

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



Twenty-eighth meeting of the Animals Committee
Tel Aviv (Israel), 30 August-3 September 2015

Interpretation and implementation of the Convention

Species trade and conservation

Periodic Review of animal species included in the CITES Appendices I and II
[Resolution Conf. 14.8 (Rev. CoP16)]

PERIODIC REVIEW OF *CUORA GALBINIFRONS*

1. This document has been submitted by the Scientific Authority of Vietnam, with the support from the Wildlife Conservation Society and the Tortoise and Freshwater Turtle Specialist Group of the Species Survival Commission of the International Union for Conservation of Nature (IUCN SSC)
2. The Periodic Review of the Appendices, as currently agreed by the Parties, is designed to review species already included in the Appendices to determine whether their listings continue to be appropriate, based on current biological and trade information and utilizing the provisions in Resolution Conf. 9.24 (Rev. CoP16) on *Criteria for amendment of Appendices I and II* [see: [AC20 Document 10 \(Rev. 1\)](#)].
3. At the 16th Conference of the Parties to CITES, Viet Nam submitted [Proposal CoP16 Prop. 33](#), Transfer of the species *Cuora galbinifrons* from Appendix II to Appendix I, and [Proposal CoP16 Prop. 35](#), Transfer of the species *Mauremys annamensis* from Appendix II to Appendix I.
4. However, following the adoption of [Proposal CoP16 Prop. 32](#), which imposed a zero quota on *Cuora galbinifrons* and *Mauremys annamensis*, among others, Proposals 33 and 35 were excluded from consideration according to paragraph 6 of Rule 23, of the Rules of Procedure. Viet Nam subsequently requested that the two species concerned be included in the *Periodic review of the Appendices* as a matter of urgency (CoP16 Com. I Rec. 9: page 3).
5. This request was adopted as [Decision 16.124](#):

The Animals Committee shall, as a matter of priority, include Cuora galbinifrons and Mauremys annamensis in its Periodic Review of the Appendices.

6. At the 27th meeting of the Animals Committee, Viet Nam volunteered to lead the Periodic Review of these two species. Viet Nam therefore presents species accounts for these turtle species for consideration under the Periodic Review process, attached as an Annex to this document. The species accounts follow the recommended format for a periodic review document, in accordance with the Resolution on the *Periodic Review of species included in Appendices I and II* [Resolution Conf. 14.8 (Rev. CoP16)]. Indeed, these

* *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.*

accounts are substantially based on the proposals submitted by Viet Nam for CoP16, and correspondingly conclude that inclusion in Appendix I appears warranted.

7. In the preparation of these species reviews, it was noted that the majority of recent taxonomic works concerning the turtle genus *Cuora* do not follow the CITES Standard Nomenclature for turtles (Fritz & Havas, 2007) in treating the taxa *bourreti* and *picturata* as subspecies of *Cuora galbinifrons*; instead, recent checklists and compilations of turtle taxonomy (for example, Nguyen et al., 2009; TTWG 2014; Uetz, 2015) have followed Stuart and Parham (2004) and Spinks *et al.* (2012) and treat these as distinct, valid species, *Cuora bourreti* and *Cuora picturata*.

8. Consequently, Vietnam intends to work with the Nomenclature Specialist – Zoology to propose, for adoption at CoP17, either of the following publications as an additional Standard Reference, for nomenclature of *Cuora bourreti*, *Cuora galbinifrons*, and *Cuora picturata* (only):

Stuart, B.L., and Parham, J.F. 2004. Molecular phylogeny of the critically endangered Indochinese box turtle (*Cuora galbinifrons*). *Molecular Phylogenetics and Evolution* 31 (2004): 164–177. doi:10.1016/S1055-7903(03)00258-6.

Spinks, P.Q., Thomson, R.C., Zhang, Y.P., Che, J., Wu, Y., and Shaffer, H.B. 2012. Species boundaries and phylogenetic relationships in the critically endangered Asian box turtle genus *Cuora*. *Molecular Phylogenetics and Evolution* 63 (2012): 656–667. doi:10.1016/j.ympev.2012.02.014

9. In preparation for the possible adoption of an additional Standard Reference concerning *Cuora*, the annex to this document presents species accounts for *Cuora bourreti* and *Cuora picturata*, as well as *Cuora galbinifrons* in its restricted sense.

10. The next step in the review of these turtle species will be to request the Animals Committee Regional Members for Asia to use the Annex to obtain input and additional information from Parties prior to the 28th meeting of the Animals Committee (AC28). This information can be provided at AC28 in the meeting of the Periodic Review Working Group.

*Cuora [galbinifrons] bourreti*1. Taxonomy

- 1.1 Class: Reptilia
- 1.2 Order: Testudines
- 1.3 Family: Geoemydidae
- 1.4 Genus, species or subspecies, including author and year: *Cuora bourreti* Obst & Reimann, 1994
Cuora [galbinifrons] bourreti Obst & Reimann, 1994
- 1.5 Scientific synonyms: No taxa have been synonymized; see Fritz & Havas 2007:217 for a history of the use of the name.

In the preparation of the review of *Cuora galbinifrons*, it was noted that the majority of recent taxonomic works concerning the turtle genus *Cuora* do not follow the CITES Standard Nomenclature for turtles (Fritz & Havas, 2007) in treating the taxa *bourreti* and *picturata* as subspecies of *Cuora galbinifrons*; instead, recent checklists and compilations of turtle taxonomy (for example, Nguyen et al., 2009; TTWG 2014; Uetz, 2015) have followed Stuart and Parham (2004) and Spinks *et al.* (2012) and treat these as distinct, valid species, *Cuora bourreti* and *Cuora picturata*. Consequently, Viet Nam recommends that at CoP17, an additional Standard Reference be adopted for nomenclature of *Cuora bourreti*, *Cuora galbinifrons*, and *Cuora picturata*. In preparation for such updated nomenclature, this account reviews available information for *Cuora [galbinifrons] bourreti*.

- 1.6 Common names: English: Bourret's Box Turtle
French: Tortue-boîte à front jaune
Spanish:
Vietnamese: Rùa hộp trán vàng miền
- 1.7 Code numbers: ITIS TSN 949148

2. Overview

Cuora galbinifrons bourreti was listed in CITES Appendix II, as part of *Cuora* spp., by unanimous adoption at CoP 11 (CoP11 Prop.36), which came into effect on 19 July 2000. A zero quota was imposed for *Cuora galbinifrons* (including *bourreti* and *picturata* as subspecies) at CoP16 (CoP16 Prop.32), effective 12 June 2013.

Cuora bourreti is not currently assessed in the IUCN Red List at species level, but is part of the Critically Endangered assessment of *C. galbinifrons*. That assessment dates from 2000 and included *bourreti*, *galbinifrons* and *picturata* as subspecies of *galbinifrons*.

The primary threat to *Cuora [g.] bourreti* is collection for trade. The species is in high demand in the international pet trade and the Asian consumption trade. Collection efforts include both casual encounters when collecting other forest products, and targeted searches for turtles involving trained dogs and/or burning undergrowth to drive and expose turtles. Turtles encountered are collected, regardless of legal protection status or location inside protected areas. Collected turtles are traded, mostly illegally, through a network of local middlemen before being exported or consumed locally. Documented market trade volumes may be several orders of magnitude greater than total reported legal trade volumes. Habitat loss and degradation is a secondary threat to the species.

Cuora [g.] bourreti is legally protected from exploitation in all range countries, but enforcement may be insufficient. To address illegal trade in this species, its protection status in national laws and under CITES must be increased. This species qualifies for transfer to Appendix I of CITES, as it meets Criterion C i) of Annex I of Res.Conf.9.24(Rev.CoP15), by having been documented to have declined severely across its range as a result of collection for trade (see section 4.4), and meets criterion C ii) as the pattern of local, casual exploitation combined with unsustainable targeted collection for trade (see sections 5 and 6.4) will likely continue unless stronger measures are implemented, and the slow recruitment and late maturity make the species intrinsically vulnerable to exploitation (see sections 3.3 and 6.5).

3. Species characteristics

3.1 Distribution

Cuora [galbinifrons] bourreti is known from central Viet Nam (Nghe An, Ha Tinh, Quang Binh, Thua Thien-Hue, Da Nang, Quang Nam, and Kon Tum provinces), as well as from adjoining Savannakhet Province in Lao PDR (Obst & Reimann, 1994; Nguyen et al., 2009; Stuart *et al.*, 2011).

3.2 Habitat

Cuora [galbinifrons] bourreti inhabits upland, moist, closed-canopy evergreen forest, usually between 300 and 1700 m altitude. The species is predominantly terrestrial and is not specifically associated with forest streams. (Stuart & Platt, 2004; Stuart *et al.*, 2011; T.McCormack, in litt. to VN MA, 29 Sept 2012).

3.3 Biological characteristics

Extremely little is known of the biology of *Cuora [galbinifrons] bourreti* in the wild; most observations on diet, growth and reproduction derive from animals maintained in captivity, either close to the species' natural range, or in artificially manipulated captive conditions such as terrariums.

Slow growth (10-15 years) to maturity is combined with low fecundity; in captivity a single clutch of 1-3 eggs is seen each year in Cuc Phuong National Park where a small group is maintained (McCormack, in litt. To VN MA, 29 Sept 2012). Similar clutch sizes of 1 to 3 eggs have been reported from long-term captive animals kept in Europe and North America (Fiebig & Lehr, 2000; Struijk, 2010).

3.4 Morphological characteristics

Cuora [galbinifrons] bourreti is a medium-sized turtle, reaching up to 18 cm carapace length at a weight of about 800 to 1200 grams. Males and females reach about the same size. Hatchlings measure about 45-50 mm and weigh 15-24 grams. The carapace (upper shell) is relatively long and oval, smooth, rounded and high-domed. The plastron (lower shell) has a very distinct hinge which allows the front and rear parts of the plastron to be raised up against the carapace, closing both front and back shell openings completely. It has a very distinct yellow or orange area on each side of the carapace, contrasting strongly with the remainder of the shell which is mainly rich dark brown. The carapace shows a fairly irregular pattern of black, brown and yellow: A broad brown band with black edges runs over the middle of the carapace, not always clearly distinct from the rest of the carapace; the brown band extends forward to reach a broad area of the carapace margin above the neck. A fine pale vertebral line is often vague, interrupted, or completely absent. A vague cloudy dark band extends across much of the middle of the costal scutes, leaving the remaining costal scute areas bright yellow both above and below this irregular band. The effect can create two sets of yellow areas, one along the upper costal scutes, the other in the lower areas of the costals. The marginal scutes are generally dark, at least their upper areas always has dark pigmentation. The plastron is yellow with a large black cloudy spot on each scute; these spots can be large enough to connect to each other, forming a black horseshoe-shaped mark or mostly black band around the plastron. The underside of the marginal scutes can vary from yellowish with small black markings to mostly black with some yellow along the margins. The head is bright yellow or orange to brown with some dark spotting, but never deep red. The soft parts of the legs and tail are generally grey with yellow.

3.5 Role of the species in its ecosystem

The role of *Cuora [galbinifrons] bourreti* in its native upland forest ecosystems is unknown; by analogy with other forest turtles, the species likely plays a modest ecological role in the dispersal of plant seeds and mushroom spores, and as a consumer of invertebrates.

4. Status and trends

Cuora bourreti is not currently assessed in the IUCN Red List at species level, but is part of the Critically Endangered assessment of *C. galbinifrons*. That assessment dates from 2000 and included *bourreti*, *galbinifrons* and *picturata* as subspecies of *galbinifrons*. The 2015 reassessment, currently in progress, indicates that *Cuora bourreti* will be assessed as Critically Endangered in its own right (TFTSG RLA, pers. comm. 16 June 2015). *Cuora galbinifrons* including *bourreti* as a subspecies was assessed as Lower Risk: near threatened in 1996.

4.1 Habitat trends

Forest cover in Viet Nam fell from 14.3 million ha (43% land area) in 1943 to 9.5 million ha (29%) in 1973, and since then the area under forest cover has appeared relatively stable at assessments in 1979-81 and 1995 (FAO, 1997; FSIV, 2009). Recent increases in forest cover since the early 2000 have largely been due to the 1998-2010 goal to reforest 5 million ha under national decision No. 661/QĐ-TTg (661 Programme: Decision No. 661/QĐ-TTg dated 29 July 1998 by the Prime Minister on objectives, tasks, policy and Organisation for implementation the 5 million hectares afforestation national programme) (ICEM 2003) and the Forest protection and Development for period 2011-2020 (Decision No 57/QĐ-TTg of Prime-Minister). Reforestation has mostly been monoculture, while the primary forests on which this species depends continues to be lost or degraded.

