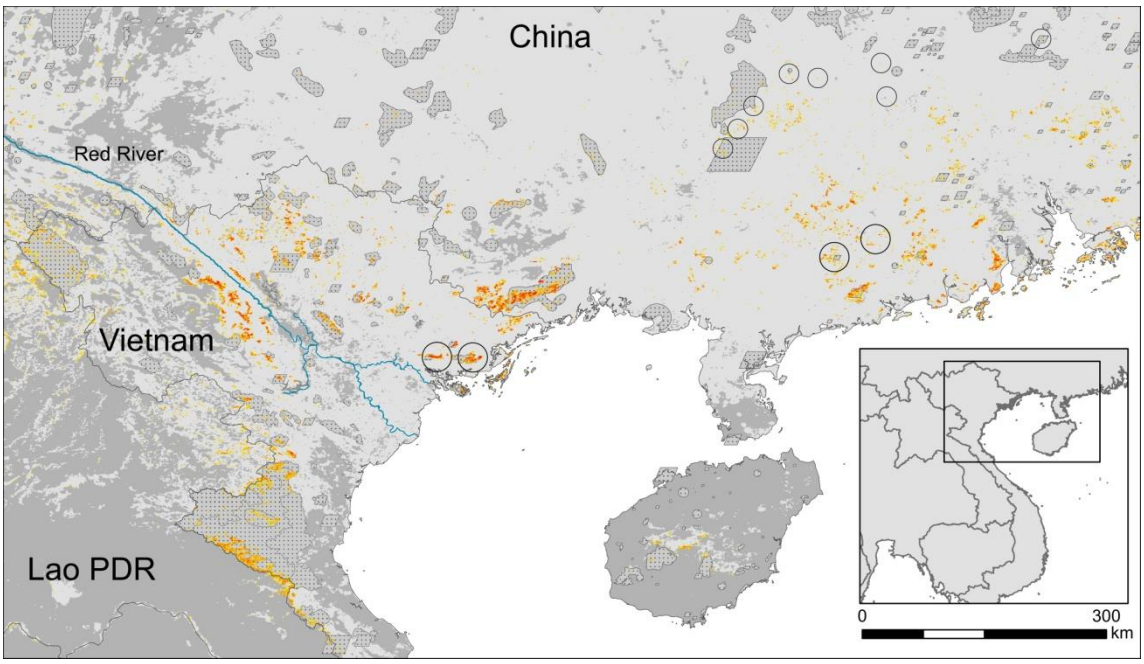

Figure 2. Potential distribution of *Shinisaurus crocodilurus.* Occurrence records of *S. crocodilurus* are displayed as black circles, with potential habitat suitability ranging from low (yellow) to high (red), coverage with designated reserves (stippled polygons). For dark grey areas, no predictions could be made, as environmental conditions exceed the training range of the SDM. Only vague locality information is displayed in order to protect remnant populations. Obtained from van Schingen *et al.* (2014a).

