The First Breeding Records, Ecology, Status, and Conservation of Brown Wood Owl *Strix leptogrammica ticehursti* in Hong Kong

Mike Kilburn
c/oHKBWS, 14/F Ruby Commercial Building, 480 Nathan Rd, Kowloon, Hong Kong

Plate 63. Juvenile Brown Wood Owl *Strix leptogrammica ticehursti* 褐林鴞幼鳥
Lam Tsuen, 5 June 2012 林村 2012年6月5日
Mike Kilburn 吳敏

The first sight record of Brown Wood Owl *Strix leptogrammica ticehursti* in Hong Kong was of an adult bird seen and photographed in the upper reaches of Shing Mun Country Park on 6th November 2007 (Wong 2011). This was not wholly unexpected as a large owl (later identified as Brown Wood Owl) had been heard calling at Tai Po Kau on three dates in March 2006 (P. & A. Crow *pers. comm.*), and a recording of the bird's diagnostic four-note call, a deep "*hoo..hu.hu.hu*", was made in Tai Po Kau on 20th March 2006 (R. & K. Barretto. *pers comm.*) (Figure 1).

Following these initial records a similar call, later confirmed to be Brown Wood Owl, was heard from *fung shui* woodland in the Lam Tsuen Valley twice in April 2008, three times in March 2009, once in September 2009 and then in every month between January 2010 and June 2011, except April 2011. The four-note call was also heard at Tai Po Kau in April 2009 and January 2010. Taken together these records strongly suggested that Brown Wood Owl had become established as a resident species in Hong Kong.

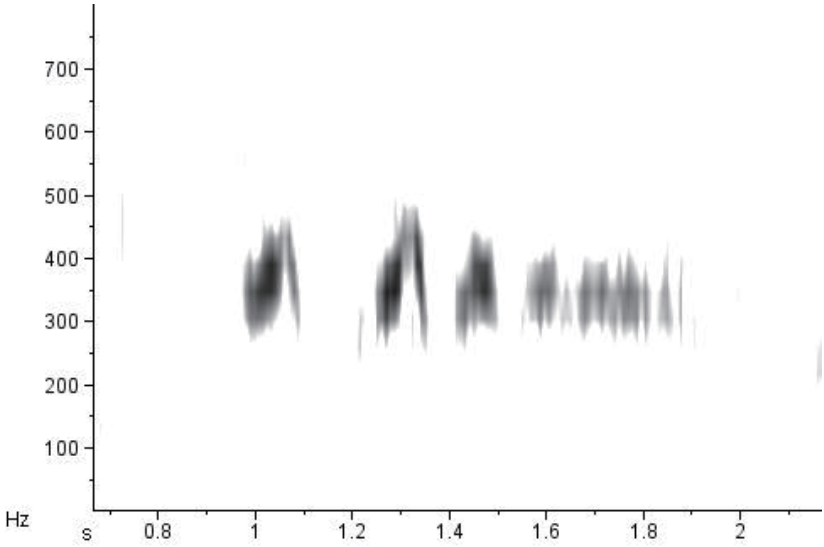

Figure 1. Sonogram of call of Brown Wood Owl, *Strix leptogrammica ticehursti* at Tai Po Kau. 20 March 2006. Recorded by R. & K. Barretto, sonogram by G. Carey

On 4th April 2009 a very young chick found abandoned on the ground and covered in ants in Tai Mo Shan Country Park provided the first evidence of breeding in Hong Kong. Unfortunately the precise location where the bird was found is not known. It was handed in to AFCD staff at the Kap Lung Management Centre, and subsequently to Kadoorie Farm & Botanic Garden (KFBG). It eventually fledged and moulted into adult plumage (Tan and Kendrick 2011), before being released back to the wild on 28th May 2010.

On 5th June 2010 a juvenile Brown Wood Owl (Plate 64) was found on a steep northwest-facing slope covered with mature *fung shui* woodland in the Lam Tsuen Valley at about 100m above sea level. The bird was well photographed and filmed, but was not searched for on subsequent days, and was not seen again.

On 5th June 2011 another juvenile, perhaps a week older than the 2010 bird (showing no downy feathers on the back), was found and again photographed in the very same tree as the 2010 bird! This bird was seen on two subsequent days, once on the same branch, and on the second day on another tree some 20-30m away. On the first day an adult bird was seen to fly off from a concealed perch within 30m of the juvenile.

On 3rd June 2012 another juvenile was discovered in the same location. Its plumage was at a similar stage of development and the bird was again filmed and photographed (Plate 63). On this occasion two adults flew off, again giving the briefest of flight views. The juvenile was seen again on 9th June, this time with one adult ghosting silently away.

In May 2011 two adult birds were heard, seen and superbly photographed over the course of two weeks in Tai Po Kau (Plate 65). A recording and sonogram made on 10 May 2011 can be found at: http://www.xeno-canto.org/species/Strix-leptogrammica LCHUNFAI XC814482011-05-10. While no direct evidence of breeding was found, the overlap in calling dates and times between the Tai Po Kau and Lam Tsuen birds suggested that at least two pairs of Brown Wood Owl were occupying territory on the northern slopes of the Tai Mo Shan massif in May 2011.

Although no nest has yet been found, the extensive records of calling birds in Lam Tsuen, the presence of young birds in four consecutive years from 2009 to 2012, and the records of birds at three different locations at Tai Mo Shan, Lam Tsuen, and Tai Po Kau demonstrate that Brown Wood Owl is an established, albeit rare, breeding species in Hong Kong.

Range and Taxonomy

Brown Wood Owl of the subspecies *ticehursti* is resident throughout southeast China, with previous Guangdong records coming from Hei Shi Ding (Lewthwaite 1996 and Lee *et al.* 2006) and Chebaling (Lewthwaite 1996). The current understanding of this taxon and its distribution in China is discussed more fully in Wong (2011). Given its distribution, the active reforestation of hilly areas in southern China, and the availability of suitable habitat in Hong Kong, this discovery, should not perhaps be wholly surprising.

The taxonomy of Brown Wood Owl is complex and not fully understood. Although currently considered conspecific by some authors (Rasmussen and Anderton 2006), Lin *et al.* 2008, König *et al.* 1999 and König & Wieck 2008 split the races that occur in Greater China, northern Indochina and the Himalayas, including *ticehursti*, as a different species, *Strix newarensis* (confusingly referred to as Himalayan Wood Owl in König *et al.* 1999 but Mountain Wood Owl in König & Wieck 2008), from races occurring further south.

