

Advisory Council on the Environment
Nature Conservation Subcommittee
Contraceptive/Neutering Program of wild monkeys in Hong Kong

Purpose

This paper briefs Members on the progress of the contraceptive/neutering program of wild monkeys in Hong Kong implemented by the Agriculture, Fisheries and Conservation Department (AFCD).

Background

2. In Hong Kong, Kam Shan and Lion Rock Country Parks are famously known as “Monkey Hills” to most locals for the wild monkeys which inhabited therein. According to the camera trap survey conducted by AFCD in 2002-06, wild monkeys are common but have a fairly restricted distribution in Hong Kong. They are mostly found in Kam Shan, Lion Rock, Shing Mun Country Parks and Tai Po Kau Nature Reserve as shown in Figure 1. Although Hong Kong falls within the range of natural distribution of the Rhesus Macaque (*Macaca mulatta*), the original wild stock is believed to have become extirpated. The existing wild monkey populations are considered as the descendents of the individuals of the Rhesus Macaque which had been introduced to the above areas in the 1910s. A few individuals of the Long-tailed Macaque (*M. fascicularis*) had also been released to the same area in the 1950s which have led to crossbreeding between these two *Macaca* species.

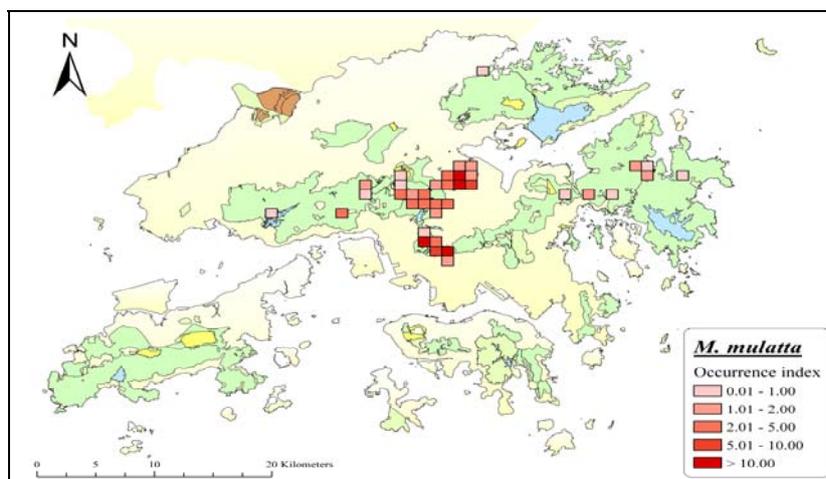


Figure 1. Distribution of the Rhesus Macaque (*Macaca mulatta*) in Hong Kong. Occurrence Index refers to the number of photos of *M. mulatta* taken per 100 days.

3. Due to excessive feeding by human, the number of wild monkeys in Hong Kong has increased from a few to over 2,000 individuals. Through frequent contacts with humans over the years, some wild monkeys lose their natural fear of human and even become habituated to stray into nearby sub-urban residential areas to search for easy food. Their behaviors, sometimes aggressive, have caused nuisance and human-wild monkey conflicts in both Country Parks and urban fringe residential areas (Figure 2).