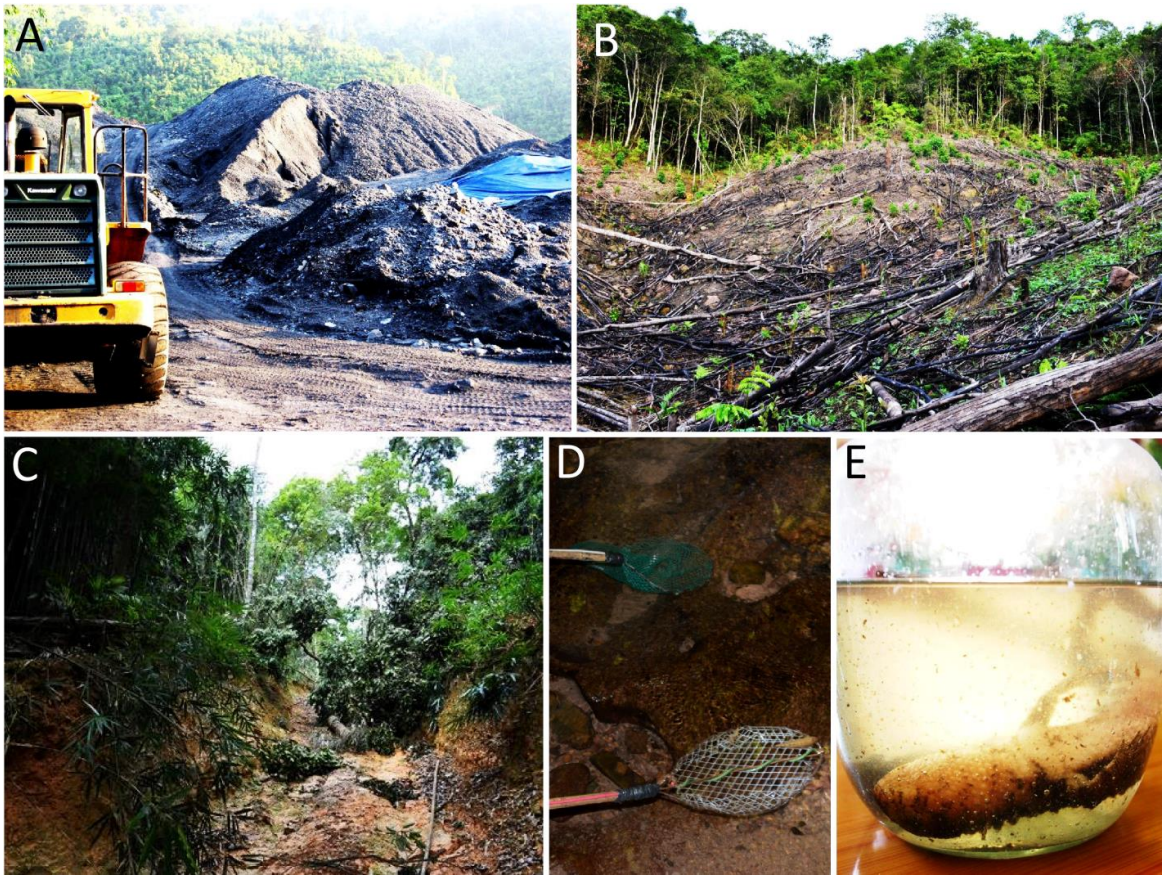

Figure 3. Threats to *Shinisaurus crocodilurus*: A) Coal-mining; B) Forest burning, clearance and for agricultural purpose or substitution with more profitable plants; C) Fragmentation and increase of accessibility of once remote habitats due to e.g., building of roads; D) Electro-fishing and E) use of *S. crocodilurus* in traditional medicine or for food. Photos taken within remaining habitats of *S. crocodilurus* in Viet Nam by M. Bernardes and M. van Schingen.