Plate 64. Juvenile Brown Wood Owl *Strix leptogrammica ticehursti* 褐林鴞幼鳥
Lam Tsuen, 5 June 2010 林村 2010年6月5日
Martin Hale

Plate 65. Adult Brown Wood Owl *Strix leptogrammica ticehursti* 褐林鴞成鳥
Tai Po Kau, 11 May 2011 大埔滘 2011年5月11日
Chui Kai Yuen 崔啓元

Breeding ecology

There are two studies on the breeding ecology of Brown Wood Owl which can help to provide a context for the Hong Kong records. Lin *et al.* (2008) detail the breeding ecology of three pairs of the slightly larger Taiwanese race *S. l. caligata*, as summarized in Table 1.

Table 1. Summary of data on breeding ecology of three pairs of Brown Wood Owl *Strix leptogrammica caligata* from Taiwan

Year	1996	2003	2004
Site	Nantou (Cuifeng)	Taichung (Snowy Mts)	Taipei (Pinglin)
Elevation	2,350m	2,650m	918m
Nesting tree: species	*Cyclobalanopsis stenopylloides*	*Chaemaecyparis formosensis*	*Machilus japonica var. Kusanoi (Hayata) Liao*
height	18m	25m	21m
diameter	55 cm	71cm	52cm
nest type	Bird's nest fern	Hole 40 cm × 35 cm × 70 cm deep	Bird's nest fern
height	13 m	12 m	8m
No. of eggs laid	One	One	Two (one hatched)
Egg dimensions & weight	-	-	53 × 45 mm, 53 g
Hatching date	10 April	21 Mar	2 April
Chicks leave nest	5 May (26 days)	18 Apr (28 days)	25 April (23 days)
Female on nest	9-15 days after hatching		
Female on guard outside nest	18-21 days after hatching		
Female first brings food	13-17 days after hatching		
Observation of juvenile bird	87-145 days		

Despite the differences of habitat and climate, a pair of the race *ochrogenys* in Sri Lanka followed a rather similar pattern. (Samarawickrama *et al*. 2006). One or, more usually, two eggs (considerably smaller than the Taiwanese birds at 48.8 x 43.2mm) were laid in a hole in a large tree in a garden and incubated for 25-30 days. The chicks stayed in the nest for at least 34 days and emerged a few days apart. Juveniles remained wholly dependent on the adults for some two months after hatching.

Two fledglings photographed at Wuyuan, northeastern Jiangxi on 1st June 2006, and a report of two chicks brought to a rescue centre in Anhui in June 2012 (Anon., June 2012) show that *S.l.ticehursti* may also produce two chicks, even though no more than one has yet been found in Hong Kong.

Vocalisations

Between March 2006 and June 2012 Brown Wood Owl was heard calling in Hong Kong on over seventy occasions in all months of the year. Figure 2 summarises the records in Lam Tsuen, for which the most complete data is available. The month with most records is March - the only month in which the call has been heard in four out of five years. A second peak noted in September 2010 may represent the end of the breeding cycle as fully-fledged young birds are forced off their parents' territory.

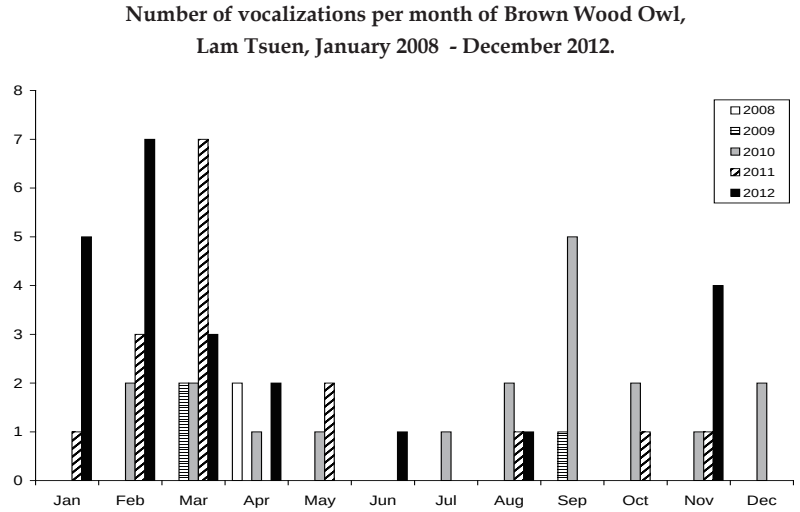

Figure 2. Number of vocalizations per month of Brown Wood Owl, Lam Tsuen, January 2008 - December 2012.

A preliminary study in Lam Tsuen (D Thomas *pers. comm.*) indicates that Brown Wood Owl calls approximately four times per minute for no more than ten minutes consecutively. Calls have been heard at all times of the night, from shortly after dusk to shortly after dawn, with extreme times recorded being 1815 and 0820. Calls are rarely heard from the same location two nights running. No strong preference is shown either for a specific phase of the moon or clear or overcast nights. Data collected from January to March 2012 in Lam Tsuen suggests that drizzly evenings were favoured, but further research is required to confirm this pattern.

Another distinctive vocalization, undescribed for any of the races of the putative *Strix newarensis* was heard in Lam Tsuen on four evenings in March 2011. This call differed from the familiar four-note call in being just three distinct, but closely-spaced notes: "*hoo..hoo-hoo*". Females of the Sri Lankan race *ochrogenys* are reported to give a similar call prior to breeding (Samarawickrama *pers. comm.*)

Plumages of *S. l. ticehursti*

The rescued Tai Mo Shan chick was photographed at various stages of its growth by KFBG staff. These photographs, along with those of the Lam Tsuen juveniles and the adult birds from Tai Po Kau in 2011, comprise a near complete record of the plumage development of this taxon (Plate 66). This is the first known documentation of the plumage development of *S.l. ticehursti*. Lin et al. (2008) depicts all the plumages of *S.l.caligata* after it leaves the nest, providing a useful source for comparison of these two closely related, and perhaps synonymous, subspecies.