Quantitative data on primary forest area or trends in Lao PDR are not available at the time of writing this review.

4.2 Population size

No absolute population size numbers or estimates are available for *Cuora [g.] bourreti*, and only anecdotal relative population density data. All recent indications are that the species requires extensive search effort to encounter. During field surveys in Lao PDR in 1993-1999, encounter rates were at the order of one turtle per three months in the field for a herpetologist, and one *Cuora galbinifrons* per day when working with a trained turtle hunting dog in prime turtle habitat (Stuart & Timmins, 2000).

4.3 Population structure

No population structure data are available for *Cuora [g.] bourreti*. No distinct sex bias has been observed during field or trade surveys. All age classes except hatchlings are seen in trade; juveniles are normally kept at the village level as traders prefer not to buy very small individuals.

4.4 Population trends

A great deal of survey work has been undertaken in Viet Nam between 2009 – 2012 focused on determining the range and priority habitat for *Cuora galbinifrons*, with a focus on *Cuora [g.] bourreti* and *Cuora [g.] picturata*. Anecdotal information from interviews throughout the range has found that historic quantities of the species available for collection in the forest have been greatly reduced, with many hunters stating that while the species was common 7-15 years ago, it is now increasingly difficult to find. During surveys in 2006 in and around Song Thanh Nature Reserve, Quang Nam province local hunters at that time claimed that numbers of *Cuora [g.] bourreti* had already been seriously depleted, from being able to catch 20 animals a day in the in the mid 1990's to only a few animals a week. However the increasing economic value of the species to an average of US\$15.00 per kg is an increase from 2006, when surveys found an average value of US\$9.00 around Song Thanh Nature Reserve, Quang Nam province. Similar reports of reductions in wild populations, and corresponding increases in wholesale prices paid, have been documented during interviews throughout the species range in Viet Nam (T.McCormack, in litt to VN MA, 29 Sept 2012).

4.5 Geographic trends

All available information indicates that *bourreti* is intensively collected throughout its range in Lao PDR and Viet Nam.

5. Threats

The primary threat to *Cuora [g.] bourreti* is collection for trade. The species is in high demand in the international pet trade and the Asian consumption trade. Collection efforts include both targeted searches for turtles involving trained dogs, or occasionally pitfall traps, as well as capitalizing on casual turtle encounters when collecting other forest products. Turtles, of any species, are collected whenever and wherever encountered in the region, regardless of legal protection status or location inside protected areas. Collected turtles are traded, mostly illegally, through a network of local middlemen before being illegally exported or consumed locally. Increasing economic value has ensured that hunting pressure is sustained despite the increasing rarity of the species (Hendrie, 2000; Stuart & Timmins, 2000; McCormack et al., 2010; Stuart et al., 2011). Habitat loss and degradation are considered a significant but more localized threat to the species.

6. Utilization and trade

6.1 National utilization

Historically *Cuora [g.] bourreti* have been consumed locally for food as part of a subsistence diet, however in the last decade consumption has largely ceased with most animals now sold into the trade due to the high economic incentive. Juvenile animals are often kept at the village level in attempts to raise them to sell on into the trade (often unsuccessful, with animals dying). The species does not have specific local medicinal uses, but bones are often sold to traders for production of bone glue. In some areas turtles of all species are consumed as broad “health invigorators”. The *Cuora galbinifrons* group represents the second most valuable type of turtle in trade in Viet Nam and Lao PDR after the *C. trifasciata* complex (Stuart in litt., to IUCN and TRAFFIC, 2012).

6.2 Legal trade

The UNEP-WCMC CITES Trade Database records a total of 2377 live specimens and 17 specimens of *Cuora galbinifrons* as net and gross exports during the period 1998-2014. Reported net imports during the same period comprised 3282 live animals and 35 specimens, while gross imports comprised 3363 live animals and 35 specimens.

Tabulation of reported Net Exports of *Cuora galbinifrons*, 1998-2014; no records are entered for 1998, 2005, 2008, or 2011. Consulted 17 June 2015.

Term	Country	1999	2000	2001	2002	2003	2004	2006	2007	2009	2010	2012	2013	Total
live	CN				24		6		5		3			38
live	LA							1500						1500
live	VN	7	33	16								175	608	839
specimens	VN					14	2			1				17

Noteworthy is the report of a single shipment of 1500 animals, with source code ‘ranched’, originating from Lao PDR and reported as imports by Viet Nam, representing nearly 60% of all reported trade.

Largest importers are Viet Nam (1501, including the aforementioned shipment from Lao PDR), United States (776), Japan (634), Hong Kong (161), and Spain (90), with Belgium, Germany, Jersey, Switzerland, Taiwan, Thailand, the United Kingdom, and the Czech Republic each declaring imports of between 10 and 30 animals during the period.

The UNEP-WCMC CITES Trade Database does not specify subspecies; thus the data above cannot be used to elucidate trends in the trade of *galbinifrons sensu stricto*, *bourreti* or *picturata*.

Searches of internet fora and bulletin boards occasionally yields offers of *Cuora [g.] bourreti* for sale, often claimed bred in captivity; the veracity of such claims is often difficult to confirm without contacting to the studbook keeper. *Cuora [g.] bourreti* has not been evident in visible retail trade in China or Hong Kong recently (van Dijk, pers comm to VN SA, 22 June 2015).

6.3 Parts and derivatives in trade

Number of turtle shells are bought in Viet Nam by traders to make into a generic bone glue, plastrons are normally preferred. In some areas shell fragments are discarded. In many areas shells considered beautiful are kept as household decorations, this is often seen with *Cuora galbinifrons* and *Manouria impressa*.

Some shells or shell fragments are traded internationally: Chen *et al.* (2009) recorded that *Cuora galbinifrons* were rare but present among imported turtle shells for Chinese traditional medicine in Taiwan.

6.4 Illegal trade

Visible trade in *Cuora galbinifrons* at Hanoi's principal wildlife market, Dong Xuan, stopped by about 2006 due to better market enforcement. Prior to this, dozens of *Cuora galbinifrons*, including the taxon *bourreti*, were regularly available each week, these were often juvenile animals and intended for the pet market, not food.

It is believed that most *Cuora* transited through Viet Nam then are exported to third country destination. *Cuora galbinifrons* was present in nearly every reported market survey that looked at turtle trade in China and Hong Kong since recording began in 1993, with *bourreti* usually present if precise taxonomic identification was recorded.

6.5 Actual or potential trade impacts

Long-lived, late-maturing species with limited annual reproductive output and high juvenile mortality, as exemplified by *Cuora galbinifrons*, have proven to be highly susceptible to overexploitation, particularly of adult animals (Doroff & Keith, 1990; Gibbons, 1990; Congdon *et al.*, 1993; O'Brien *et al.*, 2003). The population trend data in section 4.4 strongly suggests that *Cuora [g.] bourreti* has been subject to unsustainable collection for the past 15-20 years and this has resulted in the depletion if not collapse of each populations that has been surveyed. Of particular significance is that commercial turtle farms in East Asia create a specific demand for animals collected from the wild, being considered the primary purchasers of wild-collected turtles and driving the collection of the last remaining wild animals through increased trade prices (Shi *et al.*, 2007).

In an analysis of risk posed by international trade, *Cuora galbinifrons* emerged with a relatively high score (1.5 out of a maximum of 2.0) of endangerment from trade (Zhou & Jiang, 2008), a score which would also be applicable to *bourreti* in isolation.

7. Legal instruments

7.1 National

Lao P.D.R.: Principles, regulations and measures for the protection and management of wildlife are governed by the Wildlife and Aquatic Species Law (No07/NA 24 December 2007); *Cuora galbinifrons* is listed under Prohibited Category I, the highest the protective category, banning hunting and collection year-round.

Viet Nam: *Cuora [g.] bourreti* is protected from commercial exploitation as a Priority Protected Rare, Precious and Endangered Species under Decree 160/2013/ND-CP of the Government.

7.2 International

Cuora galbinifrons bourreti was included in CITES Appendix II at CoP 11 (Proposal 36, Gigiri, Kenya, 2000), and was selected for the Review of Significant Trade (RST) at AC17; its progress through the

RST process was detailed on pages 21-22 of document AC25 Doc. 19. A zero quota was imposed for *Cuora galbinifrons* (including *bourreti* and *picturata* as subspecies) at CoP16 (CoP16 Prop.32), effective 12 June 2013.

The genus *Cuora*, including *Cuora galbinifrons*, is included in Annex B of EU Commission Regulation no. 709/2010 (amending EC Regulation 338/97), which requires that a corresponding import permit must be issued by the country of import before a shipment of the species can enter the European Union.

Health inspection certification is required by a number of countries before live animals, including turtles, may be imported.

The recommended conditions for transport of live turtles by air are detailed in the IATA Live Animals Regulations; compulsory adherence to these Live Animal Regulations has been adopted by legislation in a number of countries, and is required by a number of international airlines.

8. Species management

8.1 Management measures

Populations of *Cuora [galbinifrons] bourreti* are not known to be managed or manipulated in any part of its range. A conservation initiative to focus on *Cuora [g.] bourreti* through improved protected area management, community engagement and enforcement capacity building has been initiated at Song Thanh Nature Reserve, Quang Nam province in Central Viet Nam (McCormack *et al.*, 2006).

8.2 Population monitoring

No population monitoring programs are known to be in place for *Cuora [g.] bourreti* anywhere in its range.

8.3 Control measures

8.3.1 International

Since its inclusion in CITES Appendix II, international shipments of *Cuora [galbinifrons] bourreti* are required to be accompanied by appropriate export permits, and subject to the customary checks by customs and wildlife authorities at the points of export and import.

8.3.2 Domestic

No control measures are in place beyond those described in section 7.1, national legislation and regulations.

Wildlife authorities, customs and enforcement authorities of the range and trading countries have made great efforts to ensure that turtles traded within their jurisdiction are legal and regulated, as evidenced by extensive record of confiscations of illegally traded turtles in the countries of the region (AC25 Doc.19, Annex C. However, resources such as officers trained in wildlife identification and identification materials in local languages remain limited, and in many cases the judicial system does not give high priority to wildlife crimes.

8.4 Captive breeding and artificial propagation

The Turtle Conservation Centre at Cuc Phuong National Park has been breeding *Cuora [galbinifrons] bourreti* with limited success; survival of eggs is low and long-term survival of hatchlings is lower. Low incubation temperatures, 25-28°C, are an important factor for successful reproduction, as are cool, humid environmental conditions for juveniles and a high protein diet.

Cuora [galbinifrons] bourreti is maintained in modest numbers in captivity by hobbyists in Asia, Europe, North America and elsewhere, and has been bred in captivity, but continues to be regarded as a difficult, sensitive species that is challenging (but not impossible) to establish and reproduce consistently in captivity (Fiebig & Lehr, 2000; Struijk, 2010). A European studbook exists for the taxon since the late 1990s, with 22 registered animals maintained in 2009 (Struijk, 2010).

Cuora galbinifrons, possibly including *bourreti*, was recorded among the stock kept at commercial turtle farms in China in the early 2000's (Parham *et al.*, 2001; Germany SA, 2003), but is understood not to breed successfully (i.e., production exceeding mortality) in commercial captive conditions and is no longer included in inventories of turtle farms in recent years (Endangered Species Import and Export Management Office of the People's Republic of China, 2002b; Zhou *et al.*, 2005, 2008; Shi *et al.*, 2008b).

8.5 Habitat conservation

Habitat conservation, in the form of National Parks, Special Conservation Areas, and other protected areas, is in place across much of the range of *Cuora [g.] galbinifrons*, and several records of these turtles originate from inside protected areas (Stuart & Platt, 2004; McCormack *et al.*, 2006; Stuart *et al.*, 2011). However, designation as protected area does not necessarily lead to effective restrictions on the collection of turtles and other 'forest products', and is insufficient by itself to safeguard viable populations of the species in its natural habitat.

8.6 Safeguards

None applicable beyond legal, regulatory and enforcement processes in place, including the need for non-detriment findings and inspections of shipments in international trade.

9. Information on similar species

Cuora box turtles can be separated from all other turtles by the combination of possessing a single hinge on the plastron allowing them to effectively close their shell, their distinctly domed to highly domed shell, and generally bright facial colouration that includes a strip of granular skin between the eye and tympanum. The taxa *bourreti*, *galbinifrons* and *picturata* are unique among all turtles in possessing a large yellow to orange area on each side of the carapace. Detailed information to differentiate these three forms was provided by Tabaka (2002, available online) and repeated in proposal CoP16 Prop. 33.

