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The Crab-eating Macaque (*Macaca fascicularis*): Widespread and Rapidly Declining

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Abstract: The crab-eating or long-tailed macaque (*Macaca fascicularis*) of tropical Southeast Asia is a widespread but rapidly declining species. The threats to the species are manifold and include habitat loss and degradation that increasingly result in conflict with expanding human populations in both rural and urban landscapes, as well as trapping and trade for pharmaceutical testing, research, and development. The greatest threat from the trade is in the Indochinese region, especially Cambodia where in 2003–2004 macaques began to be harvested from the wild, ostensibly for captive breeding for export to China and to the USA and elsewhere. The lucrative operations, however, may serve to “launder” wild-caught monkeys and appear to have resulted in their disappearance even from legally protected areas. Much of the impetus for this trade appears to be biowarfare research in the USA, the country that is the world’s largest user of primates. *Macaca fascicularis* is classified as of “Least Concern” in the *IUCN/SSC 2008 Red List of Threatened Species*. It is imperative that the conservation status of the species be reassessed and that the impact of trade on the species be assessed by the CITES Secretariat.

Key Words: *Macaca fascicularis*, crab-eating macaque, trafficking, Pharma, Indochinese region, Cambodia

Introduction

During an open meeting at the 2008 Congress of the International Primatological Society (IPS) in Edinburgh, UK, to review the biennial listing of the “World’s 25 Most Endangered Primates”, a joint endeavor of the IUCN/SSC Primate Specialist Group, Conservation International and IPS, I raised the issue of how one should address the status of a species, in this instance *Macaca fascicularis*, that is widespread and, therefore, apparently numerous, but shares threats with Critically Endangered and Endangered species, as well as suffering from growing exploitation of wild populations for biomedical research/industrial testing. It is categorized as of “Least Concern” in the *IUCN/SSC 2008 Red List of Threatened Species* (IUCN 2008).

I brought up this issue more than 20 years ago at the 1986 IPS Congress in Göttingen, Germany (Eudey 1986), and subsequently recognized it in the *Action Plan for Asian Primate Conservation: 1987–91* (Eudey 1987). At the 2008 IPS Congress, Holger Preuschoft, twice president of IPS, had questioned the wisdom of focusing attention just on precariously small populations, many of which are relict (my term). I likened *Macaca fascicularis* to the North American passenger

pigeon (*Ectopistes migratorius*), which was considered to be the most abundant bird on Earth until it was hunted to extinction in 1900 (Weisman, 2007). Russell A. Mittermeier, as convenor of the 2008 meeting on the “World’s 25 Most Endangered Primates” (Mittermeier *et al.* 2008), responded knowledgeably to my inquiry (see below), and *M. fascicularis* became recognized as the first “widespread and rapidly declining” species. Justification for this is presented below.

Geographic Distribution and Threats

Macaca fascicularis (Raffles, 1821), commonly known as the crab-eating or long-tailed macaque, is widely distributed in tropical mainland and insular Southeast Asia (Fooden 1995). The species’ natural range extends southward and eastward from India (the three southernmost Nicobar Islands), into southernmost Bangladesh, where the population has been completely decimated by shrimp cultivation and shipbuilding (Molur *et al.* 2003) and southern Burma (also known as Myanmar), where habitat area and quality have been significantly reduced by human activity, including logging, agriculture and shrimp farming (Molur *et al.* 2003). Its range also includes the southern part of the Indochinese Peninsula (Thailand,

Cambodia, Laos and Vietnam, south of 17°N), the Isthmus of Kra, the Malay Peninsula (including Singapore), Sumatra, Borneo, Java and the Lesser Sunda Islands (including Bali and Timor), and the Philippines.

The species is found most commonly at low elevations, where it prefers seashore and mangrove forest, river banks, and swamp forest (Fooden 1995), much of which is highly vulnerable to the effects of global warming. According to a recent United Nations Environment Programme (UNEP) report (Nelleman 2007), up to 98% of forest habitat in Sumatra and Borneo—a significant part of the crab-eating macaques' core area—may be destroyed by 2022 through conversion to oil palm plantations, poaching of high-grade timber and clearing land for farming.