Chick

On hatching (early April) the chick is covered in pure white down with the first hint of a dark facial disk beginning to show by mid-April. The unfeathered toes are bluish white with black claws, becoming slightly pinker on the uppersides close to the leg. The eyes are black and the bill is a pale bluish grey.

Fledgling

At the time of fledging in the first week of June the feathers inside the facial disk have become more tawny brown, except for a white band separating these feathers from the black edge of the facial disk. The facial disk is incomplete above the eyes, such that the downy white head feathers extend to the base of the upper mandible. The bill is surrounded by very fine black feathers, and the nostrils are uncovered. The outer eyelid is black and the inner eyelid, which closes diagonally across the eye from the lower outer corner, is greyish-pink.

The head, breast and upperparts retain the mostly downy plumage. The rectrices and remiges are dark chocolate brown tipped white, with widely spaced and narrow pale cream bars. The wing coverts are mostly replaced by ginger-brown feathers with pale cream bars and a broad white tip. The back and mantle are initially covered with the same plumage as the coverts, but begin to lose these in June, revealing the dark brown back of adult plumage.

Juvenile

By mid-August the breast is completely covered with narrow grey and white horizontal barring of even width. The downy white head feathers are retained, giving the appearance of a soft white hood. By May of the following year the KFBG bird was in a plumage closely resembling the adult, but the time at which the white hood was moulted was not recorded, and there are no photos of first year *ticehursti* birds between August and May. Lin *et al.* (2008) found that *caligata* adopts an adult-like plumage within four months of hatching.

Adult

The face of the adult bird from Tai Po Kau shows a broad and deep white "V" which extends from the base of the upper mandible to the top of the eye. The rest of the facial disc on this bird is dark chocolate brown, noticeably darker than the tawny orange facial disk of the juvenile from KFBG. The remainder of the head is a dark chocolate brown that continues onto the back and mantle. There is a narrow tramline of paler broad-barred dark brown and white feathers along the lower edge of the scapulars.

A narrow white band separates the lower border of the facial disc from the finely barred breast. The remainder of the underparts, including the underwing coverts and the upper toes, are evenly barred with gray and a pale orange-brown except for some black smudging on the sides of the breast. The underside of the tail is darker, with broadly spaced narrow cream bars, while the rectrices shower broad, evenly spaced pale and dark bands. As with young birds the eyes are completely black and the bill

is light horn in colour. The bare skin on the toes is white. The claws are pale with extensive dark tips. It should also be noted that the feathers of the crown and neck can be raised, making the head look almost completely circular, contrasting sharply with the more angular structure marked by the facial disc when these feathers are not raised.

Breeding cycle

Information in the papers about breeding ecology (Samarawickrama *et al*. 2006, Lin *et al*. 2008), combined with observations of birds in Hong Kong and information gathered about vocalizations, allow a timeline for the breeding cycle of *S.l.ticehursti* in Hong Kong to be proposed.

Lin *et al*. (2008) depict the different stages of plumage development. The bird identified as "one month after fledging" is at an identical stage to the Lam Tsuen juveniles (first adult feathers appearing on the breast sides). Assuming *ticehursti* and *caligata* follow a similar rate of development, the Lam Tsuen birds hatch around the second week of April, although the Tai Mo Shan Bird certainly hatched on or before 4th April. This is similar to, but slightly later than, the timing reported in Taiwan (hatching recorded between 21st March and 10th April). Taking the 25-30 days Samarawickrama *et al*. (2006) notes for incubation in *ochrogenys* as an indicative figure, eggs would be laid in Hong Kong in the second or third week in March.

Males begin calling in January, presumably to claim a territory, and continue through to March, when the three-note call of females is also heard and the eggs are laid. The eggs hatch in early to mid-April, and the fledgling emerges some three to four weeks later in early May. It remains close to the nesting tree and is wholly dependent on the adult into at least the second week in June.

The white hood, which is lost after mid-August, is thought to be the mark of a dependent juvenile. The replacement of the hood with brown adult-type feathers denotes the final stage of progression to competing adult. An increased rate of calling was noted in September 2010; the timing coincides with this loss of the white hood and may mark the end of the breeding cycle as and the adult birds drive the young bird off their territory.

Plate 66. Plumage development of Brown Wood Owl Strix leptogrammica ticehursti at KFBG.
褐林鴞羽毛的演變
KFBG, 16 April 2009, 21 May 2009, 13 August 2009, 13 May 2010
嘉道理農場暨植物園 2009年4月16日, 2009年5月21日, 2009年8月13日, 2010年5月13日

Habitat preference and ecological niche

All the birds found in Hong Kong have been recorded in mature *fung shui* and secondary woodland between 100 - 400m above sea level (Plate 67). This is substantially lower than either published English sources or Lin *et al.* (2008), which state that birds from the *newarensis* group are found between 1,000 and 4,000 metres asl.

The Lam Tsuen birds occur in *fung shui* woodland, and birds photographed in Wuyuan, Jiangxi, were also in this habitat. Tai Po Kau and the area around the Tai Mo Shan Customer Service Centre, however, are characterized by mature secondary woodland, with some introduced plantation species. The photograph of adult birds from Tai Po Kau also shows *Melaleuca quinquenervia*, an alien plantation species, suggesting that the maturity of the woodland may be a more important habitat characteristic than the specific assemblage of tree species.

Plate 67. Brown Wood Owl *Strix leptogrammica ticehursti* in typical habitat (mixed *fung shui* and secondary woodland with large trees).
褐林鴞於其典型的生境 (多大樹的風水林及次生林)
Lam Tsuen, 5 June 2010 林村 2010年6月5日
Mike Kilburn 吳敏

Fung shui woodland comprise natural broad-leaved forest and introduced trees and shrubs that were planted close to villages to provide shelter, food, traditional medicine and other products useful to rural communities. They also have spiritual significance - many in Lam Tsuen include burial grounds and shrines. Due to this long history, *fung shui* woodlands hold many of the oldest and largest trees in Hong Kong.

