Preliminary Results of Bat-box Trial Project in the Hong Kong Wetland Park

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為了解香港蝙蝠對棲所的需要，及提高本港市民對蝙蝠的保育意識，漁農自然護理署哺乳動物工作小組與濕地公園科於 2005 年 8 月始，合作進行了一項蝙蝠巢箱試驗計 劃，成功於濕地公園內為東亞家蝠提供合適的棲所。

Background

Wetlands are key habitats in the conservation of biodiversity and are suitable habitats for foraging insectivorous bats, possibly because of the abundance of insects and drinking places there. Nevertheless, the availability of natural roosts in most wetlands is very low (Flaguer *et al*., 2006; Kunz and Lumsden, 2003). Bat-boxes may thus provide alternative roosts for bats in wetlands.

Any bat species known to use artificial structures like buildings or bridge crevices as diurnal roost could potentially be a bat-box user. Among the 26 Hong Kong bat species (Shek and Chan, 2006), the Japanese Pipistrelle (*Pipistrellus abramus* 東亞家蝠), the Daubenton's Bat (*Myotis daubentonii* 水鼠耳蝠) and the Brown Noctule (*Nyctalus noctula* 褐山蝠) have been found using bat-boxes (Ades, 2004; Dahmer, 2002; Pliquett, 2001). Jointed with the Wetland Park Division, a bat-box trial project, which was designed to study the preferred bat-box designs and to enhance community awareness of bat conservation, was initiated in 2005 in the Hong Kong Wetland Park (HKWP).

Fig 29. Bat-boxes of different designs, 2-chambered (on left) and 4-chambered (on right), installed in the HKWP.

Study Method

On 31 August 2005, 20 bat-boxes of 2 types (2-chambered & 4-chambered, Fig. 29 & 30) were installed in the HKWP. Both type of boxes had similar structural design to the open bottomed, Bat Conservation International model bat house (Tuttle *et al*., 2005).

Roost chambers were of height 19.0 cm & 58.1 cm and of width 16.5 cm & 44.5 cm in the 2-chambered and 4-chambered bat-boxes respectively. In hope of getting a higher occupancy, modifications were made on the 4-chambered bat-boxes. These include: a) to provide bats with footholds by stapling fiberglass insect screening on the roosting partitions; b) to increase the durability of the boxes, and to ensure the box chamber stay dry during wet seasons, by covering the box roof with water-proof plastic clothes.

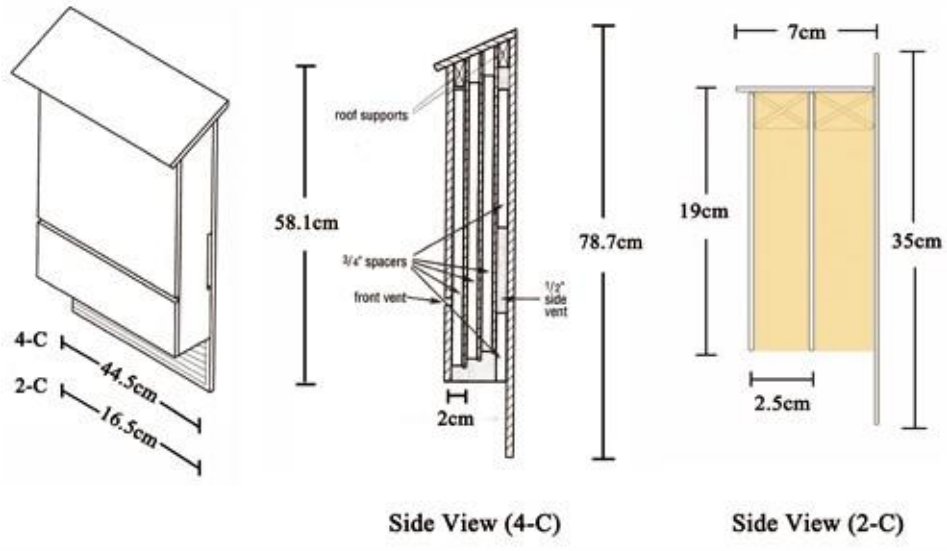

Fig 30. Designs & dimensions of the 2-chambered (2-C) and the 4-chambered (4-C) bat-boxes. (Reprinted with permission from Tuttle *et al.* (2005), Bat Conservation International, for the 4-chambered bat-box.)

