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

Eighteenth meeting of the Conference of the Parties
Colombo (Sri Lanka), 23 May – 3 June 2019

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Inclusion of *Echinotriton chinhaiensis* (Chang, 1932) and *Echinotriton maxiquadratus* Hou, Wu, Yang, Zheng, Yuan, and Li, 2014, both of which are endemic to China in Appendix II, in accordance with Article II, paragraph 2 (a) of the Convention and satisfying Criterion B in Annex 2a of Resolution Conf. 9.24 (Rev. CoP17). The international trade of these two newts should be monitored to minimise the impact of illegal hunting driven by international pet trade or collection on the survival of these two critically endangered species.

B. Proponent

China*:

C. Supporting statement

1. Taxonomy

1.1 Class: Amphibia

1.2 Order: Caudata

1.3 Family: Salamandridae

1.4 Genus, species or subspecies, including author and year:

There are three known species in the genus *Echinotriton*. The proposal includes the two species that are endemic to China *Echinotriton chinhaiensis* (Chang, 1932) and *Echinotriton maxiquadratus* Hou, Wu, Yang, Zheng, Yuan, and Li, 2014 into Appendix. *Echinotriton andersoni* (Boulenger, 1892) is not included in this proposal.

1.5 Scientific synonyms:

Echinotriton chinhaiensis: *Tylototriton chinhaiensis* Chang, 1932; *Tylototriton* (*Echinotriton*) *chinhaiensis*; *Pleurodeles chinhaiensis* (Chang, 1932); *Pleurodeles* (*Tylototrion*) *chinhaiensis*

1.6 Common names:

English:

(1) *E. chinhaiensis*: Chinhai Spiny Newt, Chinhai Spiny Crocodile Newt
(2) *E. maxiquadratus*: Mountain Spiny Newt, Mountain Spiny Crocodile Newt

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* *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.*

French:

Spanish:

Chinese:

(1) *E. chinhaiensis*: 镇海棘螈 zhèn hǎi jí yuán
(2) *E. maxiquadratus*: 高山棘螈 gāo shān jí yuán

1.7 Code numbers: N/A

2. Overview

Chinese Spiny Newts, the *E. chinhaiensis* and the *E. maxiquadratus* are endemic to China, both of which could be found in a limited number of sites in coastal areas in the east and southeast mainland China. *E. chinhaiensis* lives in low hills in the east of Ningbo City in Zhejiang Province, whereas *E. maxiquadratus* lives in low depressions near the top of the mountain in northeast Guangdong Province. Both newts are critically endangered, with the extremely narrow distribution, low population sizes and highly fragmented habitats. Adults are mainly terrestrial, nocturnal, and very slow moving which are easy to be poached as targets. These two species are late-maturing and long-lived. They reproduce once every year, and the hatching rate of eggs and the survival rate of larvae are low. Moreover, the females have strict and special requirement of spawning microhabitat in the wild.

E. chinhaiensis and *E. maxiquadratus* are the most endangered species in Caudata in Asia. Adults of *E. chinhaiensis* are estimated about 300 from capture-recapture surveys during 1997-1999. In 2008, there was a decline in its annual reproduction mainly due to weather disasters like typhoons in 2007 and freezing in 2008. Recent surveys have shown that the number of nests of eggs found each year varies over 2015-2018. The population is still being estimated and monitored, and the size should be stable compared to 20 years ago. The population in its type locality has gone vanished. For *E. maxiquadratus*, only six breeding ponds, about ten individuals and a few larvae have been found in field surveys from 2011 to 2016.

Chinese Spiny Newts remain in the area with the dense population of human beings and heavy human activity, which may benefit from their extremely small and seclusive populations. As a result, their survival will be devastating by targeted poaching and natural disasters. Together with the illegal collection, agricultural and forest industry, the human activities and pollution, habitat destruction, fragmentation and the loss of reproductive ponds are threatening the survival of these two Chinese Spiny Newts in the wild. Although there have been a few records of the selling in Hongkong SAR and Japan, considering the extremely small population size, any level of poaching or illegal trade might induce population crisis for these two newts.

E. chinhaiensis is the wildlife under second class state protection of China since 1989. The hunting and killing, and the buying, selling and utilisation of this animal and its products are prohibited in China. The habitats of this species are also under protection according to the *Law of the People's Republic of China on the Protection of Wildlife*. Habitats of this species are covered by nature reserves that the hunting and collecting of the wild population of this species are forbidden according to the *Regulations on the Nature Reserves of the People's Republic of China*.

The Chinese government, scientists and local communities have made many efforts in protecting *E. chinhaiensis*. Scientific researches, population monitoring and habitat protection, have been conducted for this species for decades. The inclusion of these two species in Appendix Ⅱ of CITES and regulating its international trade help to combat poaching and smuggling. We hope these two species will be better protected under the combination of international enforcement, domestic policy and local protection.

3. Species characteristics

3.1 Distribution

These two newts are endemic to China which could only be found in low hills in coastal areas and subalpine regions in the east and southeast mainland China (Frost, 2018). *E. chinhaiensis* is known only from Beilun and Yinzhou District in Ningbo City, Zhejiang Province (Fei et al.,2006). The type locality of *E. maxiquadratus* is in the northeast Guangdong Province (Hou et al., 2014; Hernandez, 2017).

3.2 Habitat

The genus *Echinotriton* occurs in forested habitats at low-to mid-elevations, in highly humid, subtropical conditions (Hernandez et al., 2017). *E. chinhaiensis* appears at the edge of the subtropical deciduous-evergreen broad-leaved forest, bamboo thickets and crop planting areas in little hills at lower elevations (100-200 m asl), with many ponds no more than 50 cm deep (Fei, 1992; Fei et al., 2006). *E. maxiquadratus* inhabits the subtropical evergreen broad-leaved forest in low depressions near the top of the mountain at moderate elevations (1145−1450 m asl). Depressions are covered with dense tall grasses and Sedge plants. Marshland and lentic ponds intersperse in depressions. The mean depth of the ponds is 6-10 cm (Hou et al., 2014; Hernandez, 2017). (Annex 1, Fig. 2).

3.3 Biological characteristics

E. chinhaiensis was firstly named as *Tylototriton chinhaiensis* which was discovered and described by Mengwen Zhang in 1932. The holotype was lost during the Second World War. The live animals had not been found after the discovery for the next 50 years. Until 1978, Chinhai Spiny Newts was re-discovered in timberland in Ningbo city. New holotypes were then assigned and described and named as *E. chinhaiensis* (Cai and Fei, 1984). *E. maxiquadratus* was discovered and described in 2014, which was very similar in morphology with *E. chinhaiensis*.