Mature woodland is expanding in both area and connectivity throughout Hong Kong through natural succession. Four other breeding bird species typical of forests in southern China – Mountain Bulbul *Ixos mcclellandii*, Pygmy Wren-babbler *Pnoepyga pusilla*, Lesser Shortwing *Brachypteryx leucophrys* and Mountain Tailorbird *Phyllergates cuculatus*, have successfully colonized this habitat in the last decade. In addition, Bay Woodpecker *Blythipicus pyrrhotis* has become more regular, and the fortunes of Hodgson's Hawk Cuckoo *Hierococcyx nisicolor* – a brood parasite on the forest-dependent Hainan Blue Flycatcher *Cyornis hainanus* – have risen with its host. This increasing avian diversity suggests that the progressive maturity of woodland habitats is leading to the re-opening of ecological niches lost through forest clearance that dates back to at least the seventeenth century (Dudgeon & Corlett 2004).

The diet of Brown Wood Owl in Hong Kong remains unknown as no prey items have yet been recorded or regurgitated pellets found. Elsewhere, large rodents such as flying squirrels (which are of similar size and weight to Brown Wood Owl) and partridges constitute a major part of the diet, but a wide range of smaller mammals, frogs, birds (including small owls) and even insects are also taken (Samarawickrama *et al.* 2006, Lin *et al.* 2008, König and Wieck 2008).

The fact that mature woodland in Hong Kong now supports a specialist apex predator that hunts exclusively under the canopy (unlike Besra *Accipiter virgatus*, Crested Goshawk *Accipiter trivirgatus*, and Crested Serpent Eagle *Spilornis cheela*, which feed in a wider range of habitats) suggests that Hong Kong's woodland may be approaching the structural climax status of the original primary forest cover.

A key difference between *fung shui* and mature secondary woodland is the presence in the former of trees that are large enough to provide nesting holes (R. Corlett, *pers. comm.*) The more mature woodlands (particularly *fung shui*) may also provide more food, thereby increasing the potential for successfully raising chicks to maturity. Much of Hong Kong's secondary woodland is comprised of trees of the genus *Machilus* - first generation pioneers in the succession from shrubland to forest (*ibid.*). While these may provide cover and connectivity between richer habitats, they are still several tree generations away from the floristic climax of *fung shui* woodland (*ibid.*).

Further evidence of the habitat preferences of Brown Wood Owl in Hong Kong was provided by a KFBG radio tracking study on the bird received as a chick from Tai Mo Shan (Figure 3).

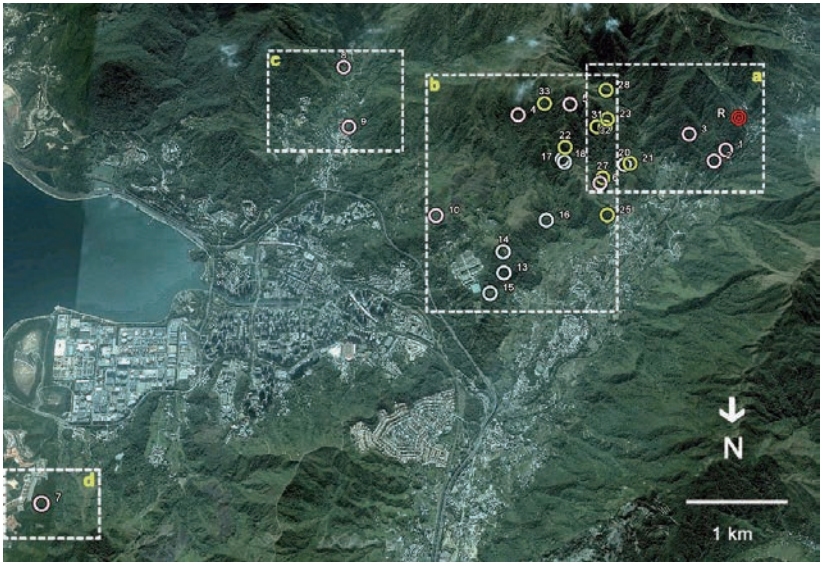

Figure 3. Locations of released Brown Wood Owl recorded by radio tracking (KFBG data).

The bird was released at KFBG on 28 May 2010 and tracked for 33 days. During this time it occupied locations below 300m that are characterized by either *fung shui* or secondary woodland, on the lower northern slopes of Tai Mo Shan between Lead Mine Pass and KFBG (with the exception of a single spurious detection away from the study area). The great majority of detections came from the southeastern slopes of the Lam Tsuen Valley, which supports a contiguous strip of mature secondary and *fung shui* woodland. This study also showed movements of less than one kilometre between roosts, and that the bird crossed neither roads nor open areas. Such breaks in habitat may act as a barrier slowing the wider colonization of apparently suitable habitats in Hong Kong (although the fact that the species has colonized Hong Kong indicates that it may occasionally cross these more open habitats).

Sensitivity to disturbance and recommendations for conservation

Brown Wood Owl is listed as "Least Concern" by Birdlife International (2012), but is considered by most authorities to be declining throughout its range, principally due to habitat destruction. Several of the radio tracking returns and all of the vocalizations of Brown Wood Owl heard in Lam Tsuen occurred in *fung shui* woodland in close proximity to villages. These are typically subject to noise disturbance from domestic activity and vehicular noise, and sometimes also from construction of new houses and firecrackers during festivals. The productivity of the Lam Tsuen birds for several years suggests that this pair at least is rather tolerant of noise. The woodland where these birds have bred is, however, subject to very little direct human disturbance, which may be a factor in the successful breeding of the species at this location. Adults at the site are shy, having never given any but the most fleeting views.

Although the maturing secondary woodland in Country Parks is well protected, some of the most mature woodland patches in Hong Kong, particularly *fung shui* woodland, are under threat from felling trees to facilitate village house development and burial plots. The spiritual significance of *fung shui* woodlands and the connection of large trees with the prosperity of the village has been a key factor in preserving this important remnant of Hong Kong's original forest habitats (Yip *et al*. 2004). Many of Hong Kong's 116 *fung shui* woods are correspondingly protected by land use zonings that prohibit development, such as Site of Special Scientific Interest or Country Park. The shrinking supply of developable land for rural housing, especially under the Small House Policy (Hopkinson & Lao 2003), and an escalating demand for burial plots are leading to *fung shui* woods being thinned and cleared, often illegally. The disappearance of these *fung shui* woodlands is perhaps the greatest threat to the small Hong Kong population of Brown Wood Owls. It is recommended that *fung shui* woodland known to support breeding and foraging habitat for Brown Wood Owls should be protected by application and active enforcement of appropriate land use zonings.