Trade

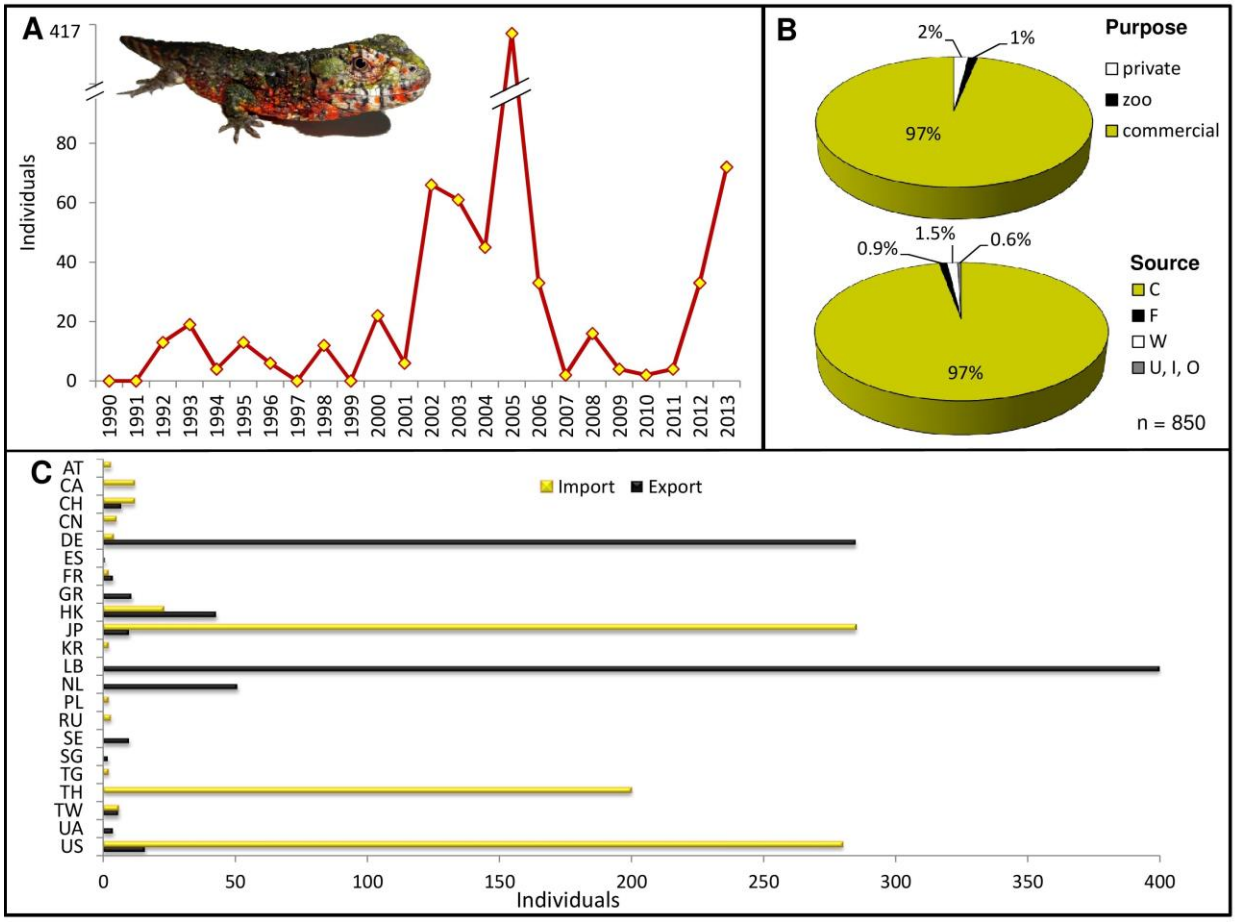

Figure 1. International trade in *Shinisaurus crocodilurus* from 1990-2013 according to the UNEP-WCMC CITES database. A: Annual volumes of imports and exports of live specimens; B: Portions of purposes of trading animals and sources (C = captive bred, F = captive born, W = wild caught, U = unknown, I = confiscated ore seized, O = Pre-convention); C: Volumes of imports and exports per country (AT = Austria, CA = Canada, CH = Switzerland; CN = China, DE = Germany, ES = Spain, FR = France, GR = Greece, HK = Hong Kong, JP = Japan, KR = Korea, LB = Lebanon, NL = Netherlands, PL = Poland, Ru = Russian Federation, SG = Singapore, TG = Togo, TH = Thailand, TW = Taiwan Province of China, UA = Ukraine, US = United States of America). Obtained from van Schingen *et al.* (2015).