10. Consultations

11. Additional remarks

12. References

- Artnr, H., and Hofer, A. 2001. Observations in the Qing Ping Free Market, Guangzhou, China, November 2000. *Turtle and Tortoise Newsletter*, issue 3: 14
- Chen, T.H., Chang, H.C., and Lue, K.Y. 2009. Unregulated trade in turtle shells for Chinese traditional medicine in East and Southeast Asia: the case of Taiwan. *Chelonian Conservation and Biology*, Vol. 8 (1): 11-18.
- Cheung, S.M., and Dudgeon, D. 2006. Quantifying the Asian turtle crisis: market surveys in southern China, 2000-2003. *Aquatic Conservation: Marine and Freshwater Ecosystems*, Vol. 16: 751-770.
- Congdon, J.D., Dunham, A.E., and Van Loben Sels, R.C. 1993. Delayed Sexual Maturity and Demographics of Blanding's Turtles (*Emydoidea blandingii*): Implications for Conservation and Management of Long-lived Organisms. *Conservation Biology*, Vol. 7 (2): 387-399.
- Doroff, A. M., and Keith, L.B. 1990. Demography and Ecology of an Ornate Box Turtle (*Terrapene ornata*) Population in South-Central Wisconsin. *Copeia*, 1990 (2): 387-399.
- Endangered Species Import and Export Management Office of the People's Republic of China. 2002a. *Identification Manual for Common Turtles and Tortoises*. China Forestry Publishing House, Beijing, China. 174 pp. ISBN 7-5038-3022-0.
- Endangered Species Import and Export Management Office of the People's Republic of China [H. Shi & Z. Fan]. 2002b. Report on the Captive Breeding of Tortoises and Freshwater Turtles in China. CITES Document CoP12 Inf. 8. 19 pp.

- FAO [Food and Agriculture Organization]. 1997. *Country Report – Vietnam*. Asia-Pacific Forestry Sector Outlook Study II - Working Papers Series, working paper No. APFSOS II/WP/2009/09.
- Fiebig, J., and Lehr, E. 2000. Haltung und Erznachzucht der Bourret-Scharnierschildkröte *Cuora galbinifrons bourreti* Obst & Reimann, 1994, mit Anmerkungen zum Bedrohungsstatus. *Salamandra*, Vol. 36 (3): 147-156
- Fritz, U., and Havas, P.. 2007. Checklist of Chelonians of the World. *Vertebrate Zoology*, Vol. 57 (2): 149-368.
- FSIV [Forest Science Institute of Viet Nam]. 2009. Viet Nam Forestry Outlook Study. Asia-Pacific Forestry Sector Outlook Study Working Papers Series, working paper No. APFSOS/WP/31.
- Germany, Scientific Authority. 2003. Development of mid- and long-term Conservation Measures for Tortoises and Freshwater Turtles. AC 19 Doc 15.2 (Rev.1).
- Gibbons, J. Whitfield (editor). 1990. *Life History and Ecology of the Slider Turtle*. Smithsonian Institution Press, Washington D.C. & London. 368 pp.
- Gong S., Fu Y., Wang J., Shi H., and Xu R. 2005. Freshwater turtle trade in Hainan and suggestions for effective management. *Biodiversity Science*, Vol. 13 (3): 239-247.
- Gong S., Wang J, Shi H., Song R & Xu R. 2006. Illegal trade and conservation requirements of freshwater turtles in Nanmao, Hainan Province, China. *Oryx*, Vol. 40(3): 331-336.
- Gong S., Chow, A.T., Fong, J.J., and Shi H.. 2009. Chelonian trade in the largest pet market in China: scale, scope and impact on turtle conservation. *Oryx*, Vol. 43(2): 213-216.
- Hendrie, D.B. 2000. Status and Conservation of Tortoises and Freshwater Turtles in Vietnam. Pp. 63-73 in *Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia* (van Dijk, Stuart & Rhodin, eds.). Chelonian Research Monographs, Number 2.
- Horne, B.D., Poole, C.M., and Walde, A.D. (eds). 2012. Conservation of Asian Tortoises and Freshwater Turtles: Setting Priorities for the Next Ten Years. Recommendations and Conclusions from the Workshop in Singapore, February 21-24, 2011. ISBN: 978-981-07-1737-7.
<http://www.cites.org/common/com/AC/26/SG-Tortoise-&-Freshwater-Turtle-Workshop-Report.pdf>
- ICEM (International Center for Environmental management). 2003. *Viet Nam National Report on Protected Areas and Development*. Review of Protected Areas and Development in the Lower Mekong River Region, Indooroopilly, Queensland, Australia. 60 pp.
- IUCN and TRAFFIC. 2012. IUCN/TRAFFIC Analyses of the Proposals to amend the CITES Appendices. Prepared by IUCN Global Species Programme and TRAFFIC for the Sixteenth Meeting of the Conference of the Parties to CITES. IUCN – International Union for the Conservation of nature, Gland, Switzerland. 103 pp.
- Lau, M.W.N., Ades, G., Goodyer, N., and Zou, F.S. 1995. Wildlife Trade in Southern China including Hong Kong and Macao. Report, available at <http://monkey.ioz.ac.cn/bwg-cciced/english/bwg-cciced/tech-27.htm>. 29 pp.
- McCormack, T., Nguyen Xuan Thuan, and Hendrie, D.B. 2006. Assessing the potential of a localised conservation initiative focused on the critically endangered Indochinese Box Turtle (*Cuora bourreti*). Asian Turtle Program (ATP), Hanoi, Viet Nam. 36 pp
- McCormack, T., Le Mai Thanh Tram, Nguyen Tai Thang, Hoang Van Ha, and Le Duc Minh. 2010. Trade and field surveys of the turtle fauna of Ngoc Son Nature Reserve, Hoa Binh Province, Viet Nam. Asian Turtle Program (ATP), Hanoi, Viet Nam. 35 pp.
- McCormack, T. Notes on status and biology of *Cuora galbinifrons*. Letter to Viet Nam CITES MA, 29 Sept 2012.
- Nguyen Van Sang, Ho Thu Cuc, and Nguyen Quang Truong. 2009. *Herpetofauna of Vietnam*. Frankfurt am Main (Germany): edition Chimaira. ISBN 978-3-89973-462-1.
- O'Brien, S., Emahalala, E.R., Beard, V., Rakotondrainy, R.M., Reid, A., Raharisoa, V., and Coulson, T. 2003. Decline of the Madagascar radiated tortoise *Geochelone radiata* due to overexploitation. *Oryx*, Vol. 37 (3): 338-343.
- Obst, F.J., and Reimann, M.. 1994. Bemerkenswerte Variabilität bei *Cuora galbinifrons* BOURRET 1939, mit Beschreibung einer neuen Unterart: *C.galbinifrons bourreti* subsp. nov. *Zoologische Abhandlungen, Museum für Tierkunde Dresden*, Vol. 48: 125-137.

- Parham, J.F., Simison, W.B., Kozak, K.H., Feldman, C.R., and Shi H.T. 2001. New Chinese Turtles: endangered or invalid? A reassessment of two species using mitochondrial DNA, allozyme electrophoresis and known-locality specimens. *Animal Conservation*, Vol. 4: 357-367.
- Robertson, S. 2012. Proposal to up-list species of freshwater turtles native to Viet Nam to CITES Appendix I. Official Correspondence letter to Viet Nam CITES MA, No.197-CVVCS Dated 4th June 2012.
- Shi H., Parham, J.F., Lau, M.W.N., & Chen T.-H. 2007. Farming Endangered Turtles to Extinction in China. *Conservation Biology*, Vol. 21 (1): 5-6.
- Shi, H.T., Hou M., Pritchard, P., Peng J.J., Fan Z., and Yin F. (eds). 2008a. Identification Manual for Traded Turtles in China. China Encyclopedia Press, Beijing, China. 168 pp. ISBN 978-7-5000-7937-8.
- Shi H., Parham, J.F., Fan Z., Hong M., and Yin F. 2008b. Evidence for the massive scale of turtle farming in China. *Oryx*, Vol. 42 (1): 147-150.
- Spinks, P.Q., Thomson, R.C., Zhang, Y.P., Che, J., Wu, Y., and Shaffer, H.B. 2012. Species boundaries and phylogenetic relationships in the critically endangered Asian box turtle genus *Cuora*. *Molecular Phylogenetics and Evolution* 63 (2012): 656–667. doi:10.1016/j.ympev.2012.02.014
- Struijk, R. 2010. European Studbooks: *Cuora bourreti*, *Cuora galbinifrons*, and *Cuora picturata*. *Turtle Survival Alliance Magazine*, issue 10: 33-34.
- Stuart, B.L., and Timmins, R.J.. 2000. Conservation Status and Trade of Turtles in Laos. Pp. 58-62 in *Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia* (van Dijk, Stuart & Rhodin, eds.). Chelonian Research Monographs, No. 2.
- Stuart, B.L., van Dijk, P.P. and Douglas B. Hendrie, D.B. 2002 "2001". *Photographic Guide to the Turtles of Thailand, Laos, Vietnam and Cambodia*. Four bilingual versions, Khmer/English (ISBN 0-9632064-6-X), Laotian/English (ISBN 0-9632064-7-8), Thai/English (ISBN 0-9632064-8-6), and Vietnamese/English (ISBN 0-9632064-9-4); each 84 pp. Wildlife Conservation Society Asia Program, July 2002.
- Stuart, B.L., and Parham, J.F. 2004. Molecular phylogeny of the critically endangered Indochinese box turtle (*Cuora galbinifrons*). *Molecular Phylogenetics and Evolution* 31 (2004): 164–177. doi:10.1016/S1055-7903(03)00258-6.
- Stuart, B.L., and Platt, S.G. 2004. Recent Records of Turtles and Tortoises from Laos, Cambodia, and Vietnam. *Asiatic Herpetological Research*, Vol. 10: 129-150
- Stuart, B.L., Hallam, C.D., Sayavong, S., Nanthavong, C., Sayaleng, S., Vongsa, O., and Robichaud, W.G.. 2011. Two Additions to the Turtle Fauna of Laos. *Chelonian Conservation and Biology*, 10(1): 113-116.
- Tabaka, C. 2002. Differentiating *Cuora galbinifrons* subspecies. <http://www.chelonia.org/Articles/Differentiatinggalbies.htm> [accessed 27 Sept 2012]
- TTWG [Turtle Taxonomy Working Group]. 2014. Turtles of the world, 7th edition: annotated checklist of taxonomy, synonymy, distribution with maps, and conservation status. In: Rhodin, et al. (Eds.). *Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group*. Chelonian Research Monographs 5(7):000.329–479, doi:10.3854/crm.5.000.checklist.v7.2014.
- Uetz, P. (editor). 2015. The Reptile Database. <http://www.reptile-database.org>, accessed 18 June 2015.
- UNEP-WCMC CITES Trade Database. *Cuora galbinifrons*. Consulted 17 June 2015.
- Wang Z., Gong S., Shi H., Zhang Y., and Xu J. 2004. Survey on Turtle Trade in Haikou, Hainan Province, China. *Sichuan Journal of Zoology*, Vol. 24 (3): 414-417.
- Wu, J. 2007. World Without Borders: Wildlife trade on the Chinese-language Internet. *Traffic Bulletin*, Vol. 21 (2): 75-84.
- Zhou T., Zhao H., & McCord, W.P.. 2005. Captive Breeding of Chelonians in Hainan Province, China. *Reptilia*, (GB), issue 41: 39-42.
- Zhou T., Huang C., McCord, W.P., and Blanck, T.. 2008. Captive Breeding of hard-Shell Chelonians in China. *Reptilia* (GB), issue 61: 27-34.
- Zhou Z. and Jiang Z. 2008. Characteristics and Risk Assessment of International Trade in Tortoises and freshwater Turtles in China. *Chelonian Conservation and Biology*, Vol. 7 (1): 28-36.

*Cuora [galbinifrons] galbinifrons*1. Taxonomy

- 1.1 Class: Reptilia
- 1.2 Order: Testudines
- 1.3 Family: Geoemydidae
- 1.4 Genus, species or subspecies, including author and year: *Cuora galbinifrons* Bourret, 1939

In the preparation of the review of *Cuora galbinifrons*, it was noted that the majority of recent taxonomic works concerning the turtle genus *Cuora* do not follow the CITES Standard Nomenclature for turtles (Fritz & Havas, 2007) in treating the taxa *bourreti* and *picturata* as subspecies of *Cuora galbinifrons*; instead, recent checklists and compilations of turtle taxonomy (for example, Nguyen et al., 2009; TTWG 2014; Uetz, 2015) have followed Stuart and Parham (2004) and Spinks *et al.* (2012) and treat these as distinct, valid species, *Cuora bourreti* and *Cuora picturata*. Consequently, Viet Nam recommends that at CoP17, an additional Standard Reference be adopted for nomenclature of *Cuora bourreti*, *Cuora galbinifrons*, and *Cuora picturata*. In preparation for such updated nomenclature, this account reviews available information for *Cuora galbinifrons* sensu stricto, being the nominate subspecies *C. galbinifrons galbinifrons* under the current Standard Reference (Fritz & Havas, 2007).

