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Advisory Council on the Environment
Nature Conservation Subcommittee

Surveys on Bats

Purpose

This paper briefs Members on the findings of the surveys on bats of Hong Kong by the Mammal Working Group of the Agriculture, Fisheries and Conservation Department (AFCD).

Background

2. Bats, making up over half of all local mammalian species, comprise an important part of Hong Kong's mammal fauna. They are important components of our biodiversity. For example, insectivorous bats are the major predators in controlling the populations of night-flying insects and fruit bats perform an important function as pollen or seed dispersers. In addition, due to their small size, mobility and longevity, they are well suited for use as indicators of general environmental conditions.

3. All bats are protected under the Wild Animals Protection Ordinance (Cap. 170) in Hong Kong. No person shall, except in accordance with a special permit, take, remove, injure, destroy or willfully disturb any bat or their roost.

Recent Studies

4. In a paper published in 1999, G. Ades described 22 bat species in Hong Kong and suggested that the distribution and the status of many species were poorly known, with only one to three known localities for many species.

5. Effective wildlife conservation relies on gathering information consistently to identify population changes of the target species over time. AFCD launched a monitoring programme for Hong Kong bats in 2002, with a view to building up baseline information on Hong Kong bats. The program included estimation of the number of species, study on species abundance and spatial distributions of bat species throughout Hong Kong and identifying changes in populations of species that are of conservation concern. The bat surveys are part of the overall "ecological surveys and database" programme of AFCD.

Surveys

Methodologies

6. The foraging and roosting requirements of bats are species-specific. Different species may have different foraging behaviours and may also differ in their susceptibility to the survey or capture techniques. Two survey methods are used: direct counting at their roost sites and captive surveys by using mist nets and harp traps.

7. Bats usually spend more than half of their lives in day roosts. For cave-dwelling species, which aggregate in caves during daytime, direct roost census is the most suitable survey method. AFCD's roost censuses covered all major water tunnels, abandoned mines, sea caves, drainage culverts and air raid shelters twice a year, i.e. the summer and winter censuses. The data were also supplemented with emergence counts and harp-trap surveys at the entrance of the caves. Both harp traps and mist nets are effective capturing devices for bats. Capturing devices are designed for studying species which are not found during roost censuses.

Major findings

8. AFCD's bat surveys reviewed and updated the taxonomy status and features for the identification of all bat species reported, with the latest information from phylogenetic studies. Scientific names and Chinese / English common names were standardized to avoid confusion. The species list of Hong Kong bats is set out at **Annex**.

9. Four bat species new to Hong Kong were found in the mist net surveys in 2005. They are Greater Bamboo Bat (*Tylonycteris robustula* 褐扁顱蝠), Least Pipistrelle (*Pipistrellus tenius* 小伏翼), Black-glided Pipistrelle (*Arielulus circumdatus* 大黑伏翼) and Whiskered Myotis (*Myotis muricola* 喜山鼠耳蝠). The discovery raised the total number of bat species in Hong Kong to 26. This figure compares favourably with many other places such as the U.K. (17 species) and Singapore (21 species).

10. The roost censuses provide baseline information on the abundance and distribution of 11 species of cave-dwelling bats in Hong Kong. Six of them are ranked either very common or common, including some, such as Rickett's Big-footed Bat (*Myotis ricketti* 大足鼠耳蝠) and Greater Bent-winged Bat (*Miniopterus magnater* 大長翼蝠), which were thought to be either rare or uncommon. Most roosts are either water tunnels or abandoned mines and such

man-made structures provide significant roosting habitats for many cave-dwelling bats. Only Horsfield's Bat (*Myotis horsfieldi* 霍氏鼠耳蝠) is ranked as "Rare".

11. The status of ten non-cave dwelling species was covered in the mist net surveys. Among these, four are ranked either very common or common, including Lesser Bamboo Bat (*Tylonycteris pachypus* 扁顱蝠) which was thought to be rare in Hong Kong. Based on their relative abundance and distribution, Chinese Pipistrelle (*Pipistrellus pulveratus* 灰伏翼), Whiskered Myotis, Greater Bamboo Bat and Black-glided Pipistrelle were ranked as "Rare".

12. A special project on Short-nosed Fruit Bat (*Cynopterus sphinx* 短吻果蝠) in urban areas of Hong Kong has been carried out since 2003. Short-nosed Fruit Bat is commonly found and widely distributed at lower elevations in the urban areas of Hong Kong, including parks and gardens where human disturbance is heavy. Occasional reports of bats straying in buildings were also recorded. This suggests that the species tolerates humans in the vicinity of their roosts. In addition, the species was found to roost on relatively young Chinese Fan-palm, which are common and widespread throughout the urban areas of Hong Kong.

13. Wrinkle-lipped Free-tailed Bat (*Chaerephon plicata* 皺唇犬吻蝠) is rare and has not be recorded in surveys done by AFCD. In overseas countries, it is reported that it prefers large caves with high ceiling and often found aggregates in groups of over 200,000 in sea caves on small islands. Up till now, no suitable roost of this species has been found in Hong Kong and all local records to date were individuals accidentally entered into houses.