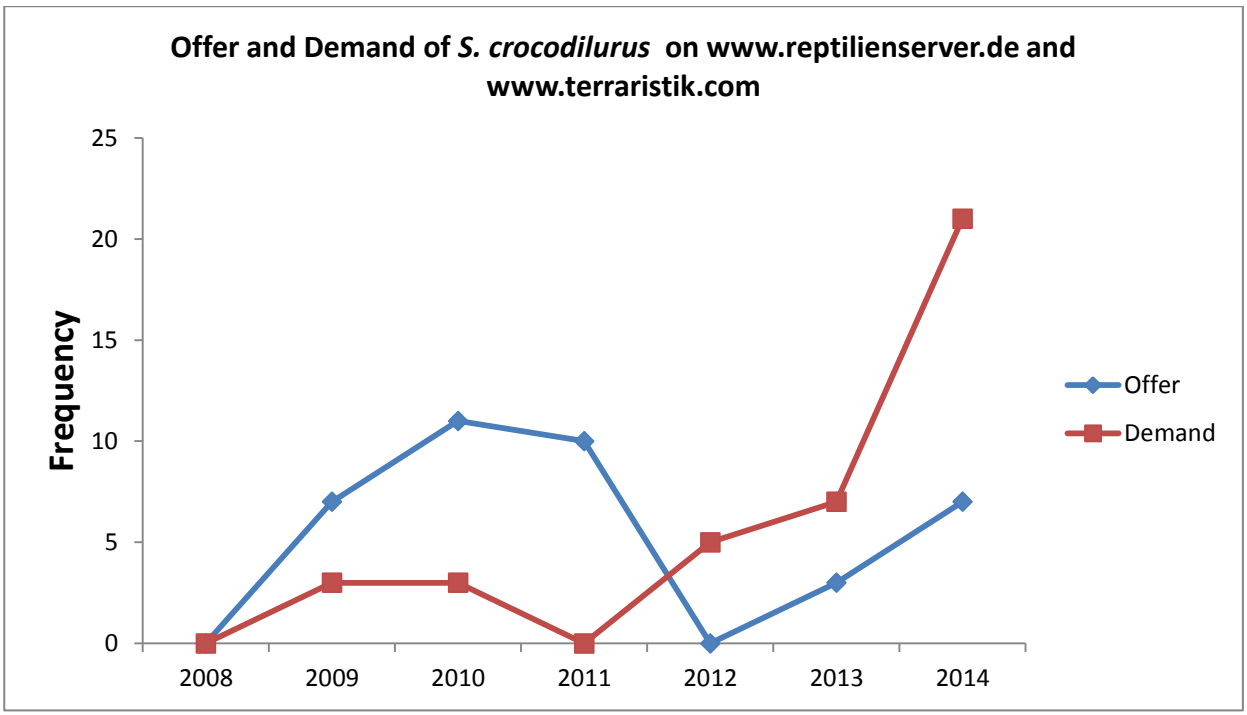

Figure 2. Trends of offer and demand of *Shinisaurus crocodilurus* between 2008 and 2014 on www.reptilienserver.de and www.terraristik.com.

Table 1. Recent adverts of trade in *Shinisaurus crocodilurus* based on internet surveys and interviews with dealers.

Date	Country	Kind of trade	No. of individuals	Cost	Purpose	Source	Comment
28.02.2015	Germany	offer		299-499 €	Shop	www.terra-tropiczoo.de	Small for 299€ and big for 499€
24.02.2015	Germany	demand			private	www.terrarsitik.com	
03.02.2015	Belgium	demand			private	www.terrarsitik.com	
29.01.2015	Germany	offer		350 €	Shop	www.terraristik.com	NZ 2014, transfer at the reptile fair in Dortmund, Germany possible
28.01.2015	France	offer		395 €	Shop	http://www.lftshop.com/shinisaurus-crocodilurus,fr,4,SHICRO.cfm	
20.01.2015	Netherlands	offer			private		CB 11-2014,available for Hamm
18.01.2015	China	offer			private	www.terraristik.com	Available for Hamm
14.01.2015	Germany	demand			private	www.terraristik.com	several
13.01.2015	Viet Nam	offer		250-280 $	private	Facebook	
13.01.2015	Germany	demand	0.1		private	Facebook	
2015	Germany	offer		490 €	Shop	http://www.tropicfauna.de	
30.12.2014	Germany	offer	0.1		private	www.terraristik.com	CB 1989
30.11.2014	Germany	offer	1.1		private	www.terraristik.com	
28.12.2014	Germany	demand			private	www.terraristik.com	adult groups
21.12.2014	Slowakia	demand			private	www.terraristik.com	handover in Dresden or Amsterdam possible
17.12.2014	Slowakia	demand			private	www.terraristik.com	handover in Dresden or Amsterdam possible
13.12.2014	Spain	offer		300 €	shop	Pers. comm.	
05.12.2014	Germany	demand			private	www.terraristik.com	
13.12.2014	Germany	offer	20 adults	300 €	private	Pers. comm.	20 adults
19.11.2014	Germany	offer		250 €	Shop	Pers. comm.	
14.11.2014	Germany	offer		250 €	Shop	www.tropenparadies.org/	
04.11.2014	Germany	offer	0.0.1		private	www.terraristik.com	CB 2014
3.11.2014	Germany	offer	0.0.3		private	www.terraristik.com	CB (2009, 2010, 2011)
30.10.2014	Austria	demand			private	www.terraristik.com	everything; handover in Hamm
28.10.2014	Belgium	offer	2.0	350 €	private	www.terraristik.com	CB 2005