- 1.5 Scientific synonyms: *Cyclemys flavomarginata hainanensis* Li, 1958 = *Cuora galbinifrons*, *Cuora galbinifrons serrata* Iverson & McCord, 1992 – documented by Parham *et al.* (2001) to be a hybrid between *Cuora galbinifrons* and *Cuora mouhotii*.
- 1.6 Common names:
- | | |
|-------------|---|
| English: | Indochinese Box Turtle; Flowerback Box Turtle |
| French: | Tortue-boîte à front jaune |
| Spanish: | Tortuga caja de Indochina |
| Vietnamese: | Rua hop tran vang |
- 1.7 Code numbers: ITIS TSN 551910.

2. Overview

Cuora galbinifrons was listed in CITES Appendix II, as part of *Cuora* spp., by unanimous adoption at CoP 11 (CoP11 Prop.36), which came into effect on 19 July 2000. A zero quota was imposed for *Cuora galbinifrons* (including *bourreti* and *picturata* as subspecies) at CoP16 (CoP16 Prop.32), effective 12 June 2013.

Cuora galbinifrons is currently assessed in the IUCN Red List as Critically Endangered. That assessment dates from 2000 and included *bourreti*, *galbinifrons* and *picturata* as subspecies of *galbinifrons*.

The primary threat to *Cuora galbinifrons* is collection for trade. Populations are widely perceived to have declined severely as a direct result of over-collection. Calculated population densities are at less than one animal per square km inside protected areas with suitable habitat. The species is in high demand in the international pet trade and the Asian consumption trade. Collection efforts include both casual encounters when collecting other forest products, and targeted searches for turtles involving trained dogs and/or burning undergrowth to drive and expose turtles. Turtles encountered are collected, regardless of legal protection status or location inside protected areas. Collected turtles are traded, mostly illegally, through a network of local middlemen before being exported or consumed locally. Documented market trade

volumes may be several orders of magnitude greater than total reported legal trade volumes. Habitat loss and degradation is a secondary threat to the species.

Cuora galbinifrons is legally protected from exploitation in all range countries, but enforcement may be insufficient. To address illegal trade in this species, its protection status in national laws and under CITES must be increased. This species warrants transfer to Appendix I of CITES, as it meets Criterion C i) of Annex I of Res.Conf.9.24(Rev.CoP15), by having been documented to have declined severely across its range as a result of collection for trade (see section 4.4), and meets criterion C ii) as the pattern of local, casual exploitation combined with unsustainable targeted collection for trade (see sections 5 and 6.4) will likely continue unless stronger measures are implemented, and the slow recruitment and late maturity make the species intrinsically vulnerable to exploitation (see sections 3.3 and 6.5).

3. Species characteristics

3.1 Distribution

Cuora [galbinifrons] galbinifrons is confirmed to occur in Hainan and Guangxi in PR China, in northern Lao PDR, and in northern Viet Nam at least as far south as Nghe An province (Iverson, 1992; Stuart *et al.*, 2002; Stuart & Parham, 2004; Stuart & Platt, 2004; Fritz & Havas, 2007; Shi *et al.*, 2008a)

3.2 Habitat

Cuora [g.] galbinifrons inhabits upland, moist, closed-canopy forest, usually between 300 and 1700 m altitude. The species is predominantly terrestrial and is not specifically associated with forest streams, though animals can swim relatively well and can be seen, at least in captivity, wallowing in shallow water or swampy areas. It is considered a cool forest turtle, with temperatures exceeding 28°C often resulting in stress and poor incubation success in captive animals (Stuart & Platt, 2004; Wang *et al.*, 2011; T.McCormack, in litt. to VN MA, 29 Sept 2012).

3.3 Biological characteristics

Extremely little is known of the biology of *Cuora galbinifrons* in the wild; most observations on diet, growth and reproduction derive from animals maintained in captivity, either within or close to the species' natural range, or in artificially manipulated captive conditions such as terrariums.

The species appears to be omnivorous; its recorded diet includes earthworms, carrion and fruit. Research on movement patterns, microhabitat use and other aspects of natural history have been carried out at the population of Diao Luo Shan in Hainan, China (Wang *et al.*, 2011).

Slow growth (10-15 years) to maturity is combined with low fecundity; in captivity a single clutch of 1-3 eggs is seen each year in Cuc Phuong National Park where a small group is maintained (McCormack, in litt. To VN MA, 29 Sept 2012). Similar clutch sizes of 1 to 3 eggs have been reported from long-term captive animals kept in Europe and North America (Bruin, 1994; Struijk, 2010).

3.4 Morphological characteristics

Cuora [g.] galbinifrons is a medium-sized turtle, reaching up to 19 cm carapace length at a weight of about 800 to 1200 grams. Males and females reach about the same size. Hatchlings measure about 45-50 mm and weigh 15-24 grams. The carapace (upper shell) is smooth, rounded and high-domed. The plastron (lower shell) has a very distinct hinge which allows the front and rear parts of the plastron to be raised up against the carapace, closing both front and back shell openings completely. It shows a very distinct yellow or orange area on each side of the carapace, contrasting strongly with the remainder of the shell which is mainly rich dark brown. The shell is relatively long and oval when viewed from above. The middle of the carapace shows a broad brown band with black edges; the brown band splits on the first vertebral scute, and only two narrow extensions reach forward to the carapace margin, enclosing a yellow area above the neck. A fine yellow, black-edged vertebral line is normally present. The lower 2/3 of each costal scute area is uniform yellow (sometimes with small black markings), creating a distinct large yellow 'window'. Most of the marginals are dark brown or black, including upper area and underside. The plastron is uniform black, or in some older animals is mostly black with some irregular areas of less dense pigmentation appearing yellowish in the midline and/or along scute seams. The head colouration variable, and usually shows areas of bright yellow,

orange and red and fine black speckling. The front limbs are generally dark, with some of the large scales being bright yellow or orange.

3.5 Role of the species in its ecosystem

The role of *Cuora [g.] galbinifrons* in its native upland forest ecosystems is unknown; by analogy with other forest turtles, the species likely plays a modest ecological role in the dispersal of plant seeds and mushroom spores, and as a consumer of invertebrates.

4. Status and trends

Cuora galbinifrons is currently assessed in the IUCN Red List as Critically Endangered. That assessment dates from 2000 and included *bourreti*, *galbinifrons* and *picturata* as subspecies of *galbinifrons*. The 2015 reassessment, currently in progress, indicates that *Cuora galbinifrons* (without *bourreti* or *picturata* as subspecies) will be assessed as Critically Endangered in its own right. *Cuora galbinifrons* was not included in the 1982 Amphibia-Reptilia Red Data Book; it was listed as 'K – Insufficiently Known (suspected to be threatened)' from 1988 to 1994, before being assessed as Lower Risk: near threatened in 1996.

4.1 Habitat trends

Forest cover in Viet Nam fell from 14.3 million ha (43% land area) in 1943 to 9.5 million ha (29%) in 1973, and since then the area under forest cover has appeared relatively stable at assessments in 1979-81 and 1995 (FAO, 1997; FSIV, 2009). Recent increases in forest cover since the early 2000 have largely been due to the 1998-2010 goal to reforest 5 million ha under national decision No. 661/QD-TTg (661 Programme: Decision No. 661/QD-TTg dated 29 July 1998 by the Prime Minister on objectives, tasks, policy and Organisation for implementation the 5 million hectares afforestation national programme) (ICEM 2003). Reforestation has mostly been monoculture, while the primary forests on which this species depends continues to be lost or degraded.

Quantitative data on primary forest area or trends in P.R. China or Lao PDR are not available at the time of writing this review.

4.2 Population size

Wang et al. (2011) calculated a population density of 0.7862 *C. [g.] galbinifrons* per square km at Diaoluoshan nature reserve in Hainan, based on surveying six sampling areas with 424 baited traps over a total of 6360 trap-days. Elsewhere for *Cuora [g.] galbinifrons*, only anecdotal relative population density data are available. All recent indications are that the species requires extensive search effort to encounter. During field surveys in Lao PDR in 1993-1999, encounter rates were at the order of one turtle per three months in the field for a herpetologist, and one *Cuora galbinifrons* per day when working with a trained turtle hunting dog in prime turtle habitat (Stuart & Timmins, 2000).

4.3 Population structure

No population structure data are available. No distinct sex bias has been observed during field or trade surveys. All age classes except hatchlings are seen in trade; juveniles are normally kept at the village level as traders prefer not to buy very small individuals.

4.4 Population trends

A great deal of survey work has been undertaken in Viet Nam between 2009 – 2012 focused on determining the range and priority habitat for *Cuora galbinifrons*. Anecdotal information from interviews throughout the range documented that historic quantities of the species available for collection in the forest have been greatly reduced, with many hunters stating that while the species was common 7-15 years ago, it is now increasingly difficult to find. Corresponding increases in wholesale prices paid have been documented during interviews throughout the species range in Viet Nam (T.McCormack, in litt to VN MA, 29 Sept 2012).

4.5 Geographic trends

All available information indicates that the species is intensively collected throughout its range in PR China, Lao PDR and Viet Nam.

5. Threats

The primary threat to *Cuora [g.] galbinifrons* has been collection for trade. The species continues to be in high demand in the international pet trade and the Asian consumption trade. Collection efforts include both targeted searches for turtles involving trained dogs, or occasionally pitfall traps, as well as capitalizing on casual turtle encounters when collecting other forest products. Turtles, of any species, are collected whenever and wherever encountered in the region, regardless of legal protection status or location inside protected areas. Collected turtles are traded, mostly illegally, through a network of local middlemen before being exported or consumed locally. Increasing economic value has ensured that hunting pressure is sustained despite the increasing rarity of the species (Hendrie, 2000; Stuart & Timmins, 2000; McCormack et al., 2010). Habitat loss and degradation are considered a significant but more localized threat to the species.

6. Utilization and trade

6.1 National utilization

Historically *Cuora [g.] galbinifrons* have been consumed locally for food as part of a subsistence diet, however in the last decade consumption has largely ceased with most animals now sold into the trade due to the high economic incentive. Juvenile animals are often kept at the village level in attempts to raise them to sell on into the trade (often unsuccessful, with animals dying). The species does not have specific local medicinal uses, but bones are often sold to traders for production of bone glue. In some areas turtles of all species are consumed as broad “health invigorators”. The *Cuora galbinifrons* group represents the second most valuable type of turtle in trade in Viet Nam and Lao PDR after the *C. trifasciata* complex (Stuart in litt., to IUCN and TRAFFIC, 2012).

6.2 Legal trade

The UNEP-WCMC CITES Trade Database records a total of 2377 live specimens and 17 specimens as net and gross exports during the period 1998-2014. Reported net imports during the same period comprised 3282 live animals and 35 specimens, while gross imports comprised 3363 live animals and 35 specimens.

Tabulation of reported Net Exports of *Cuora galbinifrons*, 1998-2014; no records are entered for 1998, 2005, 2008, or 2011. Consulted 17 June 2015.

Term	Country	1999	2000	2001	2002	2003	2004	2006	2007	2009	2010	2012	2013	Total
live	CN				24		6		5		3			38
live	LA							1500						1500
live	VN	7	33	16								175	608	839
specimens	VN					14	2			1				17

Noteworthy is the report of a single shipment of 1500 animals, with source code ‘ranched’, originating from Lao PDR and reported as imports by Viet Nam, representing nearly 60% of all reported trade.

The UNEP-WCMC CITES Trade Database does not specify subspecies; thus the data above cannot be used to elucidate trends in the trade of *galbinifrons sensu stricto*, *bourreti* or *picturata*.

Largest importers are Viet Nam (1501, including the aforementioned shipment from Lao PDR), United States (776), Japan (634), Hong Kong (161), and Spain (90), with Belgium, Germany, Jersey, Switzerland, Taiwan, Thailand, the United Kingdom, and the Czech Republic each declaring imports of between 10 and 30 animals during the period.

The UNEP-WCMC CITES Trade Database does not specify subspecies; thus the data above cannot be used to elucidate trends in the trade of *galbinifrons sensu stricto*, *bourreti* or *picturata*.