Adult *E. chinhaiensis* are terrestrial. They are inactive during the day and very slow moving when active. At night, they come out for food, including snails, ground beetles, centipedes and earthworm. When being disturbed, the adults usually display defensive behaviour with their body straightening, all their four limbs, head and tail curling upward and only the abdomen of the ground. The larvae are aquatic and live in the ponds. When the larvae complete the metamorphosis, they come to the land. They hibernate at the end of November. Until fully mature, after hibernation adults head to the spawning habitats; and April is probably the peak breeding time. Females lay eggs once and lay about 60-70 eggs each year. Eggs are laid in the grasses and fallen leaves on wet slopes of about 20-100 cm above ponds. It takes ten days for the larvae to lose their balance sticks and incubation to be completed in 20-29 days. They then would jump or be washed into the ponds by rainwater for further development. Metamorphosis is completed within a year. Only 20% of larvae come to the ponds in the field, and the survival rate of larvae after metamorphosis is only 36.7% in captive groups of *E. chinhaiensis* (Xie et al., 2001; 2002). Observations of captive animals suggest that the species is late-maturing, and long-lived with lifespans at least 20 years (Fei et al., 2006; Fei and Ye, 2016; Xie, 1999; Sparreboom and Xie, 2001a, 2001b; Xie and Gu, 2004; Xie et al., 2000, 2001, 2002).

E. chinhaiensis and *E. maxiquadratus* are similar in biological characteristics, especially in the reproductive biology that restricts the population development, like the low fecundity, the special and strict demand of spawning microhabitat and low reproductive success. Adult *E. maxiquadratus* are terrestrial, which eat earthworms, harvestmen, and millipedes (Hou et al., 2014; Hernandez et al., 2017; Hernandez, 2017; Zhou et al., 2016). The mating season concentrates from May to July. The female lays eggs once and lays 42 eggs on average each year. Eggs are laid on earth with fallen leaves which are 30-110 cm far from the shallow ponds where the larvae live (Hernandez, 2017; Zhou et al., 2016). They reproduce once each year and lay fewer eggs than *E. chinhaiensis*, moreover, both the fecundity and survival rate of larvae are low (Fei, 1992).

3.4 Morphological characteristics

As one of the primitive newts, the key to genus *Echinotriton* compared to other genera of Salamandridae are: quadrate with the lateral hook-like process; head and body obviously wide and flat and tail short and weak. *Echinotriton* can be differentiated from members of *Tylototriton* by having sharp-tipped ribs that penetrate the enlarged dorsolateral warts (do not penetrate in *Tylototriton*) and relatively large eggs deposited on land (eggs deposited in water in *Tylototriton*) (Hou et al. 2013). The *E. andersoni* which is not included in this proposal and distributed in the Ryukyu Islands has the key of two longitudinal rows of warts on each side of the back, inner row small and sparse (Fei and Ye, 2016).

E. chinhaiensis: Adult male total length 109.0-139.0 mm (119 mm on average), snout-vent length 61-81 mm (66.7 mm on average); adult female total length 124.0-151.0 mm (136 mm on average), snout-vent length 75.5-88.2 mm (82.3 mm on average). Head and body are wide and flat. Dorsal body dark brown, only corner of the mouth yellow-orange. Ventral surface of body, vent and legs dark brown, ventral sides of digits, the lower margin of tail orange or yellowish-red. Head almost triangular, wider than long. A triangular projection behind the angles of the mouth. The cranial ridge on the sides of the head not well developed, an occipital region with an “A”-shaped bony ridge. No labial folds. The gular

fold is indistinct. Dorsal body entirely covered with large and small tubercles. Vertebral ridge wide and raised. Dorsal-lateral ridges 1 row, with about 12 warts indistinctly separated. Tail laterally flat, short and weak, much shorter than the snout-vent length. Four fingers and five toes. Fingers and toes without fringe or web (Fei et al., 2006; Fei and Ye, 2016).

E. maxiquadratus: The total length of holotype (female) is 129.47 mm, and the snout-to-tail length is 85.72 mm. Body flat and glandular conical tubercles of various sizes densely distributed on the dorsal side and flanks. Mostly black in life. Tip of the 2nd to seventh lateral warts are greyish yellow. Tip of the quadrate projection, digits, carpal and tarsal tubercles, cloaca, and the ventral edge of the tail are yellowish orange. Head flat, depressed and wider than long. Snout short and truncate, depressed on top. A trapezoid projection behind the mouth corresponding to the quadrate spine. Lateral cranial ridge prominent, starting from the top of the snout over upper eyelids and reaching the parotoid gland posteriorly; the posterior end of the lateral cranial ridge slightly curved inward like a scroll. Median cranial ridges are pad-like and less prominent; anterior part depressed. Posterior to the median cranial ridge is a “V”-shaped ridge, which connects to the vertebral ridge. A series of 12 glandular warts along each side of the body. Sharp rib extremity can be seen piercing through these warts. Limbs are relatively slender and long. Palm and sole overlap when forelimb and hind limb are adpressed against flank. Tip of longest finger exceeds the tip of snout when forelimb is extended rostrally. Fingers and toes compressed with rounded tips. Four fingers and five toes with the very rudimentary interdigital web. Tubercles present on carpus and tarsus. The tail is laterally compressed, and the ventral portion is much thicker than the dorsal portion (Hou et al., 2014). (Annex 1, Fig. 1 and 3)

3.5 Role of the species in its ecosystem

Adult *E. chinhaiensis* and *E. maxiquadratus* feed on many insects and other invertebrates like snails, centipedes, slugs and millipedes (Fei et al., 2006). Amphibians are usually indicator species of the natural habitat, and the endangered salamanders could also be the umbrella species of the certain ecosystem (Hernandez et al., 2017).

4. Status and trends

4.1 Habitat trends

The habitat of *E. chinhaiensis* includes Ruiyansi timberland, Xinlu timberland and surrounding farming areas, with an area of 51km^2 in 1999 and 30km^2 from surveys conducted in 2004 (Xie, 1999; Tao et al., 2004). The spawning ponds have lost in the Beilun District, and this species has already gone extinction in its type locality (Xie et al., 2002; Xie and Gu, 2004; Hernandez, 2018a). The Ruiyansi timberland and Xinlu timberland used to be the Ningbo Nurseries built in 1951, originally with a total area of 12km^2. In the mid-1950s it changed to Ruiyansi State-owned Timberland of Zhenhai (that is Chinhai) town. A national forest park was approved to be established in Ruiyan Mountain in Ruiyansi Timberland in 1991.

In recent years, subpopulations of Chinhai Spiny Newts are also found in the surrounding areas west of Ruiyansi. However, these areas located inside the cultivated farm of herbals and cherries which are greatly disturbed by human and agricultural activities. Moreover, pollution is relatively more severe in the surrounding areas of the farm (Shi and Lu, 2011; Hernandez, 2016, 2018a). Overall, the habitats of *E. chinhaiensis* have been greatly fragmented, and the area of habitat has been reduced. Apart from those core habitats inside the Ruiyansi Timberland (4.24 km^2) and local small protected areas, all the other habitats are in the process of degradation (Tao et al., 2004； Xie and Gu, 2004; Shi and Lu, 2011; Hernandez, 2016, 2018a).