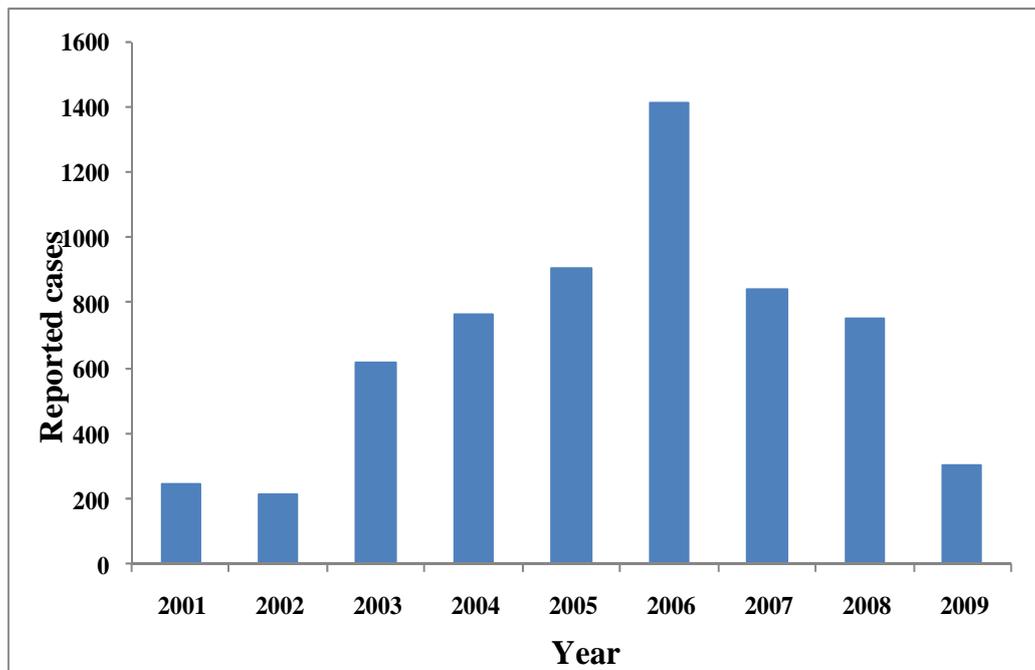


Figure 2. Total number of wild monkey nuisance cases received by AFCD from 2001-09.

Feeding Ban

4. In view of the growing complaints on wild monkey nuisance, AFCD implemented a management plan of wild monkeys in Hong Kong in 1999 which included feeding ban, contraceptive treatment to wild monkeys and public education. In order to help wild monkeys reverting back to the countryside for feeding, AFCD implemented the feeding ban of wild monkeys in the concerned Country Parks under the Wild Animals Protection Ordinance (Cap. 170) in 1999. This enforcement arrangement helped reduce the unnatural population growth of wild monkeys due to human feeding in the Kowloon Hills. To provide monkeys with sufficient natural food in their habitats, over 100,000 fruit trees are planted each year in the concerned Country Parks so as to attract wild monkeys to stay in the countryside areas for feeding.

Contraceptive/Neutering Program

5. In order to manage the growth of wild monkey population in the long term, a trial contraceptive/neutering program was initiated in 1999 on wild monkeys in captivity. The females were injected with an immuno-contraceptive vaccine named SpayVac™ which induces the immune response of females to produce antibodies which adhere to the surface of her own eggs and prevent sperms from binding, thus blocking fertilization. It was observed that a single dose of SpayVac™ confers contraception protection for three to five years. The males were treated by chemical vasectomy which is a treatment to block vas deferens permanently by injecting the scarring chemicals at the epididymis of the testes. From 2002-2007, the contraceptive /neutering program has been extended to field trial on wild populations in Country Parks and a total of 124 wild monkeys have been successfully treated in house by AFCD in five years. After the first field trial, field monitoring on the treated wild monkeys were carried out in the following years and none of the treated females were found to be pregnant within the coming two years after the SpayVac™ treatment.

6. Since 2003, the Sha Tin District Council has repeatedly raised great concerns on nuisances caused by wild monkeys and demanded the Government to deploy more staff to handle stray monkeys and to speed up the trial contraceptive/neutering treatment project. The need to speed up the contraceptive treatment project as a long-term solution to reduce the wild monkey population in Hong Kong was also brought to the attention of the LegCo in August 2005 and again in June 2007. At the LegCo case conference held in June 2007, AFCD was urged to conduct contraceptive treatment to half of the existing wild monkey population of 2,000 (i.e., about 1,000 wild monkeys) within 5 years (i.e. before 2012).