6.3 Parts and derivatives in trade

All turtle shells are bought in Viet Nam by traders to make into a generic bone glue, plastrons are normally preferred. In some areas shell fragments are discarded. In many areas shells considered beautiful are kept as household decorations, this is often seen with *Cuora galbinifrons* and *Manouria impressa*.

Some shells or shell fragments are traded internationally: Chen *et al.* (2009) recorded that *Cuora galbinifrons* were rare but present among imported turtle shells for Chinese traditional medicine in Taiwan.

6.4 Illegal trade

Visible trade in *Cuora galbinifrons* at Hanoi's principal wildlife market, Don Xuan, stopped by about 2006 due to better market enforcement. Prior to this, dozens of *Cuora galbinifrons* were regularly available each week, these were often juvenile animals and intended for the pet market, not food.

It is believed that most *Cuora galbinifrons* traded in Viet Nam are exported to third markets. The species was present in nearly every reported market survey that looked at turtle trade in China and Hong Kong since recording began in 1993.

IUCN and TRAFFIC (2012) noted that reported seizures involving *Cuora galbinifrons* provide evidence of illegal activities involving this species, although it is unclear whether any/all of these shipments were destined for international markets. In 1998, Vietnamese authorities reported having seized an estimated 700 (800 kg) of turtles and tortoises of 13 species, of which a small number were *C. galbinifrons*, from a public bus destined for Hanoi. The trader claimed that the animals were raised on farms in southern Viet Nam, but information provided to the authorities suggested they were collected from the wild in Viet Nam, Laos PDR and possibly Cambodia. The cargo was for possible onward shipment to the Chinese market (TRAFFIC, 2012). In 1999, an estimated 150 *C. galbinifrons* were among specimens seized from a truck travelling from Central Viet Nam to Hanoi, which, at the time, was the largest number of specimens of this species observed in a single trade seizure (Hendrie, 1999). In 2004, 277 kg of turtles were seized en route to Vinh City, Viet Nam, of which an unknown number were *C. galbinifrons*. Police suspected that the turtles came across the border from Lao PDR (TRAFFIC, 2012).

6.5 Actual or potential trade impacts

Long-lived, late-maturing species with limited annual reproductive output and high juvenile mortality, as exemplified by *Cuora galbinifrons*, have proven to be highly susceptible to overexploitation, particularly of adult animals (Doroff & Keith, 1990; Gibbons, 1990; Congdon *et al.*, 1993; O'Brien *et al.*, 2003). The population trend data in section 4.4 strongly suggests that *Cuora galbinifrons* has been subject to unsustainable collection for the past 15-20 years and this has resulted in the depletion if not collapse of each populations that has been surveyed. Of particular significance is that commercial turtle farms in East Asia create a specific demand for animals collected from the wild, being considered the primary purchasers of wild-collected turtles and driving the collection of the last remaining wild animals through increased trade prices (Shi *et al.*, 2007).

In an analysis of risk posed by international trade, *Cuora galbinifrons* emerged with a relatively high score (1.5 out of a maximum of 2.0) of endangerment from trade (Zhou & Jiang, 2008).

7. Legal instruments

7.1 National

P.R. China: The People's Republic of China Wild Animals Protection Law (1989) forms the national cornerstone of protection of wildlife species. The Wild Animals Protection Law also covers important economic and scientific species; *Cuora galbinifrons* is included in the list of *National Protected Terrestrial Wild Animals that are Beneficial, or with Important Economic and Scientific Research Value*, which was published by the State Forestry Administration in 2000. For terrestrial species, the State Forestry Administration is responsible for the administering and enforcing of this law, while the Fisheries Ministry is responsible for the aquatic species. The collecting of state major protected species is only allowed for scientific research, captive-breeding, exhibition and other special reasons.

The transport of state major protected species across county boundary needs the permission from the provincial Forestry or Fisheries Department. The import and export of these state major protected species and CITES-listed species need the permission from the Forestry or Fisheries bureau in the central government and a certificate issued by the Endangered Species Import and Export Management Office of the People's Republic of China (Shi & Lau, 2000; Endangered Species Import and Export Management Office of the People's Republic of China, 2002a).

Lao P.D.R.: Principles, regulations and measures for the protection and management of wildlife are governed by the Wildlife and Aquatic Species Law (No07/NA 24 December 2007); *Cuora galbinifrons* is listed under Prohibited Category I, the highest the protective category, banning hunting and collection year-round.

Viet Nam: *Cuora galbinifrons* is protected from commercial exploitation as a Priority Protected Rare, Precious and Endangered Species under Decree 160/2013/ND-CP of the Government.

7.2 International

Cuora galbinifrons was included in CITES Appendix II at CoP 11 (Proposal 36, Gigiri, Kenya, 2000), and was selected for the Review of Significant Trade (RST) at AC17; its progress through the RST process was detailed on pages 21-22 of document AC25 Doc. 19. A zero quota was imposed for *Cuora galbinifrons* at CoP16 (CoP16 Prop.32), effective 12 June 2013.

The genus *Cuora*, including *Cuora galbinifrons*, is included in Annex B of EU Commission Regulation no. 709/2010 (amending EC Regulation 338/97), which requires that a corresponding import permit must be issued by the country of import before a shipment of the species can enter the European Union. Since 10 May 2006, imports of wild specimens of *C. galbinifrons* from China have been subject to an EU import suspension (implemented on the basis of Article 4(6)(b) Council Regulation (EC) No 338/97). EU import suspensions have been in place for imports of wild specimens of this species from Viet Nam and Lao PDR since 26 November 2010.

Health inspection certification is required by a number of countries before live animals, including turtles, may be imported.

The recommended conditions for transport of live turtles by air are detailed in the IATA Live Animals Regulations; compulsory adherence to these Live Animal Regulations has been adopted by legislation in a number of countries, and is required by a number of international airlines.

8. Species management

8.1 Management measures

Populations of *Cuora galbinifrons* are not known to be managed or manipulated for sustainable offtake in any part of its range.

8.2 Population monitoring

No population monitoring programs are known to be in place for *Cuora galbinifrons* anywhere in the species' range.

8.3 Control measures

8.3.1 International

Since its inclusion in CITES Appendix II, international shipments of *Cuora galbinifrons* are required to be accompanied by appropriate export permits, and subject to the customary checks by customs and wildlife authorities at the points of export and import.

8.3.2 Domestic

Wildlife authorities, customs and enforcement authorities of the range and trading countries have made great efforts to ensure that turtles traded within their jurisdiction are legal and regulated, as evidenced by extensive record of confiscations of illegally traded turtles in the countries of the region ([AC25 Doc.19, Annex C](#)). However, resources such as officers trained

in wildlife identification and identification materials in local languages remain limited, and in many cases the judicial system does not give high priority to wildlife crimes.

8.4 Captive breeding and artificial propagation

The Turtle Conservation Centre at Cuc Phuong National Park has been breeding *Cuora [g.] galbinifrons* with limited success; survival of eggs is low and long-term survival of hatchlings is lower. Some early hatchlings are now (2015) nearing ten years of age. Low incubation temperatures, 25-28°C, are an important factor for successful reproduction, as are cool, humid environmental conditions for juveniles and a high protein diet.

Cuora galbinifrons is maintained in modest numbers in captivity by hobbyists in Asia, Europe, North America and elsewhere, and has been bred in captivity, but continues to be regarded as a difficult, sensitive species that is challenging (but not impossible) to establish and reproduce consistently in captivity (Buskirk, 1989; de Bruin, 1994; Struijk, 2010). A European studbook exist for the species since the late 1990s, with 78 registered animals maintained at institutions and private keepers in eight countries in 2009 (Struijk, 2010).

8.5 Habitat conservation

Habitat conservation, in the form of National Parks, Special Conservation Areas, and other protected areas, is in place across much of the range of *Cuora [g.] galbinifrons*, and several records of these turtles originate from inside protected areas (Stuart & Platt, 2004; McCormack *et al.*, 2006; Wang *et al.*, 2011). However, designation as protected area does not necessarily lead to effective restrictions on the collection of turtles and other 'forest products', and is insufficient by itself to safeguard viable populations of the species in its natural habitat.

8.6 Safeguards

None applicable beyond legal, regulatory and enforcement processes in place, including the need for non-detriment findings and inspections of shipments in international trade.

9. Information on similar species

Cuora box turtles can be separated from all other turtles by the combination of possessing a single hinge on the plastron allowing them to effectively close their shell, their distinctly domed to highly domed shell, and generally bright facial colouration that includes a strip of granular skin between the eye and tympanum. The taxa *bourreti*, *galbinifrons* and *picturata* are unique among all turtles in possessing a large yellow to orange area on each side of the carapace. Detailed information to differentiate these three forms was provided by Tabaka (2002, available online) and repeated in proposal CoP16 Prop. 33.

10. Consultations

11. Additional remarks

12. References

- Artner, H., and Hofer, A. 2001. Observations in the Qing Ping Free Market, Guangzhou, China, November 2000. *Turtle and Tortoise Newsletter*, issue 3: 14
- Bourret, R. 1939. Notes Herpétologiques sur l'Indochine Française. XVIII. Reptiles et Batraciens reçus au Laboratoire des Sciences Naturelles de l'Université au cours de l'année 1939. Description de quatre espèces et d'une variété nouvelles. *Annexe au Bulletin Général de l'Instruction Publique*, no. 4, December 1939: 1-40.
- Bruin, R.W.F. de. 1994. De Indochinese doosschildpad (*Cuora galbinifrons*) in het terrarium. *Lacerta*, Vol. 52 (3): 58-66.
- Buskirk, James R. 1988. The Indochinese box turtle, *Cuora galbinifrons*: A perspective on captive management. *The Vivarium*, 1 (1): 22-25.

- Chen, T.H., Chang, H.C., and Lue, K.Y. 2009. Unregulated trade in turtle shells for Chinese traditional medicine in East and Southeast Asia: the case of Taiwan. *Chelonian Conservation and Biology*, Vol. 8 (1): 11-18.
- Cheung, S.M., and Dudgeon, D. 2006. Quantifying the Asian turtle crisis: market surveys in southern China, 2000-2003. *Aquatic Conservation: Marine and Freshwater Ecosystems*, Vol. 16: 751-770.
- Congdon, J.D., Dunham, A.E., and Van Loben Sels, R.C. 1993. Delayed Sexual Maturity and Demographics of Blanding's Turtles (*Emydoidea blandingii*): Implications for Conservation and Management of Long-lived Organisms. *Conservation Biology*, Vol. 7 (2): 387-399.
- Doroff, A. M., and Keith, L.B. 1990. Demography and Ecology of an Ornate Box Turtle (*Terrapene ornata*) Population in South-Central Wisconsin. *Copeia*, 1990 (2): 387-399.
- Endangered Species Import and Export Management Office of the People's Republic of China. 2002a. *Identification Manual for Common Turtles and Tortoises*. China Forestry Publishing House, Beijing, China. 174 pp. ISBN 7-5038-3022-0.
- Endangered Species Import and Export Management Office of the People's Republic of China [H. Shi & Z. Fan]. 2002b. Report on the Captive Breeding of Tortoises and Freshwater Turtles in China. CITES Document CoP12 Inf. 8. 19 pp.
- FAO [Food and Agriculture Organization]. 1997. *Country Report – Vietnam*. Asia-Pacific Forestry Sector Outlook Study II - Working Papers Series, working paper No. APFSOS II/WP/2009/09.
- Fritz, U., and Havas, P.. 2007. Checklist of Chelonians of the World. *Vertebrate Zoology*, Vol. 57 (2): 149-368.
- FSIV [Forest Science Institute of Viet Nam]. 2009. Viet Nam Forestry Outlook Study. Asia-Pacific Forestry Sector Outlook Study Working Papers Series, working paper No. APFSOS/WP/31.
- Germany, Scientific Authority. 2003. Development of mid- and long-term Conservation Measures for Tortoises and Freshwater Turtles. AC 19 Doc 15.2 (Rev.1).
- Gibbons, J. Whitfield (editor). 1990. *Life History and Ecology of the Slider Turtle*. Smithsonian Institution Press, Washington D.C. & London. 368 pp.
- Gong S., Fu Y., Wang J., Shi H., and Xu R. 2005. Freshwater turtle trade in Hainan and suggestions for effective management. *Biodiversity Science*, Vol. 13 (3): 239-247.
- Gong S., Wang J, Shi H., Song R & Xu R. 2006. Illegal trade and conservation requirements of freshwater turtles in Nanmao, Hainan Province, China. *Oryx*, Vol. 40(3): 331-336.
- Gong S., Chow, A.T., Fong, J.J., and Shi H.. 2009. Chelonian trade in the largest pet market in China: scale, scope and impact on turtle conservation. *Oryx*, Vol. 43(2): 213-216.
- Hendrie, D.B. 2000. Status and Conservation of Tortoises and Freshwater Turtles in Vietnam. Pp. 63-73 in *Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia* (van Dijk, Stuart & Rhodin, eds.). Chelonian Research Monographs, Number 2.
- Horne, B.D., Poole, C.M., and Walde, A.D. (eds). 2012. Conservation of Asian Tortoises and Freshwater Turtles: Setting Priorities for the Next Ten Years. Recommendations and Conclusions from the Workshop in Singapore, February 21-24, 2011. ISBN: 978-981-07-1737-7. <http://www.cites.org/common/com/AC/26/SG-Tortoise-&Freshwater-Turtle-Workshop-Report.pdf>
- ICEM (International Center for Environmental management). 2003. *Vietnam National Report on Protected Areas and Development*. Review of Protected Areas and Development in the Lower Mekong River Region, Indooroopilly, Queensland, Australia. 60 pp.
- IUCN and TRAFFIC. 2012. IUCN/TRAFFIC Analyses of the Proposals to amend the CITES Appendices. Prepared by IUCN Global Species Programme and TRAFFIC for the Sixteenth Meeting of the Conference of the Parties to CITES. IUCN – International Union for the Conservation of nature, Gland, Switzerland. 103 pp.
- Lau, M.W.N., Ades, G., Goodyer, N., and Zou, F.S. 1995. Wildlife Trade in Southern China including Hong Kong and Macao. Report, available at <http://monkey.ioz.ac.cn/bwg-cciced/english/bwg-cciced/tech-27.htm>. 29 pp.
- Li Z.Y. 1958. Report on the investigation of reptiles of Hainan Island. *Chinese Journal of Zoology*, Vol. 2 (4): 234-239.