The habitats of *E. maxiquadratus* are located inside a provincial nature reserve and protected areas. However, the habitat quality is reducing, and the habitat area is gradually decreasing due to the effect of commercial plantations and tourism in the surrounding mountains (Hou et al., 2014). The top of the mountain is isolated from the relatively warmer habitats in the surrounding low-altitude areas in the subtropical mountain ecosystem in East Asia. The global warming will continue to increase over the 21st century (Collins et al., 2013) which might induce the loss of the habitat of the Mountain Spiny Newts. The natural disasters like typhoon are also harmful to habitats of these two Chinese Spiny Newts.

4.2 Population size

E. chinhaiensis is critically endangered (Zhao, 1998; Xie and Gu, 2004; Jiang et al., 2015). The Ruiyansi population was estimated as 318 to 369 in 1998 and1999. The number of adults is estimated to be 296 with a density of 9.87 individuals/km^2 based on capture-recapture surveys from 1997 to 1999 (Tao et al., 2004). The subpopulation in the type locality where this species was firstly discovered has gone extinction (Xie et al., 2002; Xie and Gu, 2004; Hernandez, 2018a). Recent surveys have shown that the number of nests of eggs found in Ruiyansi Timberland each year varies over 2015-2018 (Xu, personal communication). The population is still being estimated and monitored, and the size should be stable compared to 20 years ago.

Although few surveys have been done on the distribution and population of *E. maxiquadratus*, it is considered to be critically endangered based on the known information (Hou et al., 2014; Jiang et al., 2015; Hernandez, 2018b). Only six breeding ponds, about ten individuals and a few larvae have been recorded in two distribution sites in field surveys from 2011 to 2016. Ten individuals were found in 2013 when this species was first discovered. However, no individual was found in the type locality during several surveys after 2013 (Hernandez, 2018).

E. chinhaiensis and *E. maxiquadratus* are sister species with very similar habits. The difference is that the fecundity of *E. maxiquadratus* is even lower than that of *E. chinhaiensis*. The individuals observed in the wild, the breeding population and the spawned eggs in the survey sites of *E. maxiquadratus* are all much less than those of *E. chinhaiensis*. The average number of spawned egg for *E. maxiquadratus* is only half of that for *E. chinhaiensis*. Although there is a lack of research on the population of *E. maxiquadratus*, the population of *E. maxiquadratus* should be much less than *E. chinhaiensis* based on the comparison of survey results of *E. chinhaiensis* from 1978 to 1983 and survey result of *E. maxiquadratus* recently (Fei, 1992; Hernandez, 2017; Zhou et al., 2016).

4.3 Population structure

Limited researches revealed that the sex ratio of *E. chinhaiensis*, male to female is 1:1.04 from the specimen collected with great variations in different seasons. The male to female ratio is 1:1.75 in the breeding season (Cai and Fei, 1984; Fei， 1992). The youngest age of female Chinhai Spiny Newts appearing in breeding ponds is three years, based on the field study from 2008 to 2009: the three-year females account for 13.04%, four-year females 13.04-19.05%, five-year females 39.13-42.86%, six-year females 21.74-25.87%, seven-year females 8.69-4.76% and eight-year females 4.36-4.76% (Yang et al., 2011) (Annex 1, Fig. 4). *E. maxiquadratus* is a newly discovered species with a very small population, and few studies have been done on the population structure of this species.

4.4 Population trends

The population trend of *E. chinhaiensis* has step-downs due to weather disasters like typhoons in 2007 and freezing in 2008, tourism development and crop planting. There used to be three subpopulations for this species. After the extinction of this species in the type locality, only two subpopulations are under monitoring now, and the survival situation is worrying about the risk of extinction in the future (Xie et al., 2002; Xie and Gu, 2004). Compared to the surveys ten years ago, the fecundity in 2008 is less than 50% of that from 1998 to 2000. The number of breeding females greatly reduced, with 107 in 1999, 82 in 2000 and 47 in 2008. (Liu et al., 2010; Annex 1, Fig. 4). Recent surveys have shown that the number of nests of eggs found in Ruiyansi Timberland each year varies over 2015-2018, with 82 nests in 2015, 33 and 32 in 2016 and 2017 and 88 nests in 2018 (Xu, personal communication). The population is still being estimated and monitored, and the size should be stable compared to 20 years ago.

The population trend is not clear for *E. maxiquadratus* since it was newly discovered. They might face similar survival pressure with *E. chinhaiensis,* and the population is reducing too based on the result of field surveys (Jiang et al., 2015). The human activities are increasing in the surrounding forests of the known distribution sites of *E. maxiquadratus*. Besides that, the quality and area of wetlands are gradually decreasing due to the effect of agricultural pollution, agricultural and forest industry and tourism revealed by surveys in 2011. Also, a relatively low activity ability, fecundity, reproductive success, and foraging efficiency directly affect the survival and stability of wild populations of *E. maxiquadratus*. Overall, the population trend of *E. maxiquadratus* is supposed to gradually decreasing with the degradation of wetlands.

4.5 Geographic trends

The genus of *Echinotriton* has a disjunct geographic distribution. The new discovery of *E. maxiquadratus* in 2013 filled the distributional gap after the descriptions of *E. andersoni* one hundred and twenty-six years ago and *E. chinhaiensis* eighty-five years ago (Hou et al. 2014). Distribution of *E. chinhaiensis* is shrinking; and one of its three sites, which used to be the type locality, had no more records of the subpopulation.

5. Threats

The IUCN Red List of Threatened Species lists *E. chinhaiensis* as critically endangered (IUCN 2014, Liu et al. 2010). *E. maxiquadratus* likely suffer a similar level of population crisis (Hou et al. 2014). Chinese Spiny Newts remain unknown to science even local people for a very long time in the area with dense human population and heavy human activity. The newts may benefit from their extremely small and seclusive populations. As a result, their survival will be devastating by targeted poaching and natural disasters. *E. chinhaiensis* has been found in Hong Kong SAR and Japan through illegal trade. Although no pet trade record has been found for the newly discovered *E. maxiquadratus*, the possibility of illegal hunting and trade is high (Hou et al., 2014). For this reason, authors of *E. maxiquadratus* concealed the locality information, urged all hobbyists to refrain themselves from collecting and boycott any trade. The population trend of *E. chinhaiensis* has step-downs due to weather disasters like typhoons in 2007 and freezing in 2008. The global warming will lead to a loss of the habitat of the Mountain Spiny Newts.

Along with threat from illegal collection, habitat destruction is another critical factor that leads to population decline. Among them, the decline in habitat quality, fragmentation and the loss of reproductive ponds are the main threats. The habitats of *E. chinhaiensis* have been included in the nature reserves, and the habitat destruction and fragmentation are reducing when the conservation consciousness of local people are improved (Xie and Gu, 2004). *E. chinhaiensis* faces threats not only from illegal hunting but also from agricultural and forest industry, the human activities and pollution. Although the habitats of *E. maxiquadratus* locate inside a provincial nature reserve, the habitat quality is reducing, and the habitat area is gradually decreasing due to the effect of commercial plantations and tourism in the surrounding mountains (Hou et al., 2014).

