

The Distribution and Conservation of Strigiformes in Yunnan Province, China

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ABSTRACT

Because of its special situation and natural environment, Yunnan Province has 18 owl species which account for 62% of the total recorded in China. This paper lists the distribution, habitat, food and status of each. Threats to them are: 1) habitat destruction, 2) use of insecticides on farmland, 3) killing for medicinal purposes in remote areas. All owls are protected birds in China. More than 30 nature reserves in Yunnan Province are playing a major role in the protection of owls and their habitats. Xishuangbanna, Gaoligongshan and Ailaoshan National Nature Reserve are the three most important reserves. Since 1982, education on the protection of birds and their habitats has made most people come to understand its importance. Recommendations include: 1) provision of financial support to survey the species, their distribution and status, and to study their ecology and behaviour, 2) protection of the remaining forest and recovery of forest destroyed, 3) provision of nest-boxes in the breeding season; 4) to continue education on birds protection and promote the use of non-persistent chemicals on farmland.

INTRODUCTION

Yunnan Province, located in south-west China (21° 08' - 29° 08' N, 97° 31' - 106° 12' E), forms the main part of the Yunnan-Guizhou Plateau. Its total area is about 383,000 km², about 94% of which is mountainous plateau. It slopes downward from the north-west to the south-east. To the east of the Yuanjiang River (Red River) is the east and central Yunnan Plateau, still comparatively unimpaired. To the west of the Yuanjiang River are the Gaoligongshan, Nushan and Yunlin mountain chains, lying parallel with the Nujiang (Salween), Lancangjiang (Mekong) and Jinshajiang (Yangtze) Rivers, running from north to south and from the famous Hengduanshan Transhimalya Canyon. The average height of the ridges is over 3,000m a.s.l. The highest point is Kagebo Peak of Meli Snow Mountain, reaching 6,740m; the lowest is 76.4m at the Yuanjiang River exit, south-east of Yunnan Province.

Yunnan Province is within the monsoon belt with tropical and subtropical climates. The complex topography endows this province with climatic differences both horizontally and vertically, with frigid, temperate and torrid zones. Vegetation is mainly divided into tropical rain forest, monsoon forest, subtropical evergreen broad-leaf forest and subalpine coniferous forest.

The complex topography, climate and vegetation provide various favourable habitats for owls.

DISTRIBUTION

According to the literature and our investigations since 1958, there have been 18 owl species recorded in Yunnan Province, belonging to two families and 10 genera. The distribution of each species, its habitat, food and status are as follows: (The plotting localities are only from the collection of Kunming Institute of Zoology, Academia Sinica. Those which are first reported we marked with “*”). For each species the measurements of the first collected specimen are given in Table 1.

Tytonidae

Barn Owl

Tyto alba

T. a. stertens Hartert

Plotting localities: Kunming City; Jinggu county*; Jinghong County*; Menghai County.

Distribution: Kunming City, Jinggu County, Jinghong County, Menghai County (resident).

Remarks: Pan Qinghua *et al.* (1964) reported a specimen collected from Xishuangbanna (Menghai County) as *T. a. javanica*. Kuang Bangyu *et al.* (1980) considered a specimen from Kunming to be *T. a. stertens* because it differed from the specimen from Xishuangbanna by being more grey, with less orange-yellow upper parts, and silky white underparts with no orange-yellow. Cheng Tso-hsin (1987) thought all specimens from Yunnan were *T. a. javanica*.

The range of *T. a. stertens* includes India (Ali & Ripley 1969; Ripley 1982), Burma (Smythies 1986), northern, eastern and central Thailand (Deignan 1945, 1963), while the range of *T. a. javanica* includes Cochinchina, South Annam (Delacour & Jabouille 1940), South-east Asia and Java (Peters 1940). It seems that *stertens* is distributed in the north and west, while *javanica* covers the south and east.

Since the race in the area adjacent to Yunnan Province is *T. a. stertens*, our interpretation is that the specimens from Yunnan should be *T. a. stertens*, and the variation in colour is similar to the specimens from India and northern Thailand (Baker 1927; Deignan 1945).

Habitat: Hilly country and plains near cultivated lands and human habitation. Alt. 1,180-2,100m.

Food: Mainly rats and mice, occasionally large insects.

Status: Common.

