



Global Re-introduction Perspectives: 2013

Further case-studies from around the globe
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IUCN/SSC Re-introduction Specialist Group (RSG)





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Re-introduction of Père David's deer "Milu" to Beijing, Dafeng & Shishou, China

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Introduction

Milu (*Elaphurus davidianus*) is listed as "EW" in IUCN Redlist, and is listed as National Protected Wild Animal in China. Milu was extinct in wild in China. A captive herd was assembled at Woburn Abbey, UK around the turning 20th century. The Duke of Bedford donated 36 Milu to the Beijing Milu Park in 1985 and 1987. Another group of 39 deer from five British zoos was re-introduced to Dafeng Milu Reserve on coastal marsh site in Jiangsu Province. Milu population in Beijing Milu Park increased from 39 to 200 from 1985 - 2013, during the period over 300 Milu were relocated to more than 50 reserves and parks all over the country while Milu in Dafeng reserve increased to nearly 2000 in 2013. Since 1997, deliberate releases to the wild have taken place in Dafeng (Hu and Jiang, 2002). Ninety-one Milu were translocated from Beijing Milu Park to Tianezhou, Shishou, Hubei in 1993 and 1995, where the Shishou Milu Reserve was established. A flooding in Yangtze River in 1998 resulted in several cohorts of Milu leaving the initial release area and forming permanent herds in other parts of the province, as well as around Dongting Lake in Hunan Province (Maddison *et al.*, 2012).

Goals

- Goal 1: Identification of potential re-introduction sites within historic range of Milu.
- Goal 2: Creating nature reserve and parklands for hosting the re-introduced Milu.
- Goal 3: Forming self-sustained re-introduced Milu population and gradually using the re-introduced Milu herd as source for further relocation.
- Goal 4: Monitoring of disease and parasites in the re-introduced Milu populations and managing habitat at re-introduction sites.



Milu in Dafeng Reserve: 2010 © Jiang Zhigang

- **Goal 5:** Releasing Milu to wild and re-establish wild Milu populations in the country.

Success Indicators

- **Indicator 1:** Establishing healthy self-sustaining breeding stocks of re-introduced Milu.
- **Indicator 2:** Relocation of the re-introduced Milu to other suitable sites in its historical range.
- **Indicator 3:** Establishing wild populations of Milu in its historical range.
- **Indicator 4:** Using Milu as conservation education model to promote conservation consciousness.
- **Indicator 5:** Learning experience from the case of Milu re-introduction for re-introducing other wild extinct species such as Przewalski's wild horse (*Equus przewalskii*), Saiga (*Saiga tatarica*) and one-horned rhino (*Rhinoceros unicornis*) in the country.

Project Summary

Feasibility: After last glacial period, Milu was restricted to swamp and wetland in the region south of 43°N and east of 110°E in China. Population of Milu declined due to human hunting and land reclamation as human population expanded in Holocene. Milu was finally extinct in the field (Cao *et al.*, 1992). Nanyuan Royal Hunting Garden in the Qing Dynasty (1616 - 1911) hosted a last herd of Milu, the landscape in the 200 km² hunting garden in south suburb of Beijing was a predominantly a wetland of swamp, ponds and lakes during that period. At the end of 19th century, wall of the garden was first destroyed by a heavy flood in the Yongding River, and then by the cannon fire of the allied foreign forces during the Second Opium War, the Père David's deer escaped and were hunted.

Before the demise of the royal herd of Milu in the Nanyuan, Milu had been introduced into Europe. During the last decade of the 19th century, the 11th Duke of Bedford gathered all last 18 Milu in the world to form a breeding herd at the Woburn Abbey. The heavily inbred Milu safely passed through the genetic bottleneck of inbreeding and adopted the vast open parkland of mid-England estate. In the 1950s, number of Milu reached several hundreds (Beck & Wemmer, 1983). After culture revolution, the feasibility of re-introducing Milu to China was explored.

Implementation: The first conservation re-introduction of Milu included two groups of 20 (5 males:15 females) and 18 (all females) in 1985 and 1987, respectively. After a careful search and evaluation by a group of zoologists, botanists, wildlife managers and officers the relic site of the Nanyuan Royal Hunting Garden was chosen as the site of re-introduction. For the re-introduction, the Beijing Milu Park (39°07'N, 116°03'E) was established.