6. Utilisation and trade

6.1 National utilisation

E. chinhaiensis and *E. maxiquadratus* are the most endangered amphibians in China. Some scientific institutions and universities both in China and abroad have collected specimens of *E. chinhaiensis* with the approval of wildlife competent department. Besides, very few individuals have been collected and raised by animal collectors in China. The specimens of *E. chinhaiensis* are preserved in the Chengdu Institute of Biology, Chinese Academy of Sciences; Hangzhou Normal University; Medical School of Zhejiang University, and Zhejiang Natural Museum. Some individuals are raised by pet lovers in China (Annex 2 Fig.1-3). The only known specimen of *E. maxiquadratus* (female) which has been used to describe the morphology of this new species is kept in Shenyang Normal University.

6.2 Legal trade

E. chinhaiensis has been listed as the second class in the *List of Wildlife under Special State Protection* since 1989. This species is strictly protected with no commercial captive-breeding and no legal trade record. *E. maxiquadratus* is newly discovered with no legal trade record since 2014.

6.3 Parts and derivatives in trade

E. chinhaiensis: eggs, live larvae and adults are collected as pets, and larvae and adults might be involved in the international pet trade.

E. maxiquadratus: eggs, larvae and adults might be collected as pets, the whole individual or tissues might be used in scientific research.

6.4 Illegal trade

Although few illegal trade records could be found for *E. chinhaiensis*, there is demand for this species as a pet by Caudate lovers from US and EU based on the search results of the internet (www.caudata.org, Annex 2, Fig 1-2). Also, *Echinotriton* and *Tylototriton* might enter the pet market together in the US (www.caudata.org, Annex 2, Fig. 3). Illegal hunting and international illegal trade records could be found frequently in recent years. The illegal collection of *E. chinhaiensis* has been reported by local people in 2011 (Shi and Lu, 2011). Two live *E. chinhaiensis* were found to be sold in the pet store in Japan with price as high as 1400 US dollars per individual (Annex 2).

No international trade record has been found for *E. maxiquadratus* after the type locality concealed by discovers. However, there have been unverified illegal hunting information and collection in secret with price as high as 5,000 Yuan RMB per individual (Personal Communication, 2018).

6.5 Actual or potential trade impacts

See section 5.

E. chinhaiensis and *E. maxiquadratus* are highly concerned by Caudate hobbyists all over the world due to the extreme rarity. Demands for the species as pet occasionally appear in web such as www.caudata.org. The illegal hunting and international trade are also recorded. Although no known record could be found for the international pet trade for *E. maxiquadratus*, due to a high bid of *E. chinhaiensis* in the international pet trade, the attention and popularity of *E. maxiquadratus* are increasing after this species is discovered (Rpwley et al., 2016). The peculiar endemism and rarity, and the similar and even higher value for collection and watching, have elevated the potential commercial and scientific values of *E. maxiquadratus*. Moreover, the national and local management and conservation strategies remain to be completed since this species is newly discovered. Thus, there is a high risk of poaching, collection and illegal trade for this species. With the development of the pet market, the illegal hunting and trade of *E. maxiquadratus* would be far more frequent without proper management. As a result, their survival will be devastating by targeted poaching with the aim of the international pet trade.

7. Legal instruments

7.1 National

E. chinhaiensis has been listed in the second class of the *List of Wildlife under Special State Protection of China* since 1989, which is under protection of *Law of the People's Republic of China on the Protection of Wildlife*, *Regulations on the Nature Reserves of the People's Republic of China* and the local regulations of Zhejiang Province. The hunting, catching or killing, as well as the sale and purchase or utilisation of the species and their products, are strictly prohibited. Special exemption like the scientific research could only be conducted when the permission from the provincial wildlife conservation authorities have been got first. *E. maxiquadratus* is newly discovered which has not been included in any conservation list. Fortunately, some of their habitats are included in a nature reserve where the illegal harvest of any individuals is prohibited.

7.2 International

Not included in any conservation list included CITES appendix. *E. chinhaiensis* is evaluated as critically endangered, CR b1ab(iii,iv)+2ab(iii,iv), in the IUCN Red List in 2004.

8. Species management

8.1 Management measures

The local government and public media have taken many forms of conservation propaganda where *E. chinhaiensis* lives. *China Central Television* (CCTV) has filmed documentaries named *Secret Endangered Amphibian---E. chinhaiensis* and *Finding the E. chinhaiensis*. The local community have celecrated *Cultural Festive of Spiny Newt*s each year since 2011. Biology teachers from the local middle school (Zhejiang Chaiqiao Middle school) have established an *E. chinhaiensis* Research Group from 2002 to help publics know the conservation of *E. chinhaiensis* and their habitats (Chen, 2016; Zhang

et al., 2008). The local community have the idea of salamander conservation in their traditional culture where *E. maxiquadratus* lives.

8.2 Population monitoring

The study and monitor of the Ruiyansi population of *E. chinhaiensis* began from1980s since it was re-discovered. Researches on the conservation and population monitoring started from the 1990s. Based on the ten-years monitoring of *E. chinhaiensis* population from 1998 to 2008, the monitor work was included in the National Amphibian Observation Project in 2014. The population and habitat in Ruiyansi were included as a Ningbo-Beilun sample area in The National Amphibian Observation Project. Standard observation method was used to monitor the population of *E. chinhaiensis*. The National Amphibian Observation Project is a long-term work which is still in the process with no data published by now (Annex 3). However, no similar monitor project has been set up on *E. maxiquadratus*.

8.3 Control measures

8.3.1 International

No.

8.3.2 Domestic

E. chinhaiensis is included in the *Wildlife under Special State Protection of China*. Hence, transportation or carrying of the species or the products thereof out of any county must be approved by the department of wildlife administration under the government of the relevant province, autonomous region or municipality. *E. maxiquadratus* is not yet included in any conservation lists while some habitats are included in the nature reserves (See 7.1, Legal instrument-National).

8.4 Captive breeding and artificial propagation

The Chengdu Institute of Biology, CAS and the Beilun National Timberland have conducted experiments on the Artificial assisted propagation of *E. chinhaiensis*. Both the adults and eggs have been collected from the wild for artificial propagation and assisted hatching researches. The *ex-situ* reproduction first succeeded in Chengdu, China in 1998. More than 800 larvae of *E. chinhaiensis* have been released into the wild in original nature reserves after hatching (Xie, 1999; Xie et al.， 2001; 2002; Chen, 2016). The teachers and students in Zhejiang Chaiqiao Middle school have conducted similar researches on artificial assisted hatching and metamorphosis since 2008 and released more than 100 larvae of *E. chinhaiensis* into the Ruiyansi Timberland (Zhang et al., 2008). (Annex 3, Tab. 1).