Boxes were mounted on poles 2.5 m above ground, located near water sources and along natural bat flyways. Inspections on boxes were made on 26 April 2006 at 1400-1700 and 18 September 2006 at 1500-1800. During each inspection, the number of bats per box and box occupancy were recorded. The box-occupancy was expressed as the percentage of boxes occupied by bats among the boxes checked.

Results & Discussion

Bats were attracted before the first summer after box installation. This indicated the initial success of the project. Boxes were occupied by the Japanese Pipistrelle (Fig. 31) – a species commonly found foraging in wetlands like the HKWP and the Mai Po Inner Deep Bay Ramsar Site (Shek and Chan, 2006). The occupancies of the 2-chambered & 4-chambered bat-boxes were 62.5 % & 57.0 % respectively after one year of the installation.

Fig 31. The Japanese Pipistrelle (*Pipistrellus abramus* 東亞家蝠) roosting in a 4-chambered bat-box.

Sixteen bats were found occupying the boxes in the box-check of April 2006. The number of bats further increased to 37 in the box-check of September 2006. The number of roosting bats in each occupied box ranged from one to 17 (mean = 4.6 ± 2.1). The two largest colonies with 10 and 17 bats (82 % of the total number of bats recorded) recorded in September were found roosting in the 4-chambered bat-boxes. In addition to its relatively larger size, the 4-chambered bat-boxes also provided bats with a wider range of internal temperature that could in turn results in considerable energy savings (Lourenço and Palmeirim, 2004) as bats move to the part with the most favourable temperature. This may account for the higher number of bats found in the 4-chambered box. Apart from the Japanese Pipistrelle, bat-boxes were also found occupied by other animals during the first inspection, like frogs, geckos, spiders and ants. Invader guard and Vaseline have been applied to the mounting poles, which were found working effectively in deterring some of these animals during the second inspection.

Conclusion & Recommendation

This study highlights the role of bat-boxes as a valuable management tools to conserve bat populations in highly productive wetland habitats where few natural roost sites are available. Bats are natural predators of many night-flying insects, such as mosquitoes. Installation of bat-boxes in attracting bats could thus serve as mosquito control measure and practical preventative measures against mosquito-bounded diseases (IFCNR, 2003). However, it should be noted that not all bat species, especially the cave-dwelling bat species would roost in bat-boxes. It is thus not applicable to propose bat-boxes as ecological mitigation measures / habitat replacement tool for all the 26 local bat species.

The Mammal Working Group plans to further investigate the best designs and installation methods of bat-boxes for our local bat species. More bat-boxes will be installed in the HKWP, the country parks and the protected areas in Hong Kong. Monitoring and maintenance of the bat-boxes will be done in a regular basis.

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References

Ades, G. 2004. Kadoorie Farm & Botanic Garden – Wildlife updates & sightings. *Porcupine!* 30:15-18.

Dahmer, T.D. 2002. Pipistrelles use bat roost boxes on Kau Sai Chau. *Porcupine!* 27:10-11

Flaguer C., Torre I. and Ruiz-jarillo R. 2006. The value of bat-boxes in the conservation of *Pipistrellus pygmaeus* in wetland rice paddies. *Biological conservation*. 128:223-230.

IFCNR. 2003. "Canadians Hope Bats Will Control West Nile Virus" <http://wildecology.ifcnr.com/article.cfm?NewsID=287>

Kunz, T.H. and Lumsden, L.F. 2003. Ecology of cavity and foliage roosting bats. In: Kunz, T.H., Fenton, M.B.(Eds.), *Bat Ecology*. The University of Chicago Press, Chicago and London, pp.3-89.

Lourenço, S.I. and Palmeirim, J.M. 2004. Influence of temperature in roost selection by *Pipistrellus pygmaeus* (Chiroptera): relevance for the design of bat boxes. *Biological Conservation* 119:237-243.

Pliquett, F. 2001. "Marking *Nyctalus noctula* Part II" <http://www.zwergfledermaus.de/beringung2/ploen2_e.htm>

Tuttle, M.D., Kiser, M. and Kiser, S. 2005. *The bat house builder's Hand-book 2nd Ed.* Bat Conservation International, Austin, Texas, 34p.

Shek, C.T. and Chan, C.S.M. 2006. Mist net surveys of bats with three new bat species for Hong Kong. *Hong Kong Biodiversity* 11:1-9.