Conservation of Bats

14. Our surveys in the last three years have increased the total number of bat species identified in Hong Kong from 22 to 26. Five out of the 26 species are considered to be rare and particularly worthy for conservation actions. They are Horsfield's Bat, Chinese Pipistrelle, Whiskered Myotis, Greater Bamboo Bat and Black-glided Pipistrelle.

15. Our surveys also indicate that all bats species (except Wrinkle-lipped Free-tailed Bat) have representative populations in our protected areas, including Country Parks and Special Areas. Most bats roost in man-made structures, e.g. water tunnels, abandoned mines, culverts, bridges and attics, which provide suitable roosting habitats for them. This suggests that natural

roosting habitats (e.g. natural caves) may be limiting, and population numbers of some bat species could be enhanced by the provision of man-made roosting structures. For example, the very common Japanese Pipistrelle (*Pipistrellus abramus* 東亞家蝠) roosts mainly in man-made structures and provision of bat boxes would further increase their population number.

16. Our surveys also suggest that some species of bats tolerate certain levels of human disturbance. Japanese Pipistrelles are found roosting in village houses and Short-nosed Fruit Bats are found on palm trees in many parks and playgrounds in urban areas, both with human activities in the vicinity of their roosts. There are also evidences that bats move from roosts to roosts, e.g. among the different water tunnels. As such, disturbance to bats roosting in water tunnels could be minimized if the maintenance of water tunnels is carried out in phases and in non-breeding season. The non-breeding season may vary for different species, but generally falls between September to December.

Way forward

17. Some bats, e.g. Rhinolophidae and Hipposideridae, are adept at avoiding mist nets by highly maneuverable flights and echolocations. In view of this, an acoustic monitoring program is now being developed for studying bats by detecting their species-specific ultrasonic echolocation calls. We are also developing monitoring methods for studying bats by different bat detectors. The main aim is to establish a complete call library of all bat species of Hong Kong.

18. Provisions of artificial roosting sites, e.g. bat boxes, are found to be an effective tool to enhance bat populations. A trial on different designs of bat boxes is being planned for 2006. The objective is to compare different types of bat boxes for the local bat species, such as Japanese Pipistrelle and Brown Noctule (*Nyctalus noctula* 褐山蝠).

19. Tagging studies are also being planned to collect further information on the migration of some target species, such as Chinese Horseshoe Bat and Horsfield's Bat in Hong Kong. This would provide essential information on roost fidelity, roosting habitat requirements and local migration of our bats.

20. Species action plans will be developed for the conservation of bat species and / or habitats, in particular to maintain and enhance population numbers of the five target species listed in paragraph 14 above. Further studies, such as radio tracking, may also be required to identify the roosting habitats of some of the target species.

21. AFCD is also assisting the University of Hong Kong in the collection of mouth and anal swab samples for the surveillance for coronaviruses in the bats of Hong Kong. This surveillance exercise is an on-going project and samples of more local bat species are being collected for screening.

22. We will also incorporate the data obtained in the bat surveys in our publicity programmes to raise public awareness of bats. Information on species diversity, distribution and current status can now be found at AFCD's website: Hong Kong Biodiversity Online at www.hkbiodiversity.net. A field guide to terrestrial mammals, including bats, of Hong Kong will be published later this year.

Advice Sought

23. Members are invited to note and comment on the findings of surveys on bats of Hong Kong and the proposed way forward.

Agriculture, Fisheries and Conservation Department
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Annex

Species List of Hong Kong Bats

Common Name	Scientific Name	Status	Remarks
1. Leschenault's Rousette (**棕果蝠**)	*Rousettus leschenaulti*	Common	Feed on fruit and nectar; 9 roost sites recorded, e.g. Kat O (>2,000) and Kau To Shan (>6,500)
2. Short-nosed Fruit Bat (**短吻果蝠**)	*Cynopterus sphinx*	Very Common	Feed on fruit and nectar; 170 roost sites recorded and common in urban areas. Roost always found under the fronds of Chinese Fan-palm
3. Black-bearded Tomb Bat (**黑鬚墓蝠**)	*Taphozous melanopogon*	Data deficiency	Insectivorous; only a single record made in 1993 in Quarry Bay and probably a foraging or stray individual into Hong Kong
4. Chinese Horseshoe Bat (**中華菊頭蝠**)	*Rhinolophus sinicus*	Very Common	Insectivorous; over 20 roost sites recorded, Sai Kung (>2,000) and Lin Fa Shan (>800)
5. Intermediate Horseshoe Bat (**中菊頭蝠**)`	*Rhinolophus affinus*	Uncommon	Insectivorous; over 20 roost sites recorded, e.g. Tung Tze (>50)
6. Least Horseshoe Bat (**小菊頭蝠**)	*Rhinolophus pusillus*	Uncommon	Insectivorous; over 20 roost sites recorded, e.g. Sai Kung (>20) and Silvermine Bay (>20)
7. Pomona Roundleaf Bat (**小蹄蝠**)	*Hipposideros pomona*	Very Common	Insectivorous; about 15 roost sites recorded, e.g. Nam Chung (>300) and Lin Fa Shan (>800)
8. Himalayan Roundleaf Bat (**大蹄蝠**)	*Hipposideros armiger*	Very Common	Insectivorous; over 20 roost sites recorded, Sai Kung (>4,500) and Silvermine Bay (>200), also found in abandoned village houses, e.g. So Lo Pun (>100)