The ZIMS, the Zoological Information Management System, which is a zoological data collection and management software in the Species 360, formerly International Species Information System or ISIS, provided holding record of animals of *Echinotriton*, however no record of *E. chinhaiensis* and *E. maxiquadratus* in the database, only *E. andersoni* has been recorded holding for genus *Echinotriton* (See Annex 3, Tab. 2).

8.5 Habitat conservation

A small nature reserve with an area of 8.7 km^2 around Runyansi Timberland was established since 1996, and the centre of this nature reserve enlarged to 1.5 km^2 from 2002. This nature reserve was important for the protection of the reproductive habitats for *E. chinhaiensis*. Two new artificial reproductive ponds were built for the restoration of reproductive habitats. Moreover, fences were built, pesticide and fertiliser were forbidden to be used, cars and unrelated people were not allowed to enter, eggs were protected, and more larvae were helped to enter the ponds for the conservation of *E. chinhaiensis* (Sparreboom and Xie, 2001b; Chen, 2016).

The specific nature reserve is planned based on the known small nature reserves in the Ningbo Wetland Conservation and Utilization Plan (2009-2020) (Ningbo Forestry Bureau, 2009). The small nature reserve for the conservation of *E. chinhaiensis* in Ruiyansi Forest Park was included in the Ecological Protection Red Line in the Beilun District Plan in 2018 (Ningbo Planning Bureau, 2018). Upstream of big rivers is where *E. maxiquadratus* inhabits which have been included in the nature reserve or tourist scenic spot (See table and figure 1 in Annex 3).

8.6 Safeguards

N/A

9. Information on similar species

There are three known species in the genus *Echinotriton*. *E. andersoni* which is not included in this proposal occurs in the Ryukyu Islands. The difference between Ryukyu Spiny Newts and Chinese Spiny Newts is that the former has 2-3 rows of smaller warts between lateral warts and the vertebral ridge on each side of the body (Fei et al., 2006; Fei and Ye, 2016). The IUCN Red List evaluates *E. andersoni* as EN. The species is designated as a natural monument by Okinawa and Kagoshima Prefectures. It is also included in the Regulation (EC) No 338/97 Annex D in EU since 2009 and under monitoring by relevant laws or regulations.

10. Consultations

N/A

11. Additional remarks

N/A

12. References

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Annex 1. Illustrations and Information about *Echinotriton chinhaiensis* and *E. maxiquadratus*

Figure 1. Morphological characteristics of *E. andersoni* (left), *E. chinhaiensis* (middle), and *E. maxiquadratus* (right).

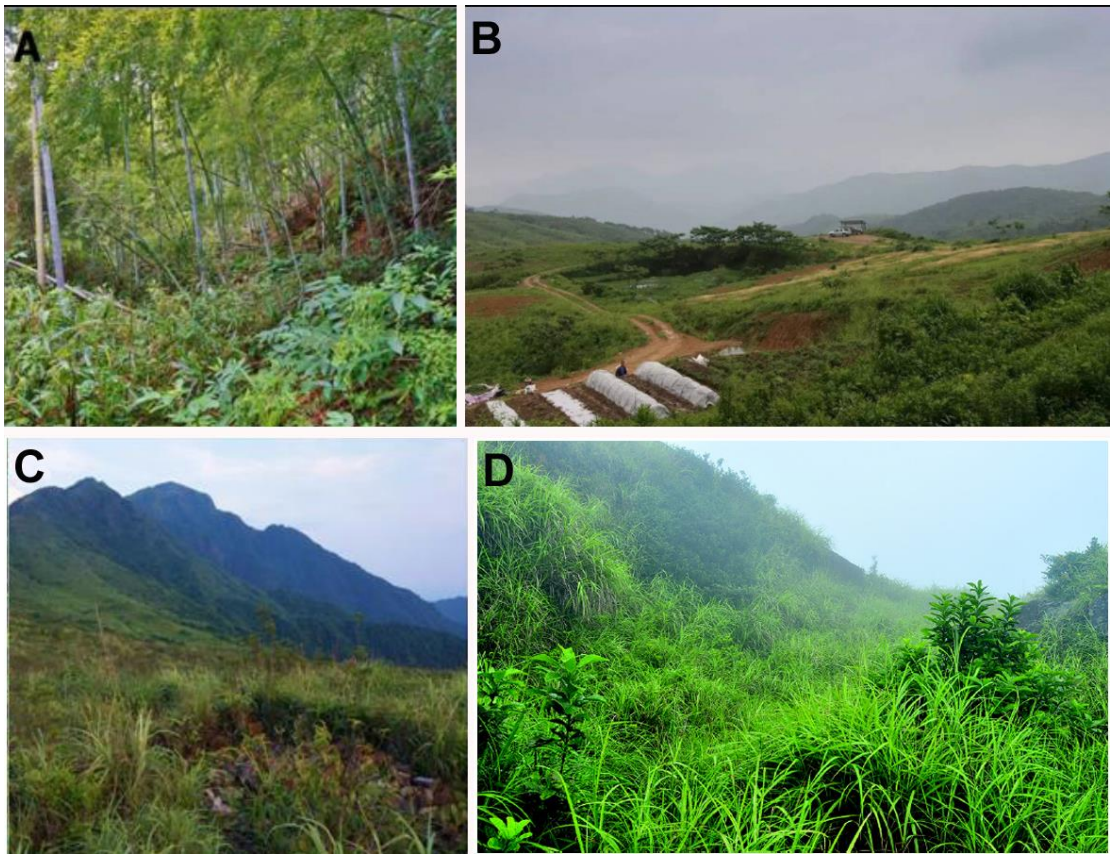


Figure 2. Typical habitat of *E. chinhaiensis* (A and B) and *E. maxiquadratus* (C and D)