2. Grass Owl

Tyto capensis

T. c. chinensis (Hartert)

Plotting localities: Kunming City*, Pingbian County*.

Distribution: Kunming City, Pingbian County, Mengzi County, Simao County, Pu'er County, Jinghong County, Menghai County (resident).

Habitat: Open grassland and high grass jungle. Alt. 300-2,100m.

Food: Chiefly rats and mice, sometimes lizards.

Status: Common.

3. Bay Owl

Phodilus badius

P. b. saturatus Robinson

Distribution: Jinghong County (resident).

Habitat: Dense evergreen forest in the submontane tracts and foothills. Alt. 620m.

Food: Not recorded in Yunnan.

Status: Very rare.

Strigidae

4. Spotted Scops Owl *Otus spilocephalus*

O. s. latouchei (Rickett)

Plotting locality: Yanjiao, Jiangcheng County*.

Distribution: Jiangcheng County, Zhenkang County (resident).

Habitat: Submontane forests. Alt. 1,440-1,700m.

Food: Mainly insects.

Status: Rare.

5. Scops Owl *Otus scops*

O. s. malayanus (Hay)

Plotting localities: Zhelong, Xiping County*; Niaodiao Mt., Eryuan County*

Distribution: Xiping County, Mengzi County, Eryuan County, Lushui County (resident).

Habitat: Deciduous and evergreen forest, groves of densely foliated trees near cultivation, and orchards. Alt. 1,800-2,500m.

Food: Mainly insects.

Status: Common.

6. Collared Scops Owl *Otus bakkamoena*

O. b. erythrocampe (Swinhoe)

Plotting localities: Xiaomengyang, Jinghong County*; Manfen and Yiwu, Mengla County*; Yongkang and Nansan, Zhenkang County*; Zhefang, Luxi County; Yingjiang County; Luobuba, Lianghe County.

Distribution: Yiliang County, Jingdong County, Mengzi County, Jinghong County, Mengla County, Zhenkang County, Luxi County, Yingjiang County, Tengchong County, Lianghe County (resident).

Remarks: The Bird Section of Kunming Institute of Zoology, Academia Sinica (1980) reported that the specimens from Luxi, Lianghe and Yingjiang Counties, western Yunnan Province, were *O. b. lettia*. Cheng Tso-hsin *et al.* (1989) adopted this view. After examining a series of almost 150 skins from nearly every part of the Asian range, Deignan (1950) thought that a specimen from the Shweli-Salween Divide, western Yunnan, was *erythrocampe*, while another from Tengchong (Tengyueh), western Yunnan, was intermediate between *erythrocampe* and *lettia* but nearer to *erythrocampe*. Because no specimen from Burma was at hand, we adopted the opinion of Deignan (1950), considering the specimen from west of Yunnan to be *erythrocampe* and that western Yunnan might be the overlap range of *erythrocampe* and *lettia*.

Habitat: Forest and well-wooded hilly country near cultivation. Alt. 300-1,400m.

Food: Chiefly insects, occasionally birds and mice.

Status: Fairly common.

7. Eagle Owl *Bubo bubo*

(1) *B. b. tibetanus* Bianchi

Plotting locality: Bapo, Gongshan County.

Distribution: Gongshan County, Deqin County (resident).

(2) *B. b. kiautschensis* Reichenow

Plotting localities: Huahongdong, Kunming City*; Dongchuan City*.

Distribution: Kunming City, Dongchuan City, Yongshan County, Tengchong County, Jinghong County, Mengzi County (resident).

Habitat: Rocky cliffs, woodland to steppes, ravines or rocky broken ground. Alt. 300-2,100m.

Food: Mainly rats and mice, sometimes rabbits and pheasants.

Status: Fairly common.

8. Forest Eagle Owl *Bubo nipalensis*

B. n. nipalensis Hodgson

Distribution: Hekou County (resident).

Habitat: Dense evergreen and moist deciduous forest. Alt. 580m.

Food: Not recorded in Yunnan.

Status: Very rare.

9. Brown Fish Owl *Ketupa zeylonensis*

K. z. orientalis Delacour

Plotting localities: Kunming City*; Xiaomengyang, Jinghong County*; Mengla County*;

Datang, Tengchong County.