Beijing Milu Park is 60 ha in area with Annual average temperature of 13.1°C, and average precipitation of 600 mm. The land was dominated by reed (*Phragmites australis*), and grasses, such as *Eleusine indica*, *Ersagrostis cilianensis*, *Digitaria*

sangunalis and *Setaria viridis*. Where the grass is overgrazed, *Amaranthus roxburghianus* dominates the vegetation. Since the re-introduction, Milu over grazed on natural vegetation in summer and autumn, thus original vegetation inside the park was damaged by over grazing and droughts. The park managers started to plant artificial grasslands and rebuilt wetlands in the park. The deer in the park receive supplemental feeding year round (Jiang *et al.*, 2008).



Author in Dafeng Reserve in 2007

Further population growth in Beijing Milu Park was restricted by its limited size, thus, the park translocated its Milu to reserves and parks. More than 300 Milu were sent over 50 sites all over China. The most important one was relocation to Tianezhou on the riverside of Yangtze River in 1990s. Ninety-one Milu were translocated to Tianezhou, Shishou, Hubei Province in 1993 and 1995, where the Shishou Milu Reserve was established. A flooding of the Yangtze River in 1998 resulted in several cohorts of Milu leaving the initial release area and forming permanent herds in other parts of the province, as well as around Dongting Lake in Hunan Province (Maddison *et al.*, 2012). The second re-introduction of Milu was carried out in August of 1986. A group of 39 Milu was selected from five UK zoos. An even more extensive survey in eastern China for potential re-introduction site was conducted. Finally, the Dafeng State Forestry Farm was chosen which is located on the coast of Yellow Sea and was lightly populated. Dafeng Milu Natural Reserve (33°05'N, 120°49'E) was established to host the re-introduced Milu.

The Dafeng Milu Natural Reserves is 2 - 4 m above sea level, with a sub-tropic monsoon type climate. Annual average temperature is 14.1°C and average annual precipitation is 1,068 mm. The vegetation is dominated by cogongrass (*Imperata cylindrica*), reed (*Phragmites australis*), locust false-indigo (*Amopha fruticosa*) and locust (*Robinia pseudoacacia*) (Jiang *et al.*, 2008). The original size of the Dafeng Milu Natural Reserve was 10 km², with 3 fenced paddocks of 273 ha. The reserve purchased another 30 km² land in 1995. In 1997, the reserve was approved by the National Nature Reserve Commission as a national nature reserve (Jiang *et al.*, 2000b).

Post-release monitoring: Wardens and veterinarians of Beijing Milu Park, Dafeng national nature reserve and Shishou Milu national reserve routinely



Close-up of Milu

closely monitored the re-introduced Milu.

Researcher and graduate students from the institute of Zoology, Chinese Academy of Sciences, Chinese Forestry Academy and universities conducted research projects including population monitoring on the introduced Milu in Beijing Milu Park, Dafeng national nature reserve and Shishou Milu national reserve. Three international workshops on management and

research on the re-introduced Milu were held in Beijing Milu Park in 2006 and Dafeng reserve in 2011 and 2012, respectively. Recently, a team is monitoring the field released Milu in coast marsh of Dafeng with satellite collars. Many papers have been published in peer-reviewed journals.

Major difficulties faced

- Populations of Milu quickly reached the carry capacities of Beijing Milu Park, Dafeng Milu nature reserve and Shishou Milu nature reserve.
- Lack of further field releasing sites for Milu in the country.
- Disease and parasites may break out occasionally in Milu populations.
- Released Milu may damage crops and thus cause conflict of interests between reserves and local people.
- The problem of low genetic diversity may be still potential threat to the survival of Milu, though we do not notice major phenological change in the population.

Major lessons learned

- A thorough investigation of cause of field extinction and biology of the species is prerequisite for successful re-introduction.
- As first step of re-introduction, the Milu were released to fenced paddocks of a large size (100 ha in Dafeng) under close monitoring and supplemented with feed in winter.
- Actively looking for additional relocation sites such as parks, zoos, safaris and nature reserve as the number of re-introduced Milu increased.
- Expanding the size of nature reserve if possible, in case of Dafeng nature reserve, more coastal march lands were acquired for the field released deer in the reserve.
- A national level coordination scheme is needed for further field release and population genetic management.

Success of project

Highly Successful	Successful	Partially Successful	Failure
√			

Reason(s) for success/failure:

- Milu is perceived as a national conservation priority and a flagship species in the wetland ecosystems of the country.
- A consulting body for Milu re-introduction was formed, field surveys were conducted in the former range of Milu and a master plan for Milu re-introduction was drawn by national wildlife management authority.
- Local governments welcomed the implementation of re-introduction of Milu, because the Milu is legendary animal in Chinese history.
- Parks and natural reserves were established for the re-introduced Milu with veterinarians, wardens and budget from the local governments.
- Scientists conducted researches on ecology, behavioral, reproductive, and genetic as well as disease prevention in Milu.

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