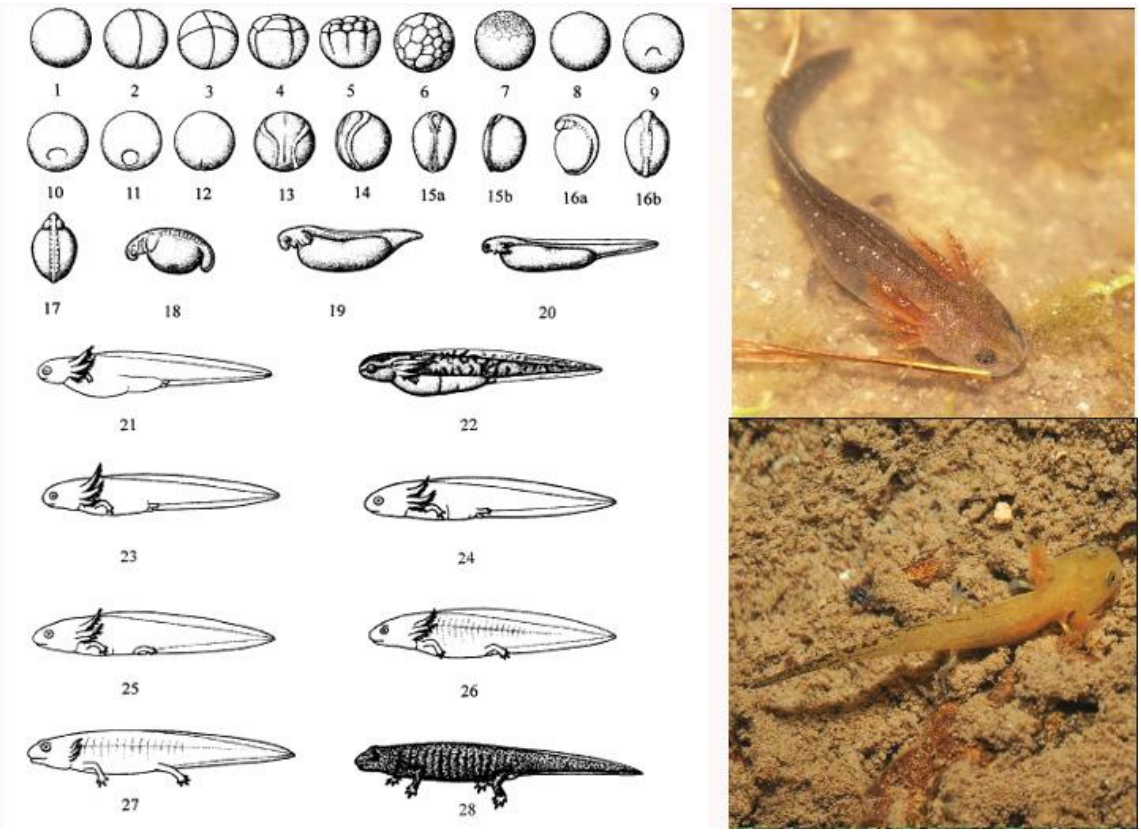


Figure 3. Embryonic development of *E. chinhaiensis* (left) and larvae of *E. maxiquadratus* (right).

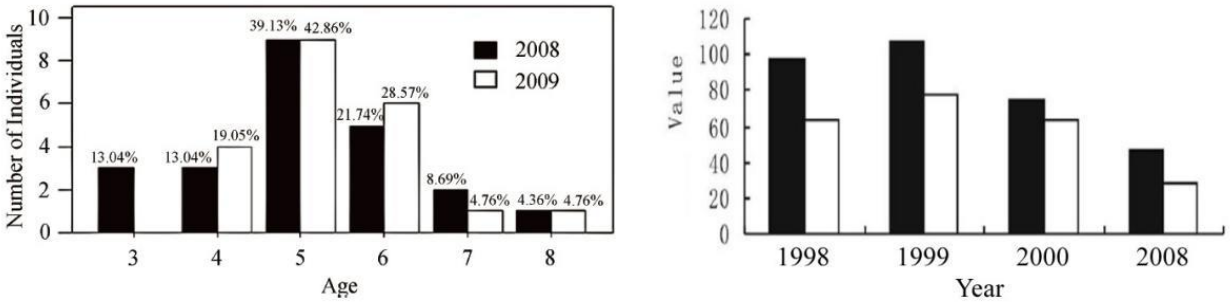
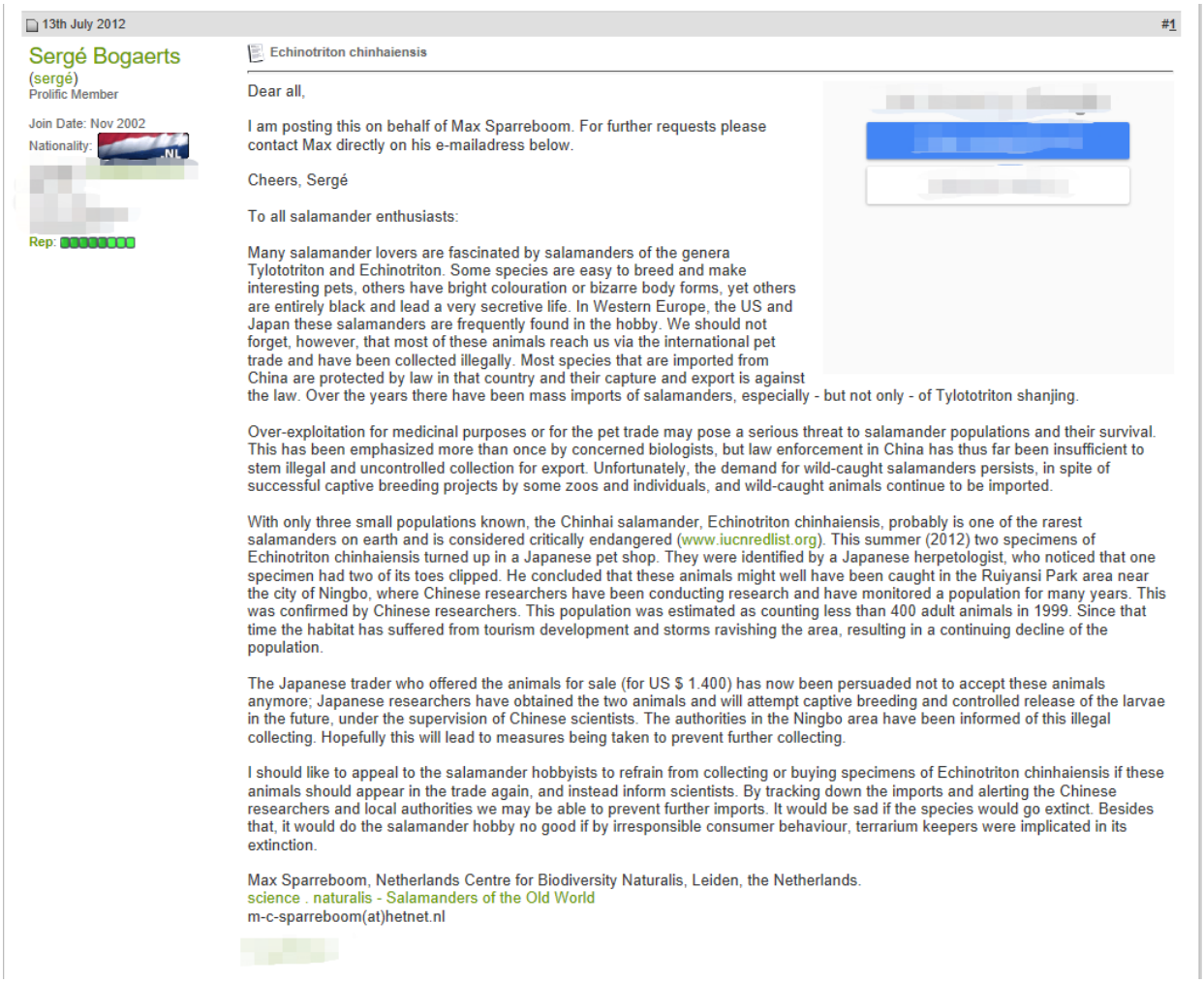