- McCormack, T., Le Mai Thanh Tram, Nguyen Tai Thang, Hoang Van Ha, and Le Duc Minh. 2010. Trade and field surveys of the turtle fauna of Ngoc Son Nature Reserve, Hoa Binh Province, Viet Nam. Asian Turtle Program (ATP), Hanoi, Viet Nam. 35 pp.
- McCormack, T. Notes on status and biology of *Cuora galbinifrons*. Letter to Viet Nam CITES MA, 29 Sept 2012.
- Nguyen Van Sang, Ho Thu Cuc, and Nguyen Quang Truong. 2009. *Herpetofauna of Vietnam*. Frankfurt am Main (Germany): edition Chimaira. ISBN 978-3-89973-462-1.
- O'Brien, S., Emahalala, E.R., Beard, V., Rakotondrainy, R.M., Reid, A., Raharisoa, V., and Coulson, T. 2003. Decline of the Madagascar radiated tortoise *Geochelone radiata* due to overexploitation. *Oryx*, Vol. 37 (3): 338-343.
- Obst, F.J., and Reimann, M.. 1994. Bemerkenswerte Variabilität bei *Cuora galbinifrons* BOURRET 1939, mit Beschreibung einer neuen Unterart: *C.galbinifrons bourreti* subsp. nov. *Zoologische Abhandlungen, Museum für Tierkunde Dresden*, Vol. 48: 125-137.
- Parham, J.F., Simison, W.B., Kozak, K.H., Feldman, C.R., and Shi H.T. 2001. New Chinese Turtles: endangered or invalid? A reassessment of two species using mitochondrial DNA, allozyme electrophoresis and known-locality specimens. *Animal Conservation*, Vol. 4: 357-367.
- Robertson, S. 2012. Proposal to up-list species of freshwater turtles native to Viet Nam to CITES Appendix I. Official Correspondence letter to Viet Nam CITES MA, No.197-CVWCS Dated 4th June 2012.
- Shi H., Parham, J.F., Lau, M.W.N., & Chen T.-H. 2007. Farming Endangered Turtles to Extinction in China. *Conservation Biology*, Vol. 21 (1): 5-6.
- Shi, H.T., Hou M., Pritchard, P., Peng J.J., Fan Z., and Yin F. (eds). 2008a. Identification Manual for Traded Turtles in China. China Encyclopedia Press, Beijing, China. 168 pp. ISBN 978-7-5000-7937-8.
- Shi H., Parham, J.F., Fan Z., Hong M., and Yin F. 2008b. Evidence for the massive scale of turtle farming in China. *Oryx*, Vol. 42 (1): 147-150.
- Spinks, P.Q., Thomson, R.C., Zhang, Y.P., Che, J., Wu, Y., and Shaffer, H.B. 2012. Species boundaries and phylogenetic relationships in the critically endangered Asian box turtle genus *Cuora*. *Molecular Phylogenetics and Evolution* 63 (2012): 656–667. doi:10.1016/j.ympev.2012.02.014
- Struijk, R. 2010. European Studbooks: *Cuora bourreti*, *Cuora galbinifrons*, and *Cuora picturata*. *Turtle Survival Alliance Magazine*, issue 10: 33-34.
- Stuart, B.L., and Timmins, R.J.. 2000. Conservation Status and Trade of Turtles in Laos. Pp. 58-62 in *Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia* (van Dijk, Stuart & Rhodin, eds.). Chelonian Research Monographs, No. 2.
- Stuart, B.L., van Dijk, P.P. and Douglas B. Hendrie, D.B. 2002 "2001". *Photographic Guide to the Turtles of Thailand, Laos, Vietnam and Cambodia*. Four bilingual versions, Khmer/English (ISBN 0-9632064-6-X), Laotian/English (ISBN 0-9632064-7-8), Thai/English (ISBN 0-9632064-8-6), and Vietnamese/English (ISBN 0-9632064-9-4); each 84 pp. Wildlife Conservation Society Asia Program, July 2002.
- Stuart, B.L., and Parham, J.F. 2004. Molecular phylogeny of the critically endangered Indochinese box turtle (*Cuora galbinifrons*). *Molecular Phylogenetics and Evolution* 31 (2004): 164–177. doi:10.1016/S1055-7903(03)00258-6.
- Stuart, B.L., and Platt, S.G. 2004. Recent Records of Turtles and Tortoises from Laos, Cambodia, and Vietnam. *Asiatic Herpetological Research*, Vol. 10: 129-150
- Stuart, B.L., Hallam, C.D., Sayavong, S., Nanthavong, C., Sayaleng, S., Vongsa, O., and Robichaud, W.G.. 2011. Two Additions to the Turtle Fauna of Laos. *Chelonian Conservation and Biology*, 10(1): 113-116.
- Tabaka, C. 2002. Differentiating *Cuora galbinifrons* subspecies. <http://www.chelonia.org/Articles/Differentiatinggalbies.htm> [accessed 27 Sept 2012]
- TRAFFIC. 2012. *Seizures and prosecutions: March 1997-October 2012*. TRAFFIC Bulletin, Cambridge, UK
- TTWG [Turtle Taxonomy Working Group]. 2014. Turtles of the world, 7th edition: annotated checklist of taxonomy, synonymy, distribution with maps, and conservation status. In: Rhodin, et al. (Eds.). *Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group*. Chelonian Research Monographs 5(7):000.329–479, doi:10.3854/crm.5.000.checklist.v7.2014.

- Uetz, P. (editor). 2015. The Reptile Database. <http://www.reptile-database.org>, accessed 18 June 2015.
- UNEP-WCMC CITES Trade Database. *Cuora galbinifrons*. Consulted 17 June 2015.
- Wang Z., Gong S., Shi H., Zhang Y., and Xu J. 2004. Survey on Turtle Trade in Haikou, Hainan Province, China. *Sichuan Journal of Zoology*, Vol. 24 (3): 414-417.
- Wang J., Shi H., Xue C., Wang L., and Zhao E. 2011. Population Densities of *Cuora galbinifrons* at Diaoluoshan Nature Reserve, Hainan Island, China. *Sichuan Journal of Zoology*, Vol. 30 (3): 471-474.
- Wu, J. 2007. World Without Borders: Wildlife trade on the Chinese-language Internet. *Traffic Bulletin*, Vol. 21 (2): 75-84.
- Zhao, E. (Compiler). 1998. *China Red Data Book of Endangered Animals: Amphibia and Reptilia*. National Environment Protection Agency, Endangered Species Scientific Commission, P.R.C. Science Press, Beijing, Hong Kong, New York.
- Zhou T., Zhao H., & McCord, W.P.. 2005. Captive Breeding of Chelonians in Hainan Province, China. *Reptilia*, (GB), issue 41: 39-42.
- Zhou T., Huang C., McCord, W.P., and Blanck, T.. 2008. Captive Breeding of hard-Shell Chelonians in China. *Reptilia* (GB), issue 61: 27-34.
- Zhou Z. and Jiang Z. 2008. Characteristics and Risk Assessment of International Trade in Tortoises and freshwater Turtles in China. *Chelonian Conservation and Biology*, Vol. 7 (1): 28-36.

*Cuora [galbinifrons] picturata*1. Taxonomy

- 1.1 Class: Reptilia
- 1.2 Order: Testudines
- 1.3 Family: Geoemydidae
- 1.4 Genus, species or subspecies, including author and year: *Cuora picturata* Lehr, Fritz & Obst, 1998, *Cuora galbinifrons picturata* Lehr, Fritz & Obst, 1998

In the preparation of the review of *Cuora galbinifrons*, it was noted that the majority of recent taxonomic works concerning the turtle genus *Cuora* do not follow the CITES Standard Nomenclature for turtles (Fritz & Havas, 2007) in treating the taxa *bourreti* and *picturata* as subspecies of *Cuora galbinifrons*; instead, recent checklists and compilations of turtle taxonomy (for example, Nguyen et al., 2009; TTWG 2014; Uetz, 2015) have followed Stuart and Parham (2004) and Spinks *et al.* (2012) and treat these as distinct, valid species, *Cuora bourreti* and *Cuora picturata*. Consequently, Viet Nam recommends that at CoP17, an additional Standard Reference be adopted for nomenclature of *Cuora bourreti*, *Cuora galbinifrons*, and *Cuora picturata*. In preparation for such updated nomenclature, this account reviews available information for *Cuora [galbinifrons] picturata*.

- 1.5 Scientific synonyms: No taxa have been synonymized; see Fritz & Havas 2007:217 for a history of the use of the name.
- 1.6 Common names: English: Southern Viet Nam Box Turtle
French:
Spanish:
Vietnamese: Rua hop viet nam.
- 1.7 Code numbers: ITIS TSN 949150

2. Overview

Cuora galbinifrons picturata was listed in CITES Appendix II, as part of *Cuora* spp., by unanimous adoption at CoP 11 (CoP11 Prop.36), which came into effect on 19 July 2000. A zero quota was imposed for *Cuora galbinifrons* (including *bourreti* and *picturata* as subspecies) at CoP16 (CoP16 Prop.32), effective 12 June 2013.

Cuora picturata is not currently assessed in the IUCN Red List at species level, but is part of the Critically Endangered assessment of *C. galbinifrons*. That assessment dates from 2000 and included *bourreti*, *galbinifrons* and *picturata* as subspecies of *galbinifrons*.

Cuora [galbinifrons] picturata is endemic to Viet Nam but whose exact area of occurrence was unknown until recently. In 2011 it was proven to inhabit evergreen hill forest with bamboo forest on the eastern slopes of the Langbian Plateau of southern Viet Nam. It is likely restricted to this specific area, so that its total range is under 25,000 square km. Within this area, suitable habitat covers much less, as the species appears to be limited to areas between 300 and 600 m altitude that have not been converted to agriculture. Available field survey information shows that the species is rare (less than one animal per square km, or requiring 60 person-hours or 45 dog hours of searching to find a single specimen. Available interview and trade observation data strongly suggest that populations have been severely depleted in recent decades. Most records derive from observations of collected animals; field encounters are rare even during dedicated surveys.

Cuora [galbinifrons] picturata is a medium-sized turtle, to 18 cm shell length, and weighing less than 1 kg. Females in captivity may produce a single clutch of 1-3 eggs per year; egg and hatchling mortality rates are high in nature, and recruitment is slow. The species is challenging to establish and reproduce in captivity, and the great majority of trade concerns animals collected from the wild.

The primary threat to *Cuora [galbinifrons] picturata* is collection for trade. The species is in high demand in the international pet trade and (previously) in the Asian consumption trade. Habitat loss and degradation is a secondary threat to the species.