Other disturbance comes from poachers of incense trees *Aquilaria sinensis* and other medicinal and ornamental plants and animals, and the increasing numbers of visitors to woodland areas for recreation. The Wild Animals Protection Ordinance (Cap. 170) prohibits the hunting, capture, keeping, trading and disturbance of all birds and their eggs and nests in Hong Kong. In order to minimize potential risks to breeding birds from bird watchers, photographers or other visitors eager to see and photograph charismatic species such as owls, it is recommended that the exact location of any known breeding sites should remain undisclosed.

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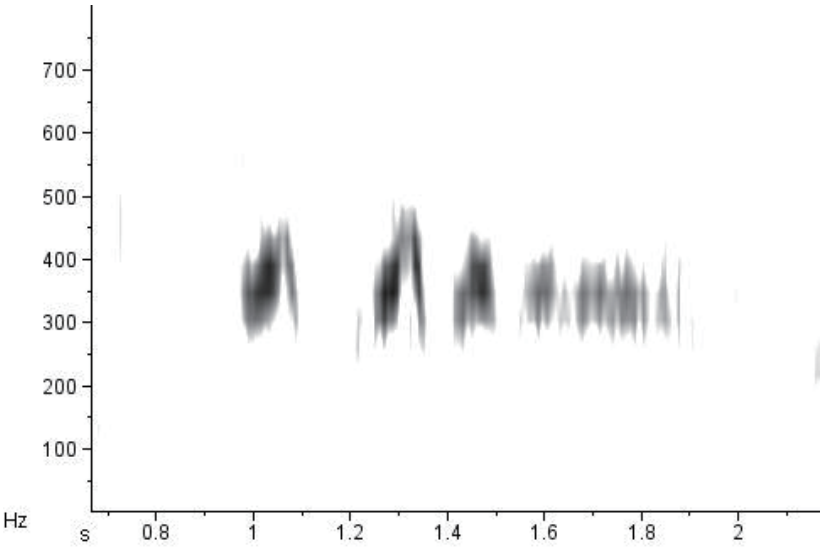
褐林鴞 *Strix leptogrammica ticehursti* 在香港的第一個繁殖紀錄及其生態和保育狀況

吳敏
香港九龍彌敦道480號鴻寶商業大廈14樓 香港觀鳥會 轉寄

香港第一個褐林鴞 *Strix leptogrammica ticehursti* 的紀錄是隻成鳥，於2007年11月6日在城門郊野公園的高地上錄得並拍攝到（Wong 2011）。這並非完全是意料之外，因爲在2006年3月曾經有人分別在3個不同的日子在大埔滘聽到一隻大型貓頭鷹（後確定爲褐林鴞）在鳴叫（P& A Crow 私人通訊），以及在2006年3月20日有一段深沉的4音調鳥鳴 "*hoo…hu.hu.hu*" 的錄音紀錄（R&K. Barretto 私人通訊）（圖表一）

有了這些初步的紀錄，之後在大埔林村谷的風水林聽到類似的鳴叫聲(後來證實爲褐林鴞)，2008年4月聽到2次，2009年3月聽到3次，2009年9月聽到1次 及2010年1月至2011年4月間每月一次(2011年4月除外)。 2009年4月和2010年1月在大埔滘亦聽到這種4音調的鳴叫。綜合這些紀錄強烈顯示褐林鴞已成爲香港的留鳥。



圖表一　2006年3月20日在大埔滘錄得的褐林鴞 *Strix leptogrammica ticehursti* 鳴叫聲的聲像圖 (錄音：R&K Barretto / 聲像圖： G. Carey)

2009年4月4日，有人發現一隻剛出生不久的雛鳥被遺棄在大帽山郊野公園並且被螞蟻覆蓋著，這是香港首個繁殖紀錄的證據。很可惜這鳥被發現的確實位置不詳，後來牠被送往甲龍管理中心的漁護署人員手上，其後被送往嘉道理農場暨植物園（KFBG）。最終

牠成功換羽到成鳥羽毛（Tan & Kendrick 2011），2010年5月28日被釋放到野外。

2010年6月5日一隻年幼的褐林鴞（插圖 63）在林村谷的風水林被發現在一個面向西北海拔約100米的陡峭斜坡上。這鳥被成功拍攝和錄影，但在隨後的日子並沒有人再尋找牠，之後鳥蹤杳然。

2011年6月5日有另一隻幼鳥，也許比2010年的幼鳥大一星期 (背面沒有毛茸茸的羽毛)，被發現並拍攝到站在去年的幼鳥的同一棵樹上！這鳥其後兩天都被看到，一次在同一條樹枝上，當時有人看到一隻成鳥從一隱蔽暗處飛出，距離那幼鳥只有30米，另一次在20-30米外的另一棵樹上。

2012年6月3日，另一隻幼鳥在相同的位置被發現。牠的羽毛跟去年那隻差不多，已被拍攝到（插圖 62）。當天有人驚鴻一瞥看到兩隻成鳥急切地飛走。這隻幼鳥於6月9日再被發現，當時有一成鳥在附近靜悄悄地看守著。

2011年5月在大埔滘發現兩隻成鳥，其後兩個星期都被拍攝到非常清晰的相片（插圖 64）。2011年5月10日的錄音及聲像圖可以在這裡找到：http://www.xeno-canto.org/species/Strix-leptogrammica LCHUNFAI XC814482011-05-10。雖然我們沒有確實的繁殖證據，但根據在大埔滘及林村所錄得的鳥鳴聲，中間有些日期是重疊的，這顯示在2011年5月應該最少有兩對褐林鴞在大帽山北部的山丘上繁殖。

雖然至今尚未找到褐林鴞的巢，但根據在林村錄得的大量鳴叫聲，及在2009至2012年連續四年間發現的幼鳥紀錄，以及在三個不同的位置包括大帽山、大埔滘和林村的紀錄，都一一表明了褐林鴞(雖然罕見)是有在香港繁殖的。

分佈範圍和分類方法

褐林鴞的亞種 ticehursti 是留鳥並在中國整個東南沿海廣泛分佈，以往曾有過廣東省黑石頂（Lewthwaite1996 and Lee 2006）和車八嶺（Lewthwaite1996）的紀錄。這個類群及其分佈在 Wong（2011）有更充分的討論，。由於牠們分佈在中國南部的丘陵地帶，加上近年中國南部積極植樹造林，以及在香港有合適的棲息地，這個在香港的發現並不令人驚訝。