The genus *Macaca* appears to be the most successful of all nonhuman primates in human landscapes (Muroyama and Eudey 2004). In contrast to many other Asian primates, crab-eating macaques thrive in secondary forest and in commensal relationships with humans, who have been introducing them onto islands for at least 4,000–5,000 years (Fooden 1995). Economic growth and a rapidly expanding human population have resulted in increasingly widespread encroachment on forest habitat, resulting in burgeoning human/nonhuman primate conflict due to crop-raiding by the macaques and, more recently, pest behavior in urban environments as they exploit garbage and other human food sources (Twigg 2008). The reluctance of people to stop deliberately feeding the macaques and to take recognized measures to secure garbage has exacerbated the problem in many urban settings. Besides forest loss and increasing urbanization in their range, trade in wild-caught macaques for human consumption and, increasingly, for research and development and testing by the pharmaceutical industry (Pharma) is having a negative impact on their populations.

In 2007, the government of Peninsular Malaysia, amid accusations of corruption, temporarily lifted a 23-year-old ban on the export of macaques in a purported, but successfully contested, effort to control urban macaques by allowing for trade for research and human consumption to China and elsewhere. A six-month program of culling and translocation based on questionably high numbers of urban and forest crab-eating macaques is reported to have been initiated during the latter half of 2008, so as to reduce the urban populations (Twigg 2008).

Trafficking in the Indochinese Region

The Indochinese region, especially Cambodia, is where *Macaca fascicularis* faces the greatest threats from trade, specifically for toxicology studies and pharmaceutical research and development. Imports to the United States (the largest user of primates in experimentation and testing) and elsewhere began to increase in 1974–1978 during the worldwide reduction and subsequent ban of *Macaca mulatta* (rhesus macaque) exports from India. Malaysia, the Philippines, and Indonesia became the primary suppliers of crab-eating macaques (Mack

and Eudey 1984). In the late 1980s, *M. fascicularis* was introduced into China, where it is not native, for captive breeding (Fan and Song 2003; Hsu and Jia 2003), although acquisition of wildlife for human consumption (food and traditional medicine) by affluent Chinese appears to have been the force driving the trade (CRES undated). China had already begun captive breeding of native rhesus macaques in 1978 and was exporting them by 1984 (Fan and Song 2003; Hsu and Jia 2003). Initially, unregulated border trade appears to have occurred between China and government-owned companies (NAFORIMEX) and government agencies in Vietnam. In the 1990s, however, some four commercial monkey farms, operated by entrepreneurs from Hong Kong and China, began to export wild-caught macaques as captive-bred in these countries, probably for transshipment. Early on, the macaques may have sold for US\$50–60, and monkeys smuggled from Cambodia and Laos appear to have figured in all these transactions (CRES undated).

In 2002–2003, the Cambodian Ministry of Agriculture, Forestry and Fisheries (MAFF) granted harvest permits to five monkey farms to breed *Macaca fascicularis* for export (Cambodian CITES Management Authority pers. comm. 2007). Ostensibly the farms are joint ventures, but they are owned and operated by Chinese and Hong Kong entrepreneurs, including some already operating in Vietnam. Collecting of monkeys began to accelerate in 2004 as farms (and holding areas) were established adjacent to protected areas, where macaques, along with other wildlife, are protected. Farm staff enlisted the aid of, and instructed, local villagers in the trapping of monkeys, which involves isolating groups in trees by felling the surrounding forest: a practice that exacerbates the already serious threat of forest loss through logging. The monkeys caught are worth the equivalent of US\$20–80, depending on weight and condition (Cambodian CITES Management Authority pers. comm. 2007).