Distribution: Kunming City, Mengzi County, Jinghong County, Mengla County, Menghai County, Shuangjiang County, Tengchong County (resident).

Remarks: The Bird Section of Kunming Institute of Zoology, Academia Sinica (1980) reported that a specimen from Tengchong, west of Yunnan, was *K. z. leschenaulti*. Cheng Tso-hsin (1987) adopted this subspecies but with a question mark. Cheng Tso-hsin *et al.* (1989) examined this specimen and found it was immature. They thought that *leschenaulti* did not occur in Yunnan. Peters (1940) and Howard & Moore (1980) recorded that the race of north-east Burma was *orientalis*. It seems to be impossible that the specimens from Tengchong, situated to the east of Burma, were *leschenaulti*. We share the opinion of Cheng Tso-hsin *et al.* (1989).

Habitat: Well-wooded country along streams, eroded ravines and steep river banks. Alt. 600-1,900m.

Food: Mainly fish, frogs.

Status: Rare.

10. Tawny Fish Owl *Ketupa flavipes*

Plotting locality: Xiaomengyang, Jinghong County*.

Distribution: Jinghong County, Yongshan County (resident).

Habitat: Forested banks of hill streams. Alt. 620-760m.

Food: Mainly fish, frogs.

Status: Very rare.

11. Malay Fish Owl *Ketupa ketupu*

K. k. aagaardi (Neumann)

Smythies (1986) reported one record from Yunnan, but we have never collected a specimen of this species there nor from any other area of China, and no other publication that we are aware of has reported this species being in China.

12. Collared Pigmy Owlet *Glaucidium brodiei*

G. b. brodiei (Burton)

Plotting localities: Mangchui, Jingdong County*; Menglian County*; Mengyuan, Mengla County*; Dongshan, Mile County*; Pinghe, Shuangbai County*; Jizu Mt., Binchuan County*; Biluo Snow Mt., Bijiang County*; Maku and Bapo, Gongshan County.

Distribution: Yuanjiang County, Xiping County, Mile County, Hekou County, Shuangbai County, Binchuan County, Gongshan County, Bijiang County, Jingdong County, Menglian County, Simao County, Mengla County (resident).

Habitat: Evergreen or mixed hill forests. Alt. 740-3,000m.

Food: Chiefly insects, also rats and mice, small birds.

Status: Fairly common.

13. Barred Owlet *Glaucidium cuculoides*

(1) *G. c. whiteleyi* (Blyth)

Plotting localities: Zhenxiong County*; Ludian, Lijiang County*

Distribution: Kunming City, Lijiang County, Zhenxiong county, Yongshan County (resident).

(2) *G. c. rufescens* Stuart Baker

Plotting localities: Linjie, Chuanhe, Dongjiashan, and Huiyao, Jingdong County*; Mengmengba, Dongguo, and Xiaoheijiang, Shuangjiang County*; Matai, Lincang County*; Mangbang, Zhenkang County*; Daxueshan and Yongkang, Yongde County*; Zhefang, Luxi County.

Distribution: Luxi County, Yingjiang County, Tengchong County, Yongde County, Zhenkang County, Gengma County, Lincang County, Shuangjiang County, Jingdong County (resident).

(3) *G. c. brugeli* (Parrot)

Plotting localities: Yuanjiang County*; Mahuangbao, Hekou County*; Zongle, Menglian County*; Damenglong and Ganlanba, Jinghong County*; Menglun and Mengpeng, Mengla County*.

Distribution: Yuanjiang County, Hekou County, Menglian County, Jinghong County, Mengla

County, Menghai County (resident).

Habitat: Open forest of pine, oak, etc.; also subtropical evergreen jungle at low elevations, large tree and bamboo forest near human habitation.

Food: Mainly insects, sometimes rats and mice, frogs.

Status: Fairly common.

14. Brown Hawk Owl *Ninox scutulata*

N. s. burmanica Hume

Plotting localities: Huiyao, Jingdong County*; Xiaomengyang, Jinghong County*; Menglun, Mengla County*; Mengzhi, Yongde County*.

Distribution: Tengchong County, Jingdong County, Gengma County, Yongde County, Mengla County, Mengzi County, Jinping County, Hekou County (resident).

Habitat: Well-wooded country, and groves of trees, often close to water. Alt. 300-1,400m.