9. Chinese Myotis **(中華鼠耳蝠)**	*Myotis chinensis*	Uncommon	Insectivorous; over 15 roost sites recorded, e.g. Sai Kung (>100) and Lin Ma Hang (>20)
10. Rickett's Big-footed Bat **(大足鼠耳蝠)**	*Myotis ricketti*	Common	Insectivorous, also feed on fish; over 15 roost sites recorded, e.g. Sai Kung (>1000) and Lin Ma Hang (>100)
11. Horsfield's Bat **(霍氏鼠耳蝠)**	*Myotis horsfieldii*	Rare	Insectivorous; only 2 roost sites recorded; rare and highly restrictedly distributed; few individuals were found in Shek Kong and Nam Chung
12. Daubenton' s Bat **(水鼠耳蝠)**	*Myotis daubentonii*	Data Deficiency	Insectivorous; the last record was from Shek Kong in 1990
13. Whiskered Myotis **(喜山鼠耳蝠)**	*Myotis muricola*	New record Rare	Insectivorous; Foraging individuals were captured in San Tau, Nam Chung and Ho Pui
14. Hairy-legged Myotis **(毛腿鼠耳蝠)**	*Myotis fimbriatus*	Data Deficiency	Insectivorous; the last record was from Silvermine Bay in 1966
15. Brown Noctule **(褐山蝠)**	*Nyctalus noctula*	Common	Insectivorous; foraging individuals were captured in Shing Mun, Tan Shan River and Tai Lam
16. Japanese Pipistrelle **(東亞家蝠)**	*Pipistrellus abramus*	Very Common	Insectivorous; also common in urban areas
17. Chinese Pipistrelle **(灰伏翼)**	*Pipistrellus pulveratus*	Rare	Insectivorous; foraging individuals were captured in Yuen Long, Ting Kau and Ma On Shan
18. Least Pipistrelle **(小伏翼)**	*Pipistrellus tenius*	New record Uncommon	Insectivorous; foraging individuals were captured in So Lo Pun, Shek Pik and Sheung Woo Hang

19. Black-glided Pipistrelle **(大黑伏翼)**	*Arielulus circumdatus*	New record Rare	Insectivorous; a foraging individual was captured in Wu Kau Tang
20. Lesser Bamboo Bat **(扁顱蝠)**	*Tylonycteris pachypus*	Very Common	Insectivorous; roosts in bamboo; over 15 roost sites recorded, e.g. Shing Mun, Pok Fu Lam, Tai Lam, Ma On Shan, Nam Chung
21. Greater Bamboo Bat **(褐扁顱蝠)**	*Tylonycteris robustula*	New Record Rare	Insectivorous; roosts in bamboo; a single record was made in So Lo Pun
22. Lesser Yellow Bat **(中黃蝠)**	*Scotophilus kuhlii*	Uncommon	Insectivorous; foraging individuals were caught in San Tau, Mai Po and HK Wetland Park
23. Greater Bent-winged Bat **(大長翼蝠)**	*Miniopterus magnater*	Common	Insectivorous; over 20 roost site recorded, e.g. Tung Tze (>1,000) and Lin Ma Hang (>1,000)
24. Common Bent-winged Bat **(長翼蝠)**	*Miniopterus schreibersii*	Data Deficiency	Insectivorous; Status unclear, due to the forearm size overlapping, and it is difficult to distinguish the *M. magnater* to *M. schreibersii*
25. Lesser Bent-winged Bat **(南長翼蝠)**	*Miniopterus pusillus*	Uncommon	Insectivorous; recorded over 20 roost sites, e.g. Nam Chung (>500) and Lin Ma Hang (>800)
26. Wrinkle-lipped Free-tailed Bat **(皺唇犬吻蝠)**	*Chaerephon plicata*	Rare	Insectivorous; only recorded from individual accidentally entered into buildings; probably foraging or stray individuals into Hong Kong

Legends

New Species: Species new to Hong Kong, discovered by AFCD in 2005

Very common: Species recorded in >30% of sites surveyed and the number of individuals recorded is >5% of the grand total of individuals of all bat species

Common: Species recorded in 10-30% of sites surveyed and the number of individuals recorded is >5% of the grand total of individuals of all bat species

Uncommon: Species recorded in >10% of sites surveyed and the number of individuals recorded is 0.1-5% of the grand total of individuals of all bat species

Rare: Species recorded in <10% of sites surveyed and the number of individuals recorded is less than 0.1% of the grand total of individuals of all bat species

Data Deficiency: No reliable record has been made in past 10 years, i.e. from 1995 to 2005.