7. Following the success of the field trials, a large scale wild monkey contraceptive/neutering program has been launched since mid-2007. The program which also includes catching/trapping of wild monkeys has been contracted out since 2008. In each operation, 30-130 monkeys would be trapped by using a 28 feet long remote control trapping cage. The trapped monkeys would be sedated and the suitable sub-adults and adults would receive contraceptive/neutering treatments. The program has been running for 3 years and up to June 2010, a total of 1,287 wild monkeys had been treated which has met the target set by the LegCo case conference. The total number of monkeys that received contraceptive /neutering treatments from 2002-10 are shown in

Table 1.

Table 1. Number of wild monkeys treated in the contraceptive/neutering program

Year	Male Treated	Female Treated	Total
2002-07 (Trial Stage)	63	202	265
2008	136	425	561
2009	179	360	539
2010 (up to Jun 10)	71	116	187
Overall:	449	1,103	1,552

8. In late 2009, a new technique for permanent sterilization of females by endoscopic tubectomy has been introduced to the program by the current Contractor of the program (i.e. the Ocean Park Conservation Foundation Hong Kong). This surgical operation involves the use of a micro endoscopic instrument of 5-7mm diameter to block, cut and remove the middle part of the oviducts of females. This sterilization method provides highly effective and permanent protection against pregnancy to female monkeys up to 20 years old. It is anticipated that this technique could effectively control the population growth of local wild monkeys in the long run.

Results of Population Survey Conducted in 2008-10

9. Since the first contraceptive/neutering trial operation in 2002, AFCD has also conducted periodical field monitoring on population changes of wild monkeys. An extensive population survey was then carried out in 2008-10 with the objectives of determining the population structure of wild monkeys in Hong Kong and at the same time to evaluate the effectiveness of the contraceptive/neutering program implemented so far.

Total Population in 2010

10. In wild monkey core areas, i.e. Kam Shan, Lion Rock and Shing Mun Country Parks, the population surveys were carried out by direct counting along forest trails of all known wild monkey sites. For other areas, such as Tai Po Kau and Sai Kung, the population sizes were estimated by interviewing with AFCD Country Park Rangers and Park Wardens who are familiar with wild monkeys in the areas.

11. Up to 2010, the total number of wild monkeys in Hong Kong was

estimated at 2,163 individuals and they are distributed in 26 heterosexual troops and 29 peripheral male groups ^{Note1} as shown in Table 2.

Table 2. Estimated Population of Wild Monkeys in Hong Kong in 2010

Locations	Heterosexual troops	Peripheral males
	Troops / Individuals	Groups/Individuals(solitary)
Kam Shan & Lion Rock	16 / 1,719	17 / 92 (11)
Shing Mun	3 / 112	11 / 39 (4)
Tai Po Kau	3 / 80	1 / 3
Sai Kung	1 / 50	-
Lam Tsuen	1 / 40	-
Sha Tin Height	1 / 15	-
Hin Keng	1 / 13	-
Overall:	26 / 2,029	29 / 134 (15)

The majority of wild monkeys are found in the Kowloon Hills (i.e. Kam Shan and Lion Rock Country Parks) which accounted for 83.7% of the total wild monkey population in Hong Kong. The majority of local wild monkeys was the Rhesus Macaque and only 101 individuals (or 4.8% of the total population) were identified as hybrids between the Rhesus Macaque and the Longtailed Macaque, and 98 of these 101 individuals were identified to belong to a troop in Kam Shan and Lion Rock Country Parks.

Age Structure in 2008-10

12. During the survey, individuals from each heterosexual troop were classified in four different age-groups as (1) “Adults” being fully grown and sexually mature male and female individuals which are typically over 6 years old; (2) “Subadults” being male and female of 4 to 6 years old which are typically smaller in body size than adults and are not fully developed sexually; (3) “Juveniles” (grouped as unisex) being aged from 1 to 3 years old, weaned but small in body sizes and showed little sexual development; and (4) “Infants” (grouped as unisex) being newborn or up to a year old which are usually carried by their mothers. The age structure of the smaller troops in other areas was not determined in the survey.