Observers from non-governmental organizations (NGOs) question whether the breeding farms are illegally buying and selling macaques, as numbers of monkeys show extreme fluctuations and the numbers of infants may exceed adults. Although “factory farming” of infant macaques (that is, removing the infant from its mother at birth to accelerate her resuming ovulation) now may occur, export of wild-caught monkeys still is suspected; and new breeding farms continue to obtain monkeys from the wild rather than purchasing captive-bred ones from existing farms (Cambodian CITES Management Authority pers. comm. 2007). At the same time, there is growing suspicion that crab-eating macaques caught in Cambodia with forged CITES permits from Laos are being smuggled into Vietnam by a large and sophisticated trans-border wildlife trafficking network (see, for example, Hoang Quoc Dong 2008). Three monkey colonies also have been identified in Laos. They appear to be obtaining macaques from Cambodia and from Thailand (where trafficking in “temple monkeys” to Cambodia may have existed for years; K. Bauers pers. comm. 2008), and

transshipping them to Hong Kong and China for further export (Y. Hamada pers. comm. 2008).

As a consequence of the wildlife trafficking described above, *Macaca fascicularis* may no longer be found in protected areas in Cambodia even where rare and more endangered species occur (R. A. Mittermeier pers. comm. 2008). During a month-long study of open wildlife (bushmeat) trade in the northeastern Cambodian province of Ratanakiri in 2008, Lee (2008) found no crab-eating macaques for sale; dead or alive. None of four farmer-hunters interviewed by him reported harvesting macaques in recent times, but one recalled hunting them and other primates with guns in the 1980's. Lee (2008) reports a general consensus that all wildlife has declined drastically in the past 5–10 years. Trappers and NGOs alike have expressed concern that at the present rate of exploitation crab-eating macaques will be extirpated in Cambodia within one or two years.

Importations into the United States

Data compiled by the US Fish and Wildlife Service (Law Enforcement Management Service) indicate a significant increase in imports of *Macaca fascicularis* into the United States, the world's greatest user of primates. Numbers rose from 17,214 in 2004 to more than 24,000 annually during 2005–2007 (Anon. 2007; my analysis of 2007 data). Imports from Cambodia, all of which were claimed to be captive-bred, went from zero in 2004 to 240 in 2005, to 2,532 in 2006, and then may have declined to 720 in 2007 (McGreal 2007; my analysis). (At a 2008 conference entitled *Animal Research in a Global Environment: Meeting the Challenges*, organized by the U.S. Institute for Laboratory Animal Research [ILAR], discussion indicated a lack of agreement on exact numbers but suggested that during 2007 total imports of *M. fascicularis* and imports from Cambodia might be higher.)

According to the Cambodian CITES Management Authority (pers. comm. 2007), the country exported 23,000 crab-eating macaques to China during 2004–2006 and more than 17,000 as of November 2007. In turn, China was responsible for more than half of all monkeys imported into the United States in 2006 and 2007 (Anon. 2007; my analysis). A contract negotiated for a drug development services company indicates that US buyers have paid US\$1,475 (cost and freight) per monkey to Cambodian macaque suppliers (plus an additional US\$100 to the transfer agent for each monkey that completes quarantine). The initial impetus for this trade would appear to be “Project Bioshield”, which was signed into US law in 2004, to encourage, with a budget of \$5.6 billion, the development of vaccines or other products to counter biowarfare (see Dudley and McFee 2005). A more recent development is outsourcing of experimentation and testing on primates to China and the associated growth of joint ventures. A press release on the company's website, for example, reports that on 24 June 2008 Covance Inc., headquartered in Princeton, New Jersey, and considered to be one of the world's largest and most comprehensive drug development

services companies, had entered into a Memorandum of Understanding with WuXi Pharma Tech of Shanghai to create a 50-50 joint venture “to provide world-class preclinical contract research services in China.”

Conclusions

Macaques frequently are considered as well known or common: as a consequence, data on the present status of populations such as numbers, distribution and population trends are deficient for most species, especially those that are widespread geographically, such as *Macaca fascicularis* (see Muroyama and Eudey 2004). It is imperative that the conservation status of *M. fascicularis* be reassessed, particularly taking into account the impact of trade on the species, requiring as such a careful assessment by the CITES Secretariat.

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