Cuora [galbinifrons] picturata is legally protected from exploitation in Viet Nam, but domestic and international enforcement may be insufficient. To address illegal trade in this species, its protection status in national laws and under CITES must be increased. This taxon qualifies for transfer to Appendix I of CITES, as it meets Criterion C i) of Annex I of Res.Conf.9.24(Rev.CoP15), by having been documented to have declined severely across its range as a result of collection for trade (see section 4.4), and meets criterion C ii) as the pattern of local, casual exploitation combined with unsustainable targeted collection for trade (see sections 5 and 6.4) will likely continue unless stronger measures are implemented, and the slow recruitment and late maturity make the species intrinsically vulnerable to exploitation (see sections 3.3 and 6.5).

3. Species characteristics

3.1 Distribution

Cuora [galbinifrons] picturata is apparently restricted to the eastern slopes of the Langbian Plateau, being known only from Khanh Hoa and Phu Yen provinces of southern Viet Nam (Ly *et al.*, 2011).

By analogy with the biogeography of better-surveyed syntopic primates (Gibbons, Douc Langurs), Ly and co-authors postulated that the *Cuora galbinifrons-bourreti-C picturata* group inhabits three discrete, disjunct hill forest areas, of which the range of *C. picturata* matches that of *Hylobates gabriellae* and *Pygathrix nigripes* in being restricted to the eastern slopes of the Langbian Plateau. This region covers an area of less than 250 x 100 km.

Cuora [g.] picturata was originally (at the time of its description, late 1990s) speculated to possibly occur in eastern Cambodia, as no confirmed field localities were known and specimens only showed up in turtle trade in southern Viet Nam, at points known to be part of the trade routes from Cambodia to Viet Nam and onwards. Surveys in Cambodia have failed to find any indication of the species there, while Ly *et al.*'s discovery of wild specimens on the Langbian Plateau explain how specimens would be part of turtle trade in southern Viet Nam.

3.2 Habitat

The only habitat details available in the literature are based on the locations of 8 animals in three surveyed localities: These animals were encountered on the forest floor of broadleaf evergreen forest mixed with bamboo forest, at altitudes between 368 and 561 m elevation (Ly *et al.*, 2011).

3.3 Biological characteristics

Extremely little is known of the biology of *Cuora [galbinifrons] picturata* in the wild; most observations on diet, growth and reproduction derive from animals maintained in captivity, either within or close to the species' natural range, or in artificially manipulated captive conditions such as terrariums.

3.4 Morphological characteristics

Cuora [galbinifrons] picturata is a medium-sized turtle, reaching at least 17.6 cm carapace (upper shell) length at a weight of up to 920 grams (Ly *et al.*, 2011). Males and females reach about the same size. Hatchlings measure about 45-50 mm and weigh 15-24 grams. The plastron (lower shell) has a very distinct hinge which allows the front and rear parts of the plastron to be raised up against the carapace, closing both front and back shell openings completely. *Cuora [galbinifrons] picturata* has a characteristic very short, steeply domed, high smooth shell, that appears almost round when seen from above. The carapace appears pale yellow with dark marks, which are rather regular and sharply defined: A broad brown band with black edges runs over the middle of the carapace; this brown band splits on the first vertebral scute, and only two narrow extensions reach forward to the

carapace margin, enclosing a yellow area above the neck. A fine yellow, black-edged vertebral line is normally present. The middle part of the costal scutes has a yellow ground colour, but as animals grow and age this usually shows some brown or black markings, obscuring the distinct clear yellow area shown by young animals. A dark band extends across much of the lower part of the costal scutes, and often extends onto the upper part of the marginal scutes, particularly on the posterior part of the shell. The marginal scutes are generally uniform yellow in the region over the front legs, or with a single distinct black spot, with increasing dark markings in the bridge region, and with extensive brown or black markings over the hind legs and tail region. The plastron is yellow, usually with a small to large black blotch at the outer edge of each scute. The underside of the marginal scutes is generally uniform yellowish. The head is bright yellow, often with fine grey or black spots, streaks or networking, but no red on the head or throat. The soft parts of the legs and tail are generally yellow, the large scales on the front limbs are marbled grey and yellow.

3.5 Role of the species in its ecosystem

The role of *Cuora [galbinifrons] picturata* in its native upland forest ecosystems is unknown; by analogy with other forest turtles, the species likely plays a modest ecological role in the dispersal of plant seeds and mushroom spores, and as a consumer of invertebrates.

4. Status and trends

Cuora picturata is not currently assessed in the IUCN Red List at species level, but is part of the Critically Endangered assessment of *C. galbinifrons*. That assessment dates from 2000 and included *bourreti*, *galbinifrons* and *picturata* as subspecies of *galbinifrons*. The 2015 reassessment, currently in progress, indicates that *Cuora bourreti* will be assessed as Critically Endangered in its own right (TFTSG RLA, pers. comm. 18 June 2015). The assessment of *Cuora galbinifrons* as Lower Risk: near threatened in 1996 did not include consideration of *picturata*, which had not yet been described at that time.

4.1 Habitat trends

Large areas of forest on the Langbian Plateau are being rapidly converted to coffee plantations and other agricultural lands. Only one of the three localities where *C. [g] picturata* was found (Deo Ca Protected Forest) was protected at the time (Ly *et al.*, 2011).

4.2 Population size

Population density of *Cuora [galbinifrons] picturata* is considered to be low. Ly *et al.* (2011) carried out field surveys throughout representative periods of the year, and required 15 days of a 4-person team with three trained hunting dogs (60 man-days, or 480 man-hours; 45 dog days or 360 dog hours) to encounter 8 turtles, translating to 60 man-hours and/or 45 dog-hours per turtle.

During a field survey in May 2012 in Deo Ca – Hon Nua Special Use Forest (a traditional collecting area in Phu Yen province, Viet Nam), a team of five dogs (four local hunting dogs and one trained survey dog) found only a single *Cuora [galbinifrons] picturata* and two *Cuora mouhotii* during a week of searching in which dogs were actively used over 21.7km of transects (T.McCormack, in litt to VN MA, 29 Sept 2012). Assuming that a team of dogs works a strip of a minimum width of 100 m, and finds half of all exposed and hidden turtles, this calculates to an estimated density of less than one *Cuora [galbinifrons] picturata* per square km, or one turtle per 280 dog hours.

The overall range of *Cuora [galbinifrons] picturata* is less than 25,000 sq km, of which much is likely unsuitable as a result of being below or above suitable altitude, as well as large areas of suitable habitat at suitable elevation having been converted to agricultural purposes. Consequently, the global surviving wild population is likely to be well below 25,000 individuals, and likely much less than this.

4.3 Population structure

Minimal population data, based on 8 wild observations, indicated a more or less balanced sex ratio of 3 males and 4 females. The proportion of a single subadult encountered versus 7 adults is not unusual for cryptic terrestrial box turtles (Ly *et al.*, 2011).

4.4 Population trends

A great deal of survey work has been undertaken in Viet Nam between 2009 – 2012 focused on determining the range and priority habitat for the *Cuora galbinifrons* group, with a focus on *Cuora [g.] bourreti* and *Cuora [g.] picturata*. Anecdotal information from interviews concluded that historic quantities of the species available for collection in the forest have been greatly reduced, with many hunters stating that while these box turtles were common 7-15 years ago, they are now increasingly difficult to find. During a survey around Deo Ca – Hon Nua Special Use Forest in May 2012, local hunters claimed they still caught 50 individuals of the species annually (during a six month hunting season) using large packs of hunting dogs, even when a pack of five dogs found just a single *Cuora galbinifrons picturata* and two *C. mouhotii* during a week's hunting, when 21.7 km of trails and transects were searched (T.McCormack, in litt to VN MA, 29 Sept 2012). Given the low fecundity and slow growth of the species, this level of collection is likely unsustainable and decimating populations of *Cuora [g.] picturata* at this location.

4.5 Geographic trends

No geographic trends in biology, population status, or exploitation have been reported, and given the restricted range of *picturata*, such trends are not expected.

5. Threats

The primary threat to *Cuora [galbinifrons] picturata* is collection for trade. The species is in high demand in the international pet trade and the Asian consumption trade. Collection efforts are targeted and occur mainly as searches for turtles involving trained dogs. Turtles, of any species, are collected whenever and wherever encountered in the region, regardless of legal protection status or location inside protected areas. Collected turtles are traded, mostly illegally, through a network of local middlemen before being exported or consumed locally. Increasing economic value has ensured that hunting pressure is sustained despite the increasing rarity of the species (Hendrie, 2000; McCormack et al., 2010; Ly et al., 2011).

Habitat loss and degradation are considered a significant but more localized threat to the species (Ly et al., 2011).

6. Utilization and trade

6.1 National utilization

Historically *Cuora [galbinifrons] picturata* have been consumed locally for food as part of a subsistence diet; in the last decade, however, consumption has largely ceased with most animals now sold into the trade due to the high economic incentive. Juvenile animals are often kept at the village level in attempts to raise them to sell on into the trade (often unsuccessful, with animals dying) (T.McCormack, in litt to VN MA, 29 Sept 2012).

Local residents collect and sell *Cuora picturata* to commercial traders; the species is readily collected with the assistance of hunting dogs, but difficult to find without them. (Ly et al., 2011; T.McCormack, in litt to VN MA, 29 Sept 2012).

6.2 Legal trade

The UNEP-WCMC CITES Trade Database records a total of 2377 live specimens and 17 specimens of *Cuora galbinifrons* as net and gross exports during the period 1998-2014. Reported net imports during the same period comprised 3282 live animals and 35 specimens, while gross imports comprised 3363 live animals and 35 specimens.

Tabulation of reported Net Exports of *Cuora galbinifrons*, 1998-2014; no records are entered for 1998, 2005, 2008, or 2011. Consulted 17 June 2015.

Term	Country	1999	2000	2001	2002	2003	2004	2006	2007	2009	2010	2012	2013	Total
live	CN				24		6		5		3			38

live	LA							1500					1500
live	VN	7	33	16							175	608	839
specimens	VN					14	2			1			17

Noteworthy is the report of a single shipment of 1500 animals, with source code 'rancher', originating from Lao PDR and reported as imports by Viet Nam, representing nearly 60% of all reported trade.

Largest importers are Viet Nam (1501, including the aforementioned shipment from Lao PDR), United States (776), Japan (634), Hong Kong (161), and Spain (90), with Belgium, Germany, Jersey, Switzerland, Taiwan, Thailand, the United Kingdom, and the Czech Republic each declaring imports of between 10 and 30 animals during the period.

The UNEP-WCMC CITES Trade Database does not specify subspecies; thus the data above cannot be used to elucidate trends in the trade of *galbinifrons sensu stricto*, *bourreti* or *picturata*.

Searches of internet fora and bulletin boards occasionally yields offers of *Cuora [g.] picturata* for sale, often claimed bred in captivity; the veracity of such claims is often difficult to confirm. *Cuora [g.] picturata* has not been evident in visible retail trade in China or Hong Kong recently (van Dijk, pers comm to VN SA, 22 June 2015).

6.3 Parts and derivatives in trade

All turtle shells are bought in Viet Nam by traders to make into a generic bone glue, plastrons are normally preferred. In some areas shell fragments are discarded. In many areas shells considered beautiful are kept as household decorations, this is often seen with *Cuora galbinifrons* and *Manouria impressa* and likely applies to *picturata*.

Some shells or shell fragments are traded internationally: Chen *et al.* (2009) recorded that *Cuora galbinifrons* (possibly including *picturata*) were rare but present among imported turtle shells for Chinese traditional medicine in Taiwan.

6.4 Illegal trade

Most trade in *Cuora [galbinifrons] picturata* has been recorded as part of *C. galbinifrons*, without differentiating (sub)species.

Visible trade in *Cuora galbinifrons* at Hanoi's principal wildlife market, Don Xuan, stopped by about 2006 due to better market enforcement. Prior to this, dozens of *Cuora galbinifrons* were regularly available each week, these were often juvenile animals and intended for the pet market, not food. It is believed that most *Cuora galbinifrons* traded in Viet Nam are exported to the third country destination markets.

6.5 Actual or potential trade impacts

Long-lived, late-maturing species with limited annual reproductive output and high juvenile mortality, as exemplified by *Cuora [galbinifrons] picturata*, have proven to be highly susceptible to overexploitation, particularly of adult animals (Doroff & Keith, 1990; Gibbons, 1990; Congdon *et al.*, 1993; O'Brien *et al.*, 2003). The population status and trend data in sections 4.2 and 4.4 strongly suggest that *Cuora [galbinifrons] picturata* has been subject to unsustainable collection for the past 15-20 years and this has resulted in the depletion if not collapse of its populations. Of particular significance is that commercial turtle farms in East Asia create a specific demand for animals collected from the wild, being considered the primary purchasers of wild-collected turtles and driving the collection of the last remaining wild animals through increased trade prices (Shi *et al.*, 2007).