褐林鴞的分類是複雜及難以令人完全理解。雖然目前一些作者認爲牠們是同種（Rasmussen and Anderton 2006），但是 Lin *et al.* 2008, Konig *et. al.* 1999 及 Konig and Wieck 2008 把在大中華區、印度支那北部和喜馬拉雅山發現的褐林鴞，包括 ticehursti 分種爲 Strix newarensis（König *et al.* 1999 把牠簡稱爲喜馬拉雅林鴞，Konig & Wieck 2008 更混淆地稱牠爲山林鴞）。

繁殖生態

有兩個褐林鴞的繁殖生態研究或許可以爲香港的紀錄提供一些背景資料。Lin *et al.*（2008）曾爲三對體積稍大的台灣種褐林鴞 *S. leptogrammica caligata* 的繁殖生態作出詳細的分析，總結見於表一。

表一： 三對台灣褐林鴞 *Strix leptogrammica caligata* 的繁殖生態資料摘要

年份	1996	2003	2004
地點	南投 (翠峰)	台中 (大雪山)	台北(坪林)
海拔	2,350米	2,650米	918米
營巢樹種	狹葉櫟 *Cyclobalanopsis stenopylloides*	台灣紅檜 *Chaemaecyparis formosensis*	大葉楠 *Machilus japonica* var. *Kusanoi (Hayata) Liao*
高度	18米	25米	21米
直徑	55 厘米	71厘米	52厘米
巢種	雀巢芒	樹洞 40 厘米 × 35厘米 × 70厘米深	雀巢芒
高度	13 米	12 米	8米
鳥蛋數量	1	1	2 (1隻孵化)
鳥蛋尺寸及重量	-	-	53 × 45毫米, 53克
孵化日期	4月10 日	3月21日	4月2日
雛鳥離巢日期	5 月5日 (26 日)	4 月18 日(28 日)	4 月25 日 (23 日)
雌鳥坐巢日期	孵化後9-15 日		
雌鳥在附近守護鳥巢日子	孵化後18-21 日		
雌鳥捕捉食物	孵化後13-17 日		
看管幼鳥日期	87-145 日		

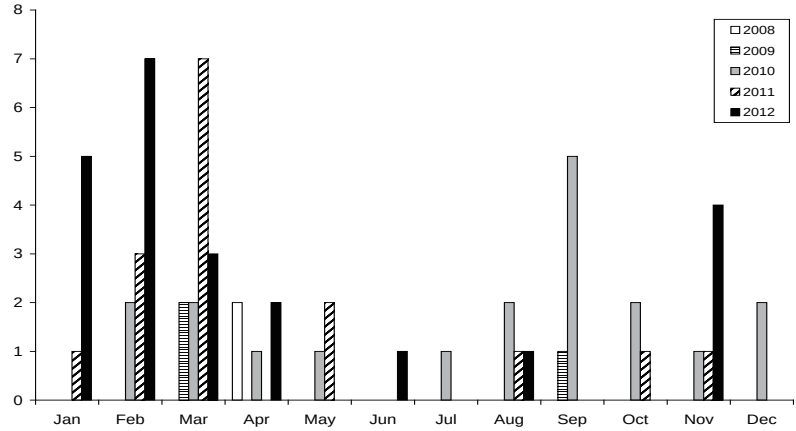
儘管有棲息地和氣候的差異，斯里蘭卡的 *ochrogenys* 種卻有著相當類似的模式（Samarawickrama *et al.*2006）。牠們生下一個，或者更通常是兩個鳥蛋在花園大樹的洞內（鳥蛋大小約48.8 x43.2毫米，比台灣的鳥蛋稍微細小），並在25至30天後孵化。雛鳥會留在巢內最少34天，然後會稍微離開鳥巢。幼鳥在孵化後的兩個月仍然完全依賴成鳥。

2006年6月1日在江西婺源拍攝到兩隻幼鳥，2012年6月有兩隻幼鳥被送到安徽的救援中心（匿名，*2012*年6月），這顯示了 *S. leptogrammica ticehursti* 是會生兩隻雛鳥的，即使在香港的發現暫時只有一隻雛鳥。

鳴聲

2006年3月至2012年6月在香港每一個月份聽到不下70次褐林鴞的鳴叫聲。圖表二總結在林村的紀錄，這算是最完整的數據。3月是錄得最多鳴叫聲的的月份 –五年之中有四年錄得。第二個高峰在2010年9月錄得，這可能代表繁殖週期的結束，羽翼漸豐的幼鳥被父母迫著離開自己的領地。

圖表二：林村的褐林鴞每月鳴叫紀錄 (2008年1月至2012年12月)



林村的初步研究顯示(D Thomas 私人通訊)，褐林鴞通常每分鐘會鳴叫4次，但每次都不會連續超過10分鐘。鳴叫聲在晚上任何時候都可能會聽到，即從黃昏後不久到天亮前，而最極端的時間紀錄爲1815和0820。在同一位置很少會有連續兩晚聽到鳴叫聲。沒有任何紀錄顯示牠們在月圓或陰天的夜晚鳴叫。根據2012年1月到3月在林村收集的數據，牠們喜在濛濛的夜晚鳴叫，但需要進一步研究確認這種模式。

另一種獨特的鳴叫聲，並沒有記載在大家普遍認爲的種類 *Strix newarrensis* 上，於2011年3月的四個晚上在林村聽到。這個叫聲跟我們熟悉的四音調截然不同，它只有三個音調緊密間隔的叫聲：“hoo..hoo-hoo”。 據說斯里蘭卡種 *ochrogenys* 的雌鳥在繁殖期前有著類似的叫聲 (Samarawickrama 私人通訊)。

S. leptogrammica ticehursti 的羽毛

在大帽山的雛鳥獲救後，由嘉道理農場職員拍照記錄牠不同的成長階段。這些照片連同林村幼鳥的照片，還有2011年大埔滘成鳥的照片，組成了有關這一分類羽毛演變的接近完整的紀錄（插圖65），這是首批已知的關於 *S. leptogrammica ticehursti* 羽毛演變的文檔。Lin *et al.*（2008）全面描述了 *S. leptogrammica caligata* 離巢後不同階段的羽毛狀況，爲比較這兩個關係密切、甚或異名同種的亞種提供了有用的資料。