Date	Country	Kind of trade	No. of individuals	Cost	Purpose	Source	Comment
				both			
05.10.2014	Germany	offer	1.3	1,500 €	private	www.terraristik.com	
26.09.2014	Netherlands	demand			private	www.terraristik.com	5 animals all ages
12.09.2014	Germany	demand			private	www.terraristik.com	Female
20.08.2014	Germany	demand			private	www.terraristik.com	
20.08.2014	Germany	offer	3.3	600 € pair		Price list reptile fair Hamm, Germany	
06.08.2014	Germany	demand			private	www.reptilienserver.de	Sex not important
23.07.2014	Spain	demand			private	www.terraristik.com	
23.07.2014	Germany	demand			Shop	www.terraristik.com	Female
14.07.2014	Germany	demand			private	www.reptilienserver.de	Male
09.07.2014	USA	offer		750 $ + shipping	Shop	Facebook	Juveniles
08.07.2014	Germany	offer			private	www.terraristik.com	CB 2013
07.07.2014	Germany	offer			private	Pers. comm.	
06.07.2014	Germany	demand			private	www.terraristik.com	Adults
06.07.2014	Spain	demand			private	www.terraristik.com	
16.06.2014	Germany	demand			private	www.terraristik.com	
16.06.2014	Germany	demand			Shop	www.terraristik.com	Adults
01.06.2014	USA	offer		650 $ + shipping	Shop	Facebook	Juveniles
30.04.2014	Germany	demand			Shop	www.terraristik.com	
22.04.2014	Germany	demand			private	www.terraristik.com	Female
10.03.2014	Germany	demand			private	www.terraristik.com	
05.03.2014	Germany	demand			Shop	www.terraristik.com	
25.02.2014	Spain	demand			private	www.terraristik.com	
2014	UK	offer	2.2	495 £ each or 950 £ pair	private	www.reptilienserver.de	
2014	Viet Nam	offer			Shop	Facebook	

Date	Country	Kind of trade	No. of individuals	Cost	Purpose	Source	Comment
2014	UK	offer	2.2	495 £ each or 950 £ pair	private	http://www.preloved.co.uk	
15.12.2013	Germany	offer	0.0.7		private	www.reptilienserver.de	
08.12.2013	Germany	offer	0.0.1	150 €		Price list reptile fair Hamm, Germany	
20.11.2013	Russia	offer			Private	www.terraristik.com	
23.10.2013	Viet Nam	offer		180-200 $	Shop	Facebook	
22.10.2013	USA	offer	1.1	2,250 $ both	Shop	Facebook	
22.10.2013	USA	offer	1.2	3,000 $ all + shipping	Shop	Facebook	
16.10.2013	USA	offer	0.0.2	1100 $	Shop	Facebook	
17.10.2013	Belgium	demand			private	www.terraristik.com	Females and juveniles
10.10.2013	Ukraine	demand	1.1		private	www.terraristik.com	
05.07.2013	Viet Nam	offer		15-25 €	Shop	Facebook	
06.06.2013	Denmark	demand			private	www.terraristik.com	Female
05.06.2013	Netherlands	demand	0.2.0		private	www.terraristik.com	
28.03.2013	Austria	demand	0.2		private	www.terraristik.com	
09.03.2013	UK	demand			private	www.terraristik.com	
06.03.2013	USA	demand			Shop	www.terraristik.com	
11.02.2013	Germany	offer			Shop	www.terraristik.com	CB 2011/2012
08.02.2013	USA	offer	1.0	650 €	private	www.faunaclassifieds.com	
23.12.2012	USA	offer	1.0	1000 $	private	www.faunaclassifieds.com	
23.02.2012	France	demand			private	www.terraristik.com	
27.10.2012	France	demand			private	www.terraristik.com	
23.10.2012	France	demand			private	www.terraristik.com	
22.10.2012	Germany	demand	0.0.10		Shop	www.terraristik.com	
16.09.2012	Spain	demand			private	www.terraristik.com	
01.12.2012	UK	demand			private	www.reptileclassifieds.co.uk	
25.01.2012	USA	demand			private	www.faunaclassifieds.com	