Figure 4. Trends of populations of *E. chinhaiensis*

Left: Age structures of a female breeding population in Ruiyansi, Ningbo in 2008 and 2009. The black bars represent the female population of 2008, and the white bars represent that of 2009. The percentages on the bars mean that the individuals of each age stage account for the total individuals of the year. (modified from Yang et al., 2011)

Right: Comparison of the number of reproductive females and total eggs of each year. The black bars represent the number of females participating in reproduction; the white bars represent the total egg number of the year (in hundreds). (modified from Liu et al., 2010)

Annex 2. Use and Trade



13th July 2012 #1

Sergé Bogaerts
(sergé)
Prolific Member

Join Date: Nov 2002
Nationality: NL

Rep:

Echinotriton chinhaiensis

Dear all,

I am posting this on behalf of Max Sparreboom. For further requests please contact Max directly on his e-mailadress below.

Cheers, Sergé

To all salamander enthusiasts:

Many salamander lovers are fascinated by salamanders of the genera Tylototriton and Echinotriton. Some species are easy to breed and make interesting pets, others have bright colouration or bizarre body forms, yet others are entirely black and lead a very secretive life. In Western Europe, the US and Japan these salamanders are frequently found in the hobby. We should not forget, however, that most of these animals reach us via the international pet trade and have been collected illegally. Most species that are imported from China are protected by law in that country and their capture and export is against the law. Over the years there have been mass imports of salamanders, especially - but not only - of Tylototriton shanjing.

Over-exploitation for medicinal purposes or for the pet trade may pose a serious threat to salamander populations and their survival. This has been emphasized more than once by concerned biologists, but law enforcement in China has thus far been insufficient to stem illegal and uncontrolled collection for export. Unfortunately, the demand for wild-caught salamanders persists, in spite of successful captive breeding projects by some zoos and individuals, and wild-caught animals continue to be imported.

With only three small populations known, the Chinhai salamander, Echinotriton chinhaiensis, probably is one of the rarest salamanders on earth and is considered critically endangered (www.iucnredlist.org). This summer (2012) two specimens of Echinotriton chinhaiensis turned up in a Japanese pet shop. They were identified by a Japanese herpetologist, who noticed that one specimen had two of its toes clipped. He concluded that these animals might well have been caught in the Ruiyansi Park area near the city of Ningbo, where Chinese researchers have been conducting research and have monitored a population for many years. This was confirmed by Chinese researchers. This population was estimated as counting less than 400 adult animals in 1999. Since that time the habitat has suffered from tourism development and storms ravishing the area, resulting in a continuing decline of the population.

The Japanese trader who offered the animals for sale (for US $ 1.400) has now been persuaded not to accept these animals anymore; Japanese researchers have obtained the two animals and will attempt captive breeding and controlled release of the larvae in the future, under the supervision of Chinese scientists. The authorities in the Ningbo area have been informed of this illegal collecting. Hopefully this will lead to measures being taken to prevent further collecting.

I should like to appeal to the salamander hobbyists to refrain from collecting or buying specimens of Echinotriton chinhaiensis if these animals should appear in the trade again, and instead inform scientists. By tracking down the imports and alerting the Chinese researchers and local authorities we may be able to prevent further imports. It would be sad if the species would go extinct. Besides that, it would do the salamander hobby no good if by irresponsible consumer behaviour, terrarium keepers were implicated in its extinction.

Max Sparreboom, Netherlands Centre for Biodiversity Naturalis, Leiden, the Netherlands.
science . naturalis - Salamanders of the Old World
m-c-sparreboom(at)hetnet.nl

Figure 1, Sparreboom's Letter to All Salamander Enthusiasts

Two specimens of *E. chinhaiensis* were identified by a Japanese herpetologist in a Japanese pet shop in summer 2012. Early July in 2012, the famous researcher on caudate from Netherland, Max Sparreboom wrote a public letter to appeal the salamander's hobbyists all over the world to refrain from collecting or buying specimens of *E. chinhaiensis.* This letter was widely forwarded in the websites, and public medias (like www.caudata.org) and the Chinese version of this letter was published in famous websites both in China and abroad (like http://news.ifeng.com , http://news.sina.com.cn, http://news.sohu.com, and http://www.sinoca.com) for the conservation of *E. chinhaiensis*.

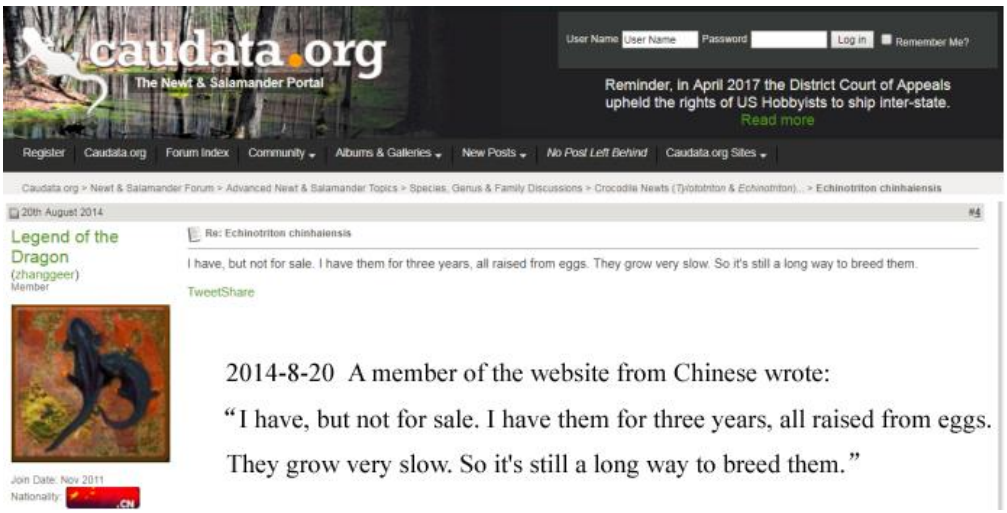


Figure 2. Keeping of *E. chinhaiensis* by a Chinese hobbyist.

