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Chinese Water Deer (*Hydropotes inermis*) Reintroduction in Nanhui, Shanghai, China

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Abstract.- This communication reports some evidence of the reintroduced Chinese water deer surviving in the Nanhui Wildlife Sanctuary, Shanghai, China. Deer were still present in the sanctuary in 2014 and evidence of breeding was also recorded. Historically, the deer was last recorded in Shanghai in 1890. The Chinese Water Deer Reintroduction Project was started in Shanghai in 2006, in order to restore the native Chinese water deer population.

Key Words: Chinese water deer, reintroduction, survival rate.

The Chinese water deer *Hydropotes inermis inermis* is an endemic species in East Asia, originally only found in China and the Korean Peninsula (*Hydropotes inermis argyropus*). In China, the deer was once widely distributed from Liaoning Province to Fujian Province (Sheng and Ohtaishi, 1993, Chen, 2006). However, with the intensification of human activities, excessive hunting and habitat loss, the wild population decreased severely, and disappeared from most locations; the last time recorded in Shanghai was in 1880s (Allen, 1938; Sheng *et al.*, 1992). The Chinese Water Deer Reintroduction Project was

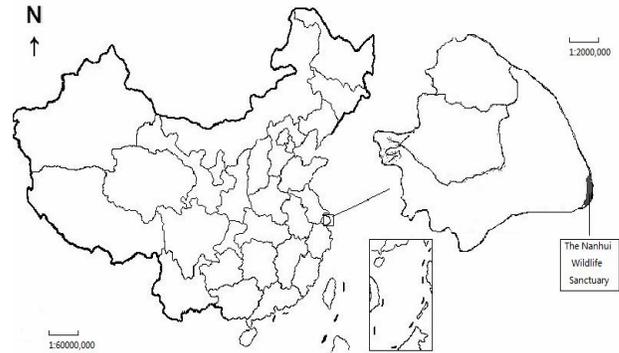


Fig. 1. The location of The Nanhui Wildlife Sanctuary, Shanghai, PRC

started in Shanghai in 2006, in order to restore the native Chinese water deer population (Ma *et al.*, 2013).

Materials and methods

In March 2007, 21 captive-bred Chinese water deer including 7males and 14females were reintroduced to a semi-captive area in Huaxia Park (N31°11'37", E121°38'35") in Shanghai. One female deer died on the first day after translocation. According to the veterinary doctors, the death may be associated with anesthesia and long-distance transportation (Ma *et al.*, 2009). By the end of 2009 the population in Huaxia Park had increased to 77 including 17 of the original individuals.

The second reintroduction site, Songjiang Punan Woodland was established in 2008. Twenty individuals were introduced from Zhoushan Archipelago in 2008 and another 20 deer were translocated from Huaxia's herd in 2009 (Chen *et al.*, 2014a). This location was found to be a good habitat for the deer, as it provided local vegetation for forage.

There are three typical habitat environments in Shanghai including: woodlands, wetlands and the country parks. Songjiang Punan Woodland is considered to be the appropriate environment for wild deer habitation (Chen *et al.*, 2014b). The deer appeared to thrive in this semi-natural environment and reproduced each year. Three years later, number of deer increased to 96 individuals. It was then considered feasible to release them in the wetland habitat —the Nanhui Wildlife Sanctuary.

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The Nanhui Wildlife Sanctuary was selected as the location for release in the wild. This sanctuary, located in the southeast of Shanghai (31°06'47"N, 121°51'40"E) was established in September 2007. It is a narrow area (40.3 km long, 2.8-4.9 km wide, about 122.5 km²) including tidal flats and reed community habitats. Of the total area 35% was water, where at least 10 edible grasses grew in considerable percentage, according to the early environment survey (He, 2013).

The deer were released in two phases. During the first phase six male deer were released from Huaxia Park into the Nanhui Wildlife Sanctuary in June 2010. The second phase involved releasing 10 deer (three males, seven females) from Songjiang Punan Woodland into the Nanhui Wildlife Sanctuary in October 2010 (He, 2013). All released deer were tracked by using GPS and VHF collars.

Results and discussion

Six months after release, four deer had died (three males, one female) because of poaching and unexplained reasons showing survival rate of 73% in the first year (He *et al.*, 2013). The home range of the released deer varied from 0.7km² to 6.17km² in the initial stage of release, which was considered to be much wider than six months later, while when the home range was considered to be the largest in winter nearly 275.33±139.18 ha (n=10), and the smallest in summer nearly 120.06±111.78 ha (n=7) according to the monitored data (He *et al.*, 2015). By the end of November 2011, 11 adult deer were found located in The Nanhui Wildlife Sanctuary meanwhile the deer might have reproduced as well. Local residents observed two fawns in the autumn of 2012. After that, we observed only some deer traces. In April 2014 infrared cameras were used in field surveys. The cameras took two images of Chinese water deer foraging in the Nanhui Wildlife Sanctuary. These photographs showed that the released deer in the Nanhui Wildlife Sanctuary had survived successfully, and also indicated that the wetland is one of the feasible habitats for release.

There are attempts to provide more habitats for the deer in Shanghai, returning farmland to forest and building more parks on the outskirts of the city. By 2014, the total number of reintroduced Chinese water deer in Shanghai has reached 300, with six

locations for deer breeding and release, including Songjiang Punan Woodland, Xinbang Woodland, Binjiang Forest Park, Shanghai Century Park, Huaxia Park and the Nanhui Wildlife Sanctuary (Chen *et al.*, 2015). However, the poaching is still a threat to Chinese water deer, like most other endangered deer species (Zulfiqar *et al.*, 2011). The enforcement of legislation needs to be strengthened; the management accorded to the Sanctuary needs to be properly managed; and penalties to the poachers and the unfenced area needs to be enhanced and strictly imposed.



Fig. 2. The image of Chinese water deer in The Nanhui Wildlife Sanctuary, Shanghai.

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