13. In 2010, the overall sex ratio of male to female for the ‘Subadults’ and

^{Note1} Wild monkeys live in troops of up to 200 individuals and each heterosexual troop generally consist of a few number of males and many females plus their depending young. Young males usually leave their troops becoming solitary for a period of time, or join a peripheral male group.

‘Adults’ was 1:3.5 including peripheral males (or 1:5.3 excluding peripheral males). The dominant age groups were females ‘Adult’ and ‘Juveniles’ which together constitutes over 70% of all members in troops surveyed. The proportion of immature (i.e. ‘Juvenile’ + ‘Infant’) was 49.7%. It is noted that there was a drop in the percentage of ‘Infants’ from 23.6% in 2008 to 11.9% in 2010, while the percentage of most other age groups increased slightly (Figure 3).

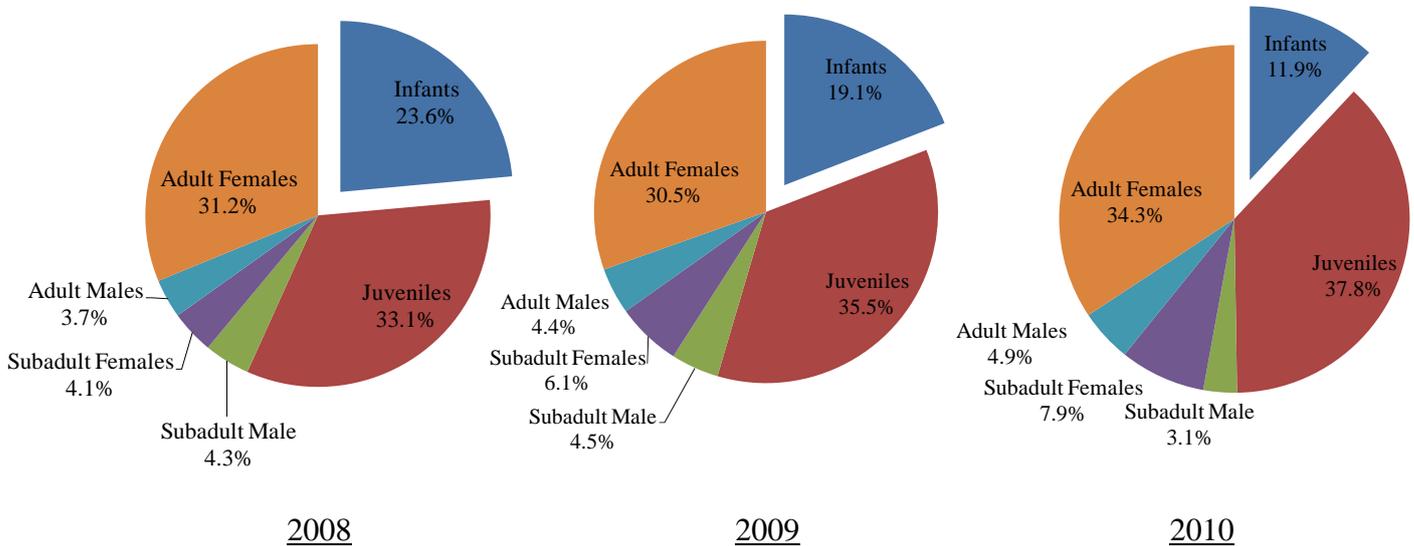


Figure 3. Age structure of wild monkeys heterosexual troops surveyed in 2008-10.

Birth Rate, survival rate and the projected population

14. The birth rate, which is defined as the total number of newborns divided by the total number of fertile females within a troop per year, decreased steadily from 77.4% in 2008, 63.2% in 2009 to 56.6% in 2010. The decreasing trend in birth rate was also reflected by a decrease in the proportion of ‘Infants’ as explained in Paragraph 12. The survival rate of different age groups (which is defined as the portion of the individuals survived in a particular age group after a year) could be determined by tracing the changes in the composition of different age groups from 2008 to 2010. It is noted that females have the survival rate at 91% to 98%, followed by 70% to 78% for males. The survival rate of ‘Infants’ and ‘Juveniles’ is 60% to 77% and 43% to 67% respectively. By taking into account the birth rates and survival rates of wild monkeys, the population growth of wild monkeys in Hong Kong is estimated to have experienced a downward trend with a rate of -1.6% in 2009 and -6.9% in 2010.

