Short Communication

Evidence for the massive scale of turtle farming in China

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Abstract One of the main threats to the survival of Asian turtles is the demand in China for turtles for use as food and medicine products. As the demand for turtle products escalated over the past 20 years entrepreneurs initiated commercial breeding facilities for profit. To gain a better understanding of the scale of the captive turtle trade we conducted a survey of the 1,499 large turtle farms known by branch offices of the Endangered Species Import and Export Management Office and the Provincial Forestry Bureaus. The results from the 684 respondent farms (46%) indicated that a total of 300 million turtles are sold per year and are worth c. USD 750 million. Although the bulk of these figures comprise the common Chinese softshell turtle *Pelodiscus sinensis* many other species are also farmed, including Critically Endangered species and even species native to North America. As 54% of known farms did not respond to our survey we suggest that the trade in captive turtles is probably a multi-billion dollar industry. This is likely considering that many Chinese turtle farms operate covertly and are thus impossible to survey. The large scale of turtle farming in China raises questions about the impact of so many threatened turtles being bred and sold for profit. Because the commercial breeding of these species is so well developed and large in scale, the deleterious impact is serious and difficult to control.

Keywords Aquaculture, Asia, captive breeding, China, freshwater turtle, trade.

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commercial secrets or having their turtles stolen. A consequence of this secrecy is that the existence of Chinese turtle farms is not fully appreciated, and it is therefore often assumed that most turtles in food markets and the pet trade come from the wild (Salzberg, 1998; Barzyk, 1999). As recently as 2002, when the data presented here were gathered, many western herpetologists still doubted the existence of large-scale turtle farms in China (H. Shi & J.F. Parham, pers. obs.). A deeper knowledge of the scale and scope of Chinese turtle farms is an important step towards understanding China’s role in the Asian turtle crisis.

To gather data on the scale of captive breeding of turtles in China we surveyed Chinese turtle farms with questionnaires in 2002. The surveys included questions about the number of species and individuals bred, as well as their estimated annual yield. The survey was distributed to branch offices of the Endangered Species Import and Export Management Office of China and local Provincial Forestry Bureaus. These offices forwarded our survey to each of the 1,499 large breeding facilities on record (excluding numerous smaller breeding operations), compiled the results, and sent a final summary report to us.

We received 684 reports from 15 Chinese provinces, mainly from central and southern China (especially Guangdong, Guangxi, Hunan and Hainan provinces). SH then surveyed 12 farms in Hainan, Guangxi and Zhejiang to verify the scale of farming and species bred through personal observations and interviews. The questionnaire survey indicated that most native species of freshwater turtles and tortoises are bred in some Chinese turtle farms. However, it became clear from the follow-up surveys that it is difficult for turtle farmers to correctly identify every species they maintain, especially the rarer taxa. For this reason we list only the 11 most commonly reared and easily identified species in Table 1 (for full data, see Appendices). The total number of commercial individuals reared of these 11 species, all of which are on the IUCN Red List (IUCN, 2007), is >300 million, with an estimated sale value of c. USD 750 million. Most species (especially *M. reevesii*, *M. mutica*, *C. trifasciata* and *Palea steindachneri*) are farmed for ingredients for food and medicine, whereas terrestrial species (e.g. *Cuora mouhotii* and *Geemyda spengleri*) are bred at smaller scales to supply the pet trade. Some exotic species are also bred. The North American red-eared slider *Trachemys scripta elegans* has been introduced since 1986 and is now bred in large numbers (Shi, 2002). Recently, the North American alligator snapping turtle *Macrochelys temminckii* has become popular because of its high meat yield, quick growth and high reproductive output but the reported numbers in 2002 were still low (Table 1).

Our results represent evidence for the massive scale of turtle farming in China. Prior to this study the only values known for the captive turtle industry in this region were restricted to a report on the utilization of chelonian products in Taiwan that included some data on the annual production of the Chinese softshell turtle.
P. sinensis during 1966-1997 (Chen et al., 2000), which reported annual numbers ranging from 6,000 kg (in 1966) to a maximum of >2 million kg (in 1997). In 2002 the 684 turtle farms we surveyed sold over 91 million kg of P. sinensis to internal wholesale markets. Clearly, the scale of the turtle farming within China is massive and far surpasses that reported in any other part of Asia. While the massive scale of this industry is possibly surprising, the reason it exists is obvious: China is by far the largest consumer of turtle products (van Dijk et al., 2000).

Because of the black market turtle trade and the secrecy of many Chinese turtle farmers the figures we have reported are almost certainly lower than the real figures (54% of farmers did not respond to our survey). A direct extrapolation of the 684 respondent values to all 1,499 farms gives an estimate that captive turtles in China in 2002 generated revenue >USD 1.3 billion. The full value of turtle farms, including non-commercial individuals (i.e. also including breeding individuals and those being reared) must be several billion USD. Even these extrapolations should be considered conservative estimates because most farms operate illegally and are therefore not known by the Provincial Forestry Bureau for Endangered Species Import and Export Management Office (Shi et al., 2004).

Whatever the exact value of the trade, our estimate of the number and value of turtles in captivity in China is extremely high. Although these data were collected in 2002 our ongoing contact with turtle farmers has not indicated any decrease in the scale of the industry. The captive breeding of turtles in China could deflect unsustainable trade pressures away from wild populations of turtles (van Dijk, 2000), especially those imported from other countries. However, turtle farms are a confounding problem for the conservation of Chinese turtle populations. In addition to the problems highlighted by Shi et al. (2007), the massive scale of turtle farming in China means that we can no longer take market surveys as direct evidence for the scale of harvesting for some species (Shi, 2002; Shi et al., 2004).

The impact of widespread turtle farming on wild populations of Chinese turtles is poorly understood. Issues such as the replenishment of breeding stock from the wild (true farming vs ranching), the impact on the availability of and demand for turtle products, the increased use of non-native species, and the likelihood of genetic pollution (Parham & Shi, 2001; Parham et al., 2001) all diminish the effectiveness of turtle farms as a potential conservation resource (Shi et al., 2007). Given the scale of the captive turtle trade in China, the deleterious effect on the conservation of wild species must be proportionately large. Instead of attempting to co-opt the captive breeding of threatened turtles for profit to conservation, we agree with Gong et al. (2006) who strongly advocate the establishment of protected natural areas to preserve the few remaining populations of wild Chinese turtles.

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References


### Appendices

The appendices for this article are available online at http://journals.cambridge.org

### Biographical sketches

Shi Haitao has researched aspects of the ecology, status, conservation and trade of Chinese turtles for 15 years. James F. Parham has been working in China since 1999, mainly investigating anthropogenic impact on the systematics and distribution of endangered turtles. Fan Zhiyong has studied and worked in wildlife management and conservation for 25 years and has carried out research on the protection of threatened species, nature reserves, wildlife trade, international laws and wildlife farming. For the last 5 years Hong Meiling has studied several aspects of the nutrition and captive breeding of Chinese turtles. Yin Feng directs wildlife conservation programmes, focusing on the domestic trade of turtles, snakes, wild birds, the Chinese pangolin, and other wildlife along the heavily trafficked border between China and Vietnam.