Date	Country	Kind of trade	No. of individuals	Cost	Purpose	Source	Comment
20.11.2011	Germany	offer		75 € - 95€	private	www.markt.de	CB 2011
08.08.2011	Germany	offer			private	www.reptilienserver.de	Several
08.08.2011	Germany	offer	1.2		private	www.reptilienserver.de	CB 2006
26.05.2011	Germany	offer	4.4		private	www.reptilienserver.de	CB 2011
15.04.2011	Germany	offer	0.2	500 € both	private	www.reptilienserver.de	
01.04.2011	Germany	offer			private	www.reptilienserver.de	Several CB 2011
23.03.2011	Germany	offer	1.0		private	www.reptilienserver.de	CB 2003
13.03.2011	Germany	offer			private	www.reptilienserver.de	CB 2010
05.02.2011	Germany	offer	0.0.12		private	www.reptilienserver.de	
22.01.2011	Germany	offer			private	www.reptilienserver.de	
09.01.2011	Germany	offer			private	www.reptilienserver.de	
26.12.2010	Germany	offer			private	www.reptilienserver.de	
09.12.2010	Germany	offer			private	www.reptilienserver.de	Adults
06.12.2010	Netherlands	offer	0.0.5		private	www.reptileclassifieds.co.uk	CB 2009
03.12.2010	Germany	offer			private	www.reptilienserver.de	CB 2010
17.11.2010	Switzerland	demand			private	www.reptilienserver.de	
14.08.2010	Germany	offer	1.1.5		private	www.reptilienserver.de	CB 2003, 2006, 2008, 2010
25.06.2010	Austria	offer	1.1	600 € both	private	www.reptilienserver.de	CB 2008
03.06.2010	Germany	offer		150 €, 230 €	private	www.reptilienserver.de	CB 2008, 2010
14.05.2010	Germany	offer	1.2	1000 € all	private	www.reptilienserver.de	
01.05.2010	Germany	offer	0.0.2	500 € both	private	www.reptilienserver.de	CB 2007
19.03.2010	Germany	demand			private	www.reptilienserver.de	CB 2008 2010
17.03.2010	Germany	offer		230, 150 €	private	www.reptilienserver.de	CB
21.02.2010	Germany	offer			private	www.reptilienserver.de	
15.01.2010	Austria	offer	2.2		private	www.reptilienserver.de	
03.01.2010	Germany	demand			private	www.reptilienserver.de	

Date	Country	Kind of trade	No. of individuals	Cost	Purpose	Source	Comment
08.12.2009	Germany	offer		450 €	private	www.reptilienserver.de	CB 2002
11.11.2009	Germany	offer			private	www.reptilienserver.de	CB 2008
12.09.2009	France	demand			private	www.reptilienserver.de	All
04.09.2009	Germany	offer	0.1		private	www.reptilienserver.de	
04.09.2009	Germany	offer			private	www.reptilienserver.de	CB 2009
04.09.2009	Germany	offer			private	www.reptilienserver.de	CB 2008
04.09.2009	Germany	offer			private	www.reptilienserver.de	CB 2009
04.09.2009	Germany	offer	0.1		private	www.reptilienserver.de	CB 2008
04.09.2009	Germany	demand	1.1		private	www.reptilienserver.de	
04.09.2009	Germany	demand			private	www.reptilienserver.de	
01.07.2009	USA	offer			Shop	Youtube	
20.10.2006	USA	offer		700 $	private	www.faunaclassifieds.com	

Figure 3. Online adverts of *Shinisaurus crocodilurus* for sale of a German (left) and a French (right) pet shop (assessed January 2015).