15. The current contraceptive/neutering program on the majority groups of wild monkey in Kam Shan and Lion Rock Country Parks would be continued with permanent endoscopic tubectomy to be performed on approximately 200

females each year. By taking into assumptions that the environmental conditions and survival rates of wild monkeys remain unchanged, the population of wild monkeys in Hong Kong will continue to shrink in a rate of -11.5% in 2011 and -9.6% in 2012 as shown in Figure 4. By 2013, the projected population would drop to about 1,630 individuals with an estimated birth rate of 48.3%.

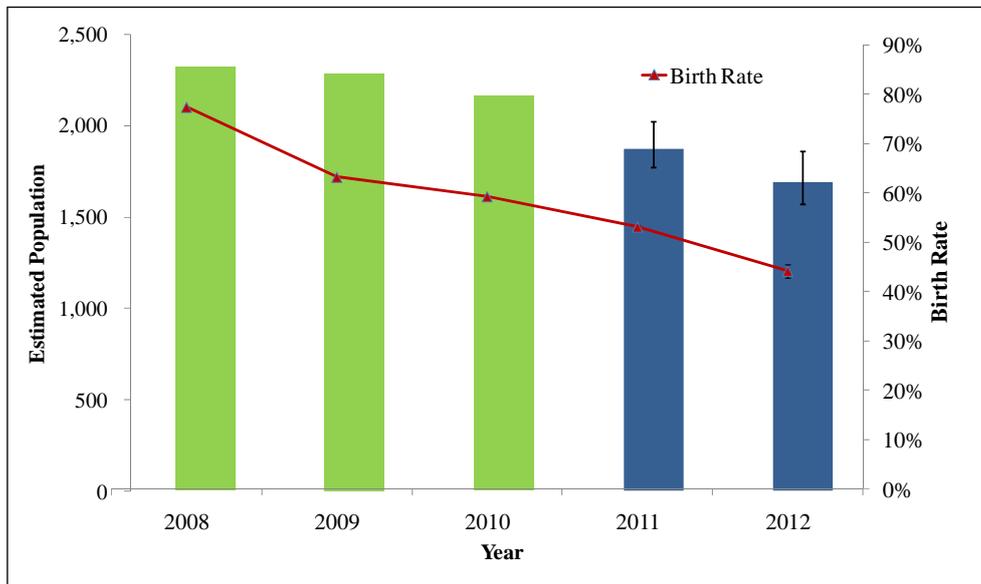


Figure 4. Estimated wild monkey population in 2008 to 2012. The green bars show population estimated based on survey results and the blue bars show the projected population.

Way Forward

16. We are planning to extend the contraceptive/neutering program to other areas, such as Shing Mun and Sai Kung Country Parks to neuter the wild monkeys that belong to other smaller troops with a view to further reduce their population size. Surveys on the populations of wild monkeys will be continued annually which provide an important tool for monitoring the changes in the population structure and the effectiveness of the wild monkey contraceptive/neutering program. Subject to the results of the population surveys and the number of nuisance cases in nearby suburban residential area, the scopes and scale of the contraceptive/neutering program will be reviewed for improvement of its effectiveness and robustness.

Conclusion

17. Hong Kong is the first city in the world to carry out contraceptive/neutering program to control wild monkey population. With the

implementation of both the feeding ban and the contraceptive/neutering program, it is observed that there is a decreasing trend in the population of wild monkeys (see Figure 4) as well as the number of wild monkey nuisance cases (see Figure 1) which indicates the initial success of the program.

Advice Sought

18. Members are invited to note and comment on the finding and progress of the contraceptive/neutering program of wild monkeys in Hong Kong.

**Agriculture, Fisheries and Conservation Department
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