雛鳥

雛鳥在孵化時（4月初）全身覆蓋純白絨毛，4月中初現深色臉盤，沒有羽毛的腳趾呈青白色，爪爲黑色，腳趾上部接近足部的位置略呈粉紅，眼黑色，喙呈淡藍灰色。

剛長羽毛的雛鳥

6月第一星期學習飛行時，臉盤內的羽毛漸呈茶褐色，其中一條白帶把這些羽毛跟臉盤的黑色邊緣分開。眼上的臉盤尚未完整，以致頭部的白絨毛延生至上喙基部。喙部周圍

是非常幼細的黑色羽毛，鼻孔外露。外眼皮黑色，內眼皮從眼下外角向眼睛對角合上，呈灰粉紅色。

頭部、胸部和上體保留大部分絨毛。尾羽和飛羽呈深棕褐色，末端白色，上有間距頗寬的淡奶油色窄長橫帶。翼覆羽大部份換成薑棕色羽毛，上有淡奶油色橫帶及闊大的白色末端。背部和上背的羽毛原本跟翼覆羽相同，到了6月則開始掉下，露出如成鳥般的深棕色背部。

幼鳥

8月中，胸部由羽毛完全覆蓋，呈灰色和白色寬度相等的窄長橫紋。頭部保留白色絨羽，狀似柔軟的白兜帽。翌年5月，這隻由嘉道理農場跟進的鳥兒已經長成恰如成鳥的羽毛，惟頭上的白兜帽何時脫下則未有紀錄，在8月至5月期間也沒有出生首年的 *ticehursti* 的照片。Lin *et al.* (2008) 發現，*caligata* 在孵出後四個月內會換上成鳥般的羽毛。

成鳥

大埔滘成鳥的臉部呈闊而深的白色「V」字形，由上喙基部延展至眼部上端。臉盤其餘部分爲深棕褐色，較嘉道理農場幼鳥的褐橘色臉盤明顯深色。頭部其餘部分深棕褐色，並一直伸延至背部和上背。肩羽下緣是較淡的闊帶狀深棕色和白色羽毛，形成一道窄長電車軌的形狀。

插圖65　褐林鴞羽毛的演變

一條窄長的白帶，把臉盤下緣與佈滿細緻橫紋的胸部分開。下體其餘部分均有灰色和淡橘褐色均勻相間的條紋，包括翼下覆羽和上趾，除了胸旁兩邊有黑斑。尾部底面較深色，有間距寬闊的奶油色窄長橫帶，尾羽則呈闊闊的、間距均勻的深色和淺色橫帶。像幼鳥一樣，眼全黑，喙呈淺牛角色。趾上裸露白色皮膚，爪色淡，有闊大的深色爪尖。值得注意的是頭冠和頸部羽毛可以提舉，使頭部看起來幾近圓形，與這些羽毛沒有提舉時由臉盤標示的角狀結構形成強烈對比。

繁殖周期

參考有關繁殖生態的研究資料（Samarawickrama *et al.* 2006, Lin *et al.* 2008），結合在香港的觀察紀錄和所收集的鳴聲資料，可以嘗試爲 *S. leptogrammica ticehursti* 在香港的繁殖周期勾劃出時間線。

Lin *et al.*（2008）描述了羽毛演變的不同階段，其中「離巢後一個月」的鳥兒與林村幼鳥處於相同的發展階段（胸側首現成鳥羽毛）。假定 *ticehursti* 和 *caligata* 的成長速度相若，林村鳥兒約於4月第二星期孵出，大帽山雛鳥則肯定於4月4日或以前孵出，這較台灣報告的時間（3月21日至4月10日期間孵出）稍晚但相若。根據 Samarawickrama *et al.*（2006）的筆記，*ochrogenys* 的孵化期爲25-30天，以此數字爲比較，香港的鳥約於3月第二或第三星期產卵。

雄鳥於1月開始鳴叫，很可能在宣示領土，並一直延續至3月，這時也能聽見雌鳥的三音節鳴聲，並已產卵。鳥卵於4月初至4月中旬孵出，剛長羽毛的雛鳥則見於三、四星期後的5月初。雛鳥總是待在巢址附近，並且完全依賴成鳥，至少到6月第二星期爲止。

頭部的白色兜帽可視爲幼鳥自立的標記，這兜帽於8月中以後消失，換上成鳥般的棕色羽毛，標示着發育爲成鳥的最後階段。2010年9月，鳴叫速度增加，這與兜帽脫下的時間吻合，可視爲繁殖周期終結的標記，成鳥會把年輕鳥兒驅離領地。

生境偏好和生態棲位

所有在香港紀錄的鳥兒均見於成熟的風水林和海拔100-400米的次生林（插圖66）。已發表的英語資料及 Lin *et al.*（2008）都指出，*newarensis* 種群見於海拔1,000-4,000米，與此相比，在香港出現的位置較低很多。

在林村風水林出現的鳥兒，以及在江西婺源拍攝的鳥兒，同樣見於這樣的生境。然而，大埔滘以及大帽山郊野公園遊客中心一帶是成熟的次生林，也有外來引進的人工種植樹種。大埔滘成鳥的照片中有外來的人工種植樹種白千層 *Melaleuca quinquenervia*，由此顯示，相較特定的樹種組合，成熟的樹林也許是更重要的生境特徵。

風水林包含天然的闊葉林，也有種植於農村附近的引進樹木和灌木，爲鄉郊社群提供林蔭、食物、傳統草藥和其他有用的產物。風水木也有其精神意義—林村不少風水林有墓地和祠堂。在香港，這些歷史悠久的風水林保留了很多古老的參天大樹。