In a separate, innovative analysis of risk posed by international trade, *Cuora galbinifrons* emerged with a relatively high score (1.5 out of a maximum of 2.0) of endangerment from trade (Zhou & Jiang, 2008).

7. Legal instruments

7.1 National

Cuora [galbinifrons] picturata is protected from commercial exploitation in Viet Nam as a Priority Protected Rare, Precious and Endangered Species under Decree 160/2013/ND-CP of the Government.

7.2 International

Cuora galbinifrons was included in CITES Appendix II at CoP 11 (Proposal 36, Gigiri, Kenya, 2000), and was selected for the Review of Significant Trade (RST) at AC17; its progress through the RST process was detailed on pages 21-22 of document AC25 Doc. 19. A zero quota was imposed for *Cuora galbinifrons* (including *bourreti* and *picturata* as subspecies) at CoP16 (CoP16 Prop.32), effective 12 June 2013.

The genus *Cuora*, including *Cuora galbinifrons*, is included in Annex B of EU Commission Regulation no. 709/2010 (amending EC Regulation 338/97), which requires that a corresponding import permit must be issued by the country of import before a shipment of the species can enter the European Union.

Health inspection certification is required by a number of countries before live animals, including turtles, may be imported.

The recommended conditions for transport of live turtles by air are detailed in the IATA Live Animals Regulations; compulsory adherence to these Live Animal Regulations has been adopted by legislation in a number of countries, and is required by a number of international airlines.

8. Species management

8.1 Management measures

Populations of *Cuora [galbinifrons] picturata* are not managed for sustainable offtake or other purposes.

8.2 Population monitoring

No population monitoring programs are in place for *Cuora [galbinifrons] picturata* anywhere in its range.

8.3 Control measures

8.3.1 International

Since its inclusion in CITES Appendix II, international shipments of *Cuora galbinifrons* including *C. g. picturata* are required to be accompanied by appropriate export permits, and subject to the customary checks by customs and wildlife authorities at the points of export and import.

8.3.2 Domestic

No control measures are in place beyond those described in section 7.1, national legislation and regulations.

Wildlife authorities, customs and enforcement authorities of the range and trading countries have made great efforts to ensure that turtles traded within their jurisdiction are legal and regulated, as evidenced by extensive record of confiscations of illegally traded turtles in the countries of the region (AC25 Doc.19, Annex C. However, resources such as officers trained in wildlife identification and identification materials in local languages remain limited, and in many cases the judicial system does not give high priority to wildlife crimes.

8.4 Captive breeding and artificial propagation

Cuora [galbinifrons] picturata is maintained in small numbers in captivity by hobbyists and institutions in Asia, Europe, North America and elsewhere, and has been bred in captivity, but continues to be regarded as a difficult, sensitive species that is challenging (but not impossible) to establish and reproduce consistently in captivity (Struijk, 2010). A European studbook exist for *picturata* since the late 1990s, with 57 registered animals maintained at three institutions and private keepers in 2009; of these, 31 were born in captivity (Struijk, 2010).

8.5 Habitat conservation

Only one of the three localities that was found to harbor *Cuora [galbinifrons] picturata* is currently protected (Deo Ca Protected Forest). Additional field surveys on the plateau are needed to determine whether *C. [g.] picturata* occurs within any additional established protected areas that will safeguard it from deforestation and overharvesting, and if not, what can be done to mitigate its extinction in the wild (Ly *et al.*, 2011).

8.6 Safeguards

None applicable beyond legal, regulatory and enforcement processes in place, including the need for non-detriment findings for shipments in international trade.

9. Information on similar species

Cuora box turtles can be separated from all other turtles by the combination of possessing a single hinge on the plastron allowing them to effectively close their shell, their distinctly domed to highly domed shell, and generally bright facial colouration that includes a strip of granular skin between the eye and tympanum. The taxa *bourreti*, *galbinifrons* and *picturata* are unique among all turtles in possessing a large yellow to orange area on each side of the carapace. Detailed information to differentiate these three forms was provided by Tabaka (2002, available online) and repeated in proposal CoP16 Prop. 33.

10. Consultations

11. Additional remarks

12. References

- Artnr, H., and Hofer, A. 2001. Observations in the Qing Ping Free Market, Guangzhou, China, November 2000. *Turtle and Tortoise Newsletter*, issue 3: 14
- Chen, T.H., Chang, H.C., and Lue, K.Y. 2009. Unregulated trade in turtle shells for Chinese traditional medicine in East and Southeast Asia: the case of Taiwan. *Chelonian Conservation and Biology*, Vol. 8 (1): 11-18.
- Cheung, S.M., and Dudgeon, D. 2006. Quantifying the Asian turtle crisis: market surveys in southern China, 2000-2003. *Aquatic Conservation: Marine and Freshwater Ecosystems*, Vol. 16: 751-770.
- Congdon, J.D., Dunham, A.E., and Van Loben Sels, R.C. 1993. Delayed Sexual Maturity and Demographics of Blanding's Turtles (*Emydoidea blandingii*): Implications for Conservation and Management of Long-lived Organisms. *Conservation Biology*, Vol. 7 (2): 387-399.
- Doroff, A. M., and Keith, L.B. 1990. Demography and Ecology of an Ornate Box Turtle (*Terrapene ornata*) Population in South-Central Wisconsin. *Copeia*, 1990 (2): 387-399.
- Endangered Species Import and Export Management Office of the People's Republic of China. 2002a. *Identification Manual for Common Turtles and Tortoises*. China Forestry Publishing House, Beijing, China. 174 pp. ISBN 7-5038-3022-0.
- Endangered Species Import and Export Management Office of the People's Republic of China [H. Shi & Z. Fan]. 2002b. Report on the Captive Breeding of Tortoises and Freshwater Turtles in China. CITES Document CoP12 Inf. 8. 19 pp.

- Fritz, U., & P. Havaš. 2007. Checklist of Chelonians of the World. *Vertebrate Zoology*, Vol. 57 (2): 149-368.
- Germany, Scientific Authority. 2003. Development of mid- and long-term Conservation Measures for Tortoises and Freshwater Turtles. AC 19 Doc 15.2 (Rev.1).
- Gibbons, J. Whitfield (editor). 1990. *Life History and Ecology of the Slider Turtle*. Smithsonian Institution Press, Washington D.C. & London. 368 pp.
- Gong S., Fu Y., Wang J., Shi H., and Xu R. 2005. Freshwater turtle trade in Hainan and suggestions for effective management. *Biodiversity Science*, Vol. 13 (3): 239-247.
- Gong S., Wang J, Shi H., Song R & Xu R. 2006. Illegal trade and conservation requirements of freshwater turtles in Nanmao, Hainan Province, China. *Oryx*, Vol. 40(3): 331-336.
- Gong S., Chow, A.T., Fong, J.J., and Shi H.. 2009. Chelonian trade in the largest pet market in China: scale, scope and impact on turtle conservation. *Oryx*, Vol. 43(2): 213-216.
- Hendrie, D.B. 2000. Status and Conservation of Tortoises and Freshwater Turtles in Vietnam. Pp. 63-73 in *Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia* (van Dijk, Stuart & Rhodin, eds.). Chelonian Research Monographs, Number 2.
- Horne, B.D., Poole, C.M., and Walde, A.D. (eds). 2012. Conservation of Asian Tortoises and Freshwater Turtles: Setting Priorities for the Next Ten Years. Recommendations and Conclusions from the Workshop in Singapore, February 21-24, 2011. ISBN: 978-981-07-1737-7.
<http://www.cites.org/common/com/AC/26/SG-Tortoise-&Freshwater-Turtle-Workshop-Report.pdf>
- IUCN and TRAFFIC. 2012. IUCN/TRAFFIC Analyses of the Proposals to amend the CITES Appendices. Prepared by IUCN Global Species Programme and TRAFFIC for the Sixteenth Meeting of the Conference of the Parties to CITES. IUCN – International Union for the Conservation of nature, Gland, Switzerland. 103 pp.
- Lau, M.W.N., Ades, G., Goodyer, N., and Zou, F.S. 1995. Wildlife Trade in Southern China including Hong Kong and Macao. Report, available at <http://monkey.ioz.ac.cn/bwg-cciced/english/bwg-cciced/tech-27.htm>. 29 pp.
- Lehr, E., Fritz, U., and Obst, F.J. 1998. *Cuora galbinifrons picturata* subsp. nov., eine neue Unterart der Hinterindischen Scharnierschildkröte. *Herpetofauna*, Vol. 20 (119): 5-11.
- Ly, T., Hoang, H.D., and Stuart, B.L. 2011 Market turtle mystery solved in Vietnam. *Biological Conservation*, Vol. 144: 1767-1771.
- McCormack, T. Notes on status and biology of *Cuora galbinifrons*. Letter to Viet Nam CITES MA, 29 Sept 2012.
- Nguyen Van Sang, Ho Thu Cuc, and Nguyen Quang Truong. 2009. *Herpetofauna of Vietnam*. Frankfurt am Main (Germany): edition Chimaira. ISBN 978-3-89973-462-1.
- O'Brien, S., Emahalala, E.R., Beard, V., Rakotondrainy, R.M., Reid, A., Raharisoa, V., and Coulson, T. 2003. Decline of the Madagascar radiated tortoise *Geochelone radiata* due to overexploitation. *Oryx*, Vol. 37 (3): 338-343.
- Roberton, S. 2012. Proposal to up-list species of freshwater turtles native to Viet Nam to CITES Appendix I. Official Correspondence letter to Viet Nam CITES MA, No.197-CVWCS Dated 4th June 2012.
- Shi H., Parham, J.F., Lau, M.W.N., & Chen T.-H. 2007. Farming Endangered Turtles to Extinction in China. *Conservation Biology*, Vol. 21 (1): 5-6.
- Shi, H.T., Hou M., Pritchard, P., Peng J.J., Fan Z., and Yin F. (eds). 2008a. Identification Manual for Traded Turtles in China. China Encyclopedia Press, Beijing, China. 168 pp. ISBN 978-7-5000-7937-8.
- Shi H., Parham, J.F., Fan Z., Hong M., and Yin F. 2008b. Evidence for the massive scale of turtle farming in China. *Oryx*, Vol. 42 (1): 147-150.
- Spinks, P.Q., Thomson, R.C., Zhang, Y.P., Che, J., Wu, Y., and Shaffer, H.B. 2012. Species boundaries and phylogenetic relationships in the critically endangered Asian box turtle genus *Cuora*. *Molecular Phylogenetics and Evolution* 63 (2012): 656–667. doi:10.1016/j.ympev.2012.02.014
- Struijk, R. 2010. European Studbooks: *Cuora bourreti*, *Cuora galbinifrons*, and *Cuora picturata*. *Turtle Survival Alliance Magazine*, issue 10: 33-34.
- Stuart, B.L., and Parham, J.F. 2004. Molecular phylogeny of the critically endangered Indochinese box turtle (*Cuora galbinifrons*). *Molecular Phylogenetics and Evolution* 31 (2004): 164–177. doi:10.1016/S1055-7903(03)00258-6.

- Tabaka, C. 2002. Differentiating *Cuora galbinifrons* subspecies.
<http://www.chelonia.org/Articles/Differentiatinggalbies.htm> [accessed 27 Sept 2012]
- TTWG [Turtle Taxonomy Working Group]. 2014. Turtles of the world, 7th edition: annotated checklist of taxonomy, synonymy, distribution with maps, and conservation status. In: Rhodin, et al. (Eds.). Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group. Chelonian Research Monographs 5(7):000.329–479, doi:10.3854/crm.5.000.checklist.v7.2014.
- Uetz, P. (editor). 2015. The Reptile Database. <http://www.reptile-database.org>, accessed 18 June 2015.
- UNEP-WCMC CITES Trade Database. *Cuora galbinifrons*. Consulted 17 June 2015.
- Wu, J. 2007. World Without Borders: Wildlife trade on the Chinese-language Internet. *Traffic Bulletin*, Vol. 21 (2): 75-84.
- Zhou T., Zhao H., & McCord, W.P.. 2005. Captive Breeding of Chelonians in Hainan Province, China. *Reptilia*, (GB), issue 41: 39-42.
- Zhou T., Huang C., McCord, W.P., and Blanck, T.. 2008. Captive Breeding of hard-Shellled Chelonians in China. *Reptilia* (GB), issue 61: 27-34.
- Zhou Z. and Jiang Z. 2008. Characteristics and Risk Assessment of International Trade in Tortoises and freshwater Turtles in China. *Chelonian Conservation and Biology*, Vol. 7 (1): 28-36.