Figure 3. Demand of *E. chinhaiensis*

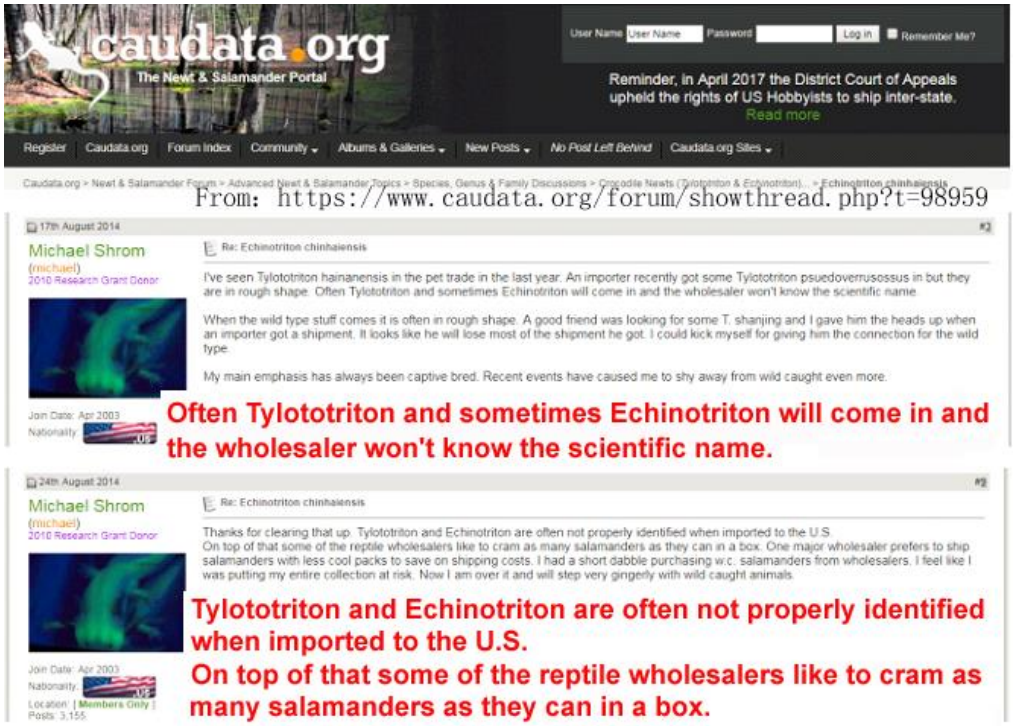


Figure 4. Information about *Tylototriton* and *Echinotriton* exported to the U. S.

Annex 3. Summary of conservation actions and captive breeding

Table 1. List of *E. chinhaiensis* conservation actions

SPECIES INFORMATION	SCIENTIFIC NAME	CONSERVATION STATUS	DISCOVER TIME	IUCN RED LIST
	Echinotriton chinhaiensis	Wildlife under second class state protection	First:1932 Re-discover:1978	CR(2004)

CONSERVATION ACTIONS	Extant actions	Development Plan
	A small nature reserve with an area of 8.7 km^2 around Runyansi Forest Farm was established since 1996, and the center of this nature reserve enlarged to 1.5 km^2 from 2002. Two new reproductive ponds were built. Pesticide and fertiliser were forbidden to be used in the surrounding economic forests. Fences were built in the natural reproductive ponds, and specific persons were assigned for the management and raising of *E. chinhaiensis*. Artificial propagation and release.	The specific provincial nature reserve is planned to be built. Habitats have been included in the *Ecological Protection Red Line Plan*

SCIENTIFIC RESEARCH	Time	Content	Participating unit	Source of Project
	1996-2000	Reproductive behavior of *E. chinhaiensis*	Chengdu Institute of Biology, CAS; Zhejiang Natural Museum; Beilun Forest Farm	The Ninth Five Important Project of CAS
	1996-2000	Conservation biology of *E. chinhaiensis*		Beilun Scientific Commission
	1996-2000	The study on the population of Key Amphibians in Zhejiang Province	The Forest Resource Monitoring Center of Zhejiang Province	The Ninth Five National Key Resources Survey The Governor's Fund in Zhejiang Province
	2008-2010	The comparison and analysis of the yearly fecundity of the Ruiyansi population	Chengdu Institute of Biology, CAS; Zhejiang Chaiqiao Middle School	National Natural Science Fund of China
	2009-2011	Habitat investigation of *E. chinhaiensis*	China Jiliang University	China Jiliang University
	2002-2018	Artificial assisted hatching and metamorphosis, release larvae into the wild	Zhejiang Chaiqiao Middle School	Ministry of Education, Zhejiang Education Department, Zhejiang Chaiqiao Middle School

POPULATION MONITORING	Time	Content	Implementer
	1996-2008	Monitoring of the Ruiyansi population	Chengdu Institute of Biology, CAS
	2014-	The Ningbo-Beilun sample area in *National Amphibian Observation Project*	China Jiliang University

PROPAGANDA AND EDUCATION	Activity Form and Content	Host
	Education in middle school based on the conservation of *E. chinhaiensis* (2002-)	Zhejiang Chaiqiao Middle School
	Survey on the habitat of *E. chinhaiensis* by scientific groups in 2003	Zhejiang Xinyu Primary School

	*E. chinhaiensis* was chosen as the mascot of the main field of China Women Volleyball Prix from 2005 to 2008	China International Women's Volleyball match, World Grand Prix, and World Championship Qualifying match
	Cultural Festive of Spiny Newts since 2011	Ruiyan Community in Chaiqiao Street
	Documentary: *Secret Endangered Amphibian --- E. chinhaiensis*, and *Find E. chinhaiensis*	CCTV

Table 2. Species holding report for *Echinotriton* / Newt from Species 360 (access on April 2018)

Species holding report for: Echinotriton / Newt								
Institution	Male	Female	Other	Birth (last 12 month)	Group M.	Group F.	Group O.	Total
All 11 Institutions, 2 Regions	4	6	16	0	3	4	61	94
Species: Echinotriton andersoni / Alligator newt								
All 11 Institutions, 2 Regions	4	6	16	0	3	4	61	94
Region: Asia 1 Institutions, Male: 0 , Female: 0, Other: 3								
TOKYOUENO / Ueno Zoological Gardens	0	0	0	0	0	0	3	3
Region: North America 10 Institutions, Male: 7 , Female: 10, Other: 74								
ABILENE / Abilene Zoological Gardens	1	1	0	0	0	0	7	9
AUDUBON / Audubon Zoo	0	0	0	0	0	0	4	4
BUFFALO / Buffalo Zoo	0	0	0	0	0	0	1	1
CINCINNAT / Cincinnati Zoo & Botanical Garden	2	2	11	0	0	0	0	15
DETROIT / Detroit Zoological Society	1	1	5	0	0	1	25	33
NY BRONX / Bronx Zoo/Wildlife Conservation Society	0	0	0	0	0	0	3	3
OKLAHOMA / Oklahoma City Zoological Park	0	2	0	0	0	0	0	2
PROSPECTP / Prospect Park Zoo	0	0	0	0	0	0	4	4
SEDGWICK / Sedgwick County Zoo	0	0	0	0	3	3	9	15
WACO / Cameron Park Zoo	0	0	0	0	0	0	5	5

Figure 1. The Cultural Festive of Spiny Newts (*E. Chinhaiensis*) celebrated by the local community each year since 2011