隨着自然演替，香港的成熟樹林正在擴大其面積和連接。四種典型的華南森林繁殖鳥種，包括綠翅短腳鴝 *Ixos mcclellandii*、小鶯鴝 *Pnoepyga pusilla*、白喉短翅鶇 *Brachypteryx leucophrys* 和金頭縫葉鶯 *Phyllergates cuculatus*，於過去十年成功在香港的生境形成種群。此外，黃嘴栗啄木鳥 *Blythipicus pyrrhotis* 更爲常見，而托卵寄生於海南藍仙鶲 *Cyornis hainanus* 的霍氏鷹鵑 *Hierococcyx nisicolor* 也與牠的寄主一同有較大的成功繁殖機會。鳥類多樣性的增長揭示，樹林生境持續成熟，其發展正朝向重新發展出至少自十七世紀以來因森林砍伐而消失的生態環境（Dudgeon & Corlett 2004）。

由於沒有捕食獵物的紀錄，也沒有找到食繭，香港褐林鴞的捕食習性至今未明。其他地方的資料顯示，褐林鴞的主要食物是大型齧齒動物如鼩鼠（體積和體重均與褐林鴞相若）和鵪鶉，此外也會捕食多種較小型的哺乳動物、蛙類、鳥類（包括小鴞）甚至昆蟲（Samarawickrama *et al.* 2006, Lin *et al.* 2008, König and Wieck 2008）。

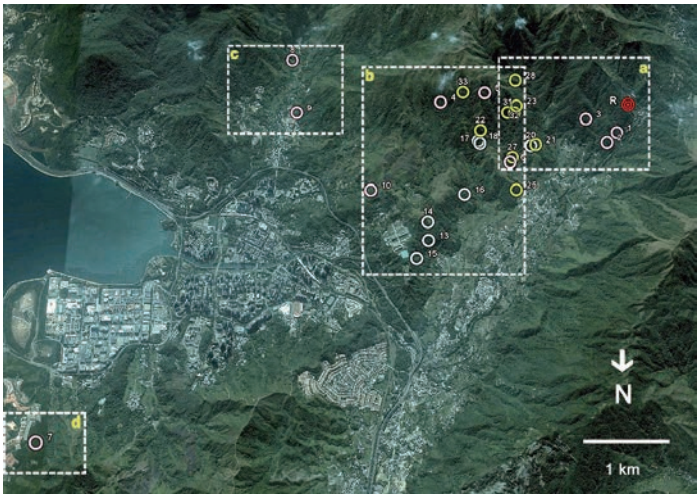
香港的成熟樹林正爲某類專門於林冠下捕食的頂級專業捕獵者提供資源（這有別於可在較多不同生境覓食的松雀鷹 *Accipiter virgatus*、鳳頭鷹 *Accipiter trivirgatus* 和蛇鵰 *Spilornis cheela*），由此可見，香港的樹林也許正由最初的原生森林覆蓋發展至結構上的極盛狀態。

風水林和成熟次生林的關鍵差別在於，前者擁有足以提供巢穴的大樹（R. Corlett, *pers. comm.*）。愈成熟的樹林（尤其風水林）愈能提供食物，因而愈能讓雛鳥成功長大。香

港大部分次生林由潤楠屬 *Machilus* 樹種構成，這是由灌木林演替爲森林的第一代開拓林（*ibid.*）。儘管這樣能夠爲生境提供更豐富的覆蓋和連接，但與風水林的植物極盛狀況相比，還相差好幾代的樹木生成（*ibid.*）。

嘉道理農場對來自大帽山的雛鳥進行了無線電追蹤研究（圖表三），爲褐林鴞在香港的生境偏好找到更多證據。

圖表三　由無線電追蹤的野放褐林鴞位置（嘉道理農場數據）



該鳥於2010年5月28日在嘉道理農場野放追蹤33天，其間棲於鉛礦坳與嘉道理農場之間的大帽山北坡下層各處（除了一次在研究範圍以外的虛假偵測），地點俱爲300米以下的風水林或次生林。大部分偵測均來自林村谷地東南坡，這兒是一片相連狹長的成熟次生林和風水林。研究顯示，該鳥於棲地之間的行動均在1千米內，也不會越過道路或空曠地方。這樣的棲地分隔也許會構成障礙，延緩褐林鴞在香港這似乎合宜的生境形成更大的種群（雖然這鳥種已在香港形成種群，顯示牠也許偶爾會越過這些較開揚的生境）。

對外界干擾的警覺及保育建議

褐林鴞在 *Birdlife International*（2012）中列爲「無危」類別，但大多數組織均認爲，其於分佈區內的數目正在下降，這主要由於生境受到破壞。多個從無線電偵得的結果和所有在林村聽到的褐林鴞鳴聲，均在農村鄰近的風水林錄得，這典型是因爲鳥兒受到人們日常活動和交通產生的噪音干擾，有時也受到房地建築和節日鞭炮的噪音干擾。從幾年來的繁殖情況看，這對林村鳥兒至少可算頗能容忍噪音。然而，這些鳥兒繁殖的地點是極少直接受人打擾的樹林，這也許是鳥兒能在這裏成功繁殖的原因之一。這裏的成鳥非常害羞，從不露面，往往只能驚鴻一瞥。

儘管郊野公園的成熟次生林妥受保護，香港好些非常成熟的林地尤其風水林卻正面臨威脅，樹木給砍掉，以發展村屋和墳地。風水林的精神意義，以及參天大樹作爲農村昌盛的命脈，成爲保育這些僅存而重要的香港原生森林生境的關鍵因素（Yip *et al.* 2004）。香港的116片風水林中，很多都受相關的土地用途分區管制保護而禁止發展，例如「具特殊科學價值地點」和郊野公園。然而，農村房地供應收縮，尤其在小型屋宇政策（丁屋政策）下（Hopkinson & Lao 2003），加上墳地需求增加，導致風水林給砍伐、剷除，這些往往是非法行爲。風水林的消失，也許是褐林鴞在香港的小種群面對的最大威脅。建議透過申請和積極執行合適的土地用途管制，保護已知能爲褐林鴞提供繁殖和覓食生境的風水林。

其他干擾來自偷竊沉香樹 *Aquilaria sinensis* 和其他藥用、觀賞用植物和動物，以及到林區遊玩的訪客有所增加。《野生動物保護條例》（第170章）嚴禁狩獵、捕捉、管有、買賣及干擾所有在香港的雀鳥、鳥蛋和鳥巢。觀鳥者、攝影人士及其他訪客總熱切渴望見到、拍攝到如褐林鴞般魅力非凡的鳥種，爲減少這些行爲對繁殖鳥構成的潛在威脅，建議必須把所有繁殖地點資料保密。

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