Food: Mainly insects.

Status: Common.

15. Spotted Little Owl *Athene brama*

A. b. pulchra Hume Baker (1927) reported that the distribution range of *Athene brama pulchra* included Yunnan. Peters (1940) raised questions about its distribution in Yunnan. Smythies (1986) stated that *Athene brama* did not occur in Yunnan. Since a new subspecies of *Athene brama*, *Athene brama poikila* Yang & Li, was recorded (Yang Lan & Li Guiyuan 1989) in Baixin and Yajiang Counties, Sichuan Province, situated to the north of Yunnan, and the range of *A. b. pulchra* is from central Burma to south-west Indochina (Howard & Moore 1980), and although we did not get a specimen of this species from Yunnan, it seems that *Athene brama* might be distributed there. But which subspecies it should be needs further study.

16. Brown Wood Owl *Strix leptogrammica*

S. l. ticehursti Delacour

Plotting locality: Mengla County*; Datang, Tengchong County; Santai Mt., Luxi County; Danane, Yingjiang County.

Distribution: Tengchong County, Luxi County, Mengla County, Menghai County (resident).

Habitat: Deep forest. Alt. 300-2,670m.

Food: rats and mice, birds.

Status: Rare.

17. Tawny Wood Owl *Strix aluco*

S. a. novicola (Blyth)

Plotting localities: Huahongdong, Kunming City*; Pantiange, Weixi County*; Dulongjiang, Gongshan County*; Mengwang, Luxi County; Datang, Tengchong County.

Distribution: Kunming City, Yongshan County, Lijiang County, Weixi County, Gongshan County, Tengchong County, Luxi County (resident).

Habitat: Coniferous, mixed or deciduous forests, open country with some large trees. Alt. 760-2,000m.

Food: Mainly rats and mice, sometimes frogs, birds, occasionally fish.

Status: Common.

18. Short-eared Owl *Asio flammeus*

A. f. flammeus (Pontoppidan)

Plotting localities: Yangjie, Xundian County*; Shuangjiang County*, Simao County*.

Distribution: Xundian County, Tengchong County, Simao County, Shuangjiang County, Jinghong County (winter visitor).

Habitat: Tundra, steppes, meadows and marshes. Alt. 620-1,400m.

Food: Mainly rats and mice, sometimes small birds, large insects, occasionally plant seed.

Status: Common in winter.

Among the above 18 species, the occurrence of two in Yunnan is uncertain and needs further surveying; one is a winter visitor; 15 species are residents in Yunnan. Among these 15 residents,

Table 1. Measurements of owl specimens from Yunnan Province, China. [Note all weights in grams and linear measurements in mm]

Species	Weight	Length	Bill	Wing	Tail	Tarsus
<i>Tyto alba stertens</i>	485-1000	340-390	33-34	295-300	137-146	67-70
<i>Tyto capensis chinensis</i> immatures	280 320-367	345 300-340	33 28-32	340 245-278	135 114-123	85 78-80
<i>Otus spilocephalus latochei</i>	88	185	17-18	132	65	26
<i>Otus scops malayanus</i>	47-108	180-193	18-19	146-151	69-179	22-29
<i>Otus bakamoena erythrocampa</i> immatures	100-140 76-133	200-250 175-195	20-21 20	159-170 121-130	82-102 63-70	31-35 32-33
<i>Bubo bubo kiauhschensis</i> immatures	1000-2200 550-1600	610-650 380-550	45-47 37-49	450 270-375	265-270 136-222	76-80 68-78
<i>Ketupa zeylonensis orientalis</i>	1020-1359	440-545	40-48	372-390	190-206	65-73
<i>Ketupa flavipes</i>			44	420	194	77
<i>Glacidium brodiei</i>	40-61	132-174	10-14	83-100	55-72	18-23
<i>Glacidium cuculoides whiteleyi</i>	280	260	15-17	150-154	91-105	24-26
<i>G. c. rufescens</i>	152-240	203-257	15-17	144-164	85-94	22-29
<i>G. c. brucei</i>	139-202	163-253	15-18	139-157	81-99	21-29
<i>Ninox scutulata burmanica</i> immatures	184-214 174-190	297-305 255-265	19-21 19	212-227 157-193	145-154 100-110	27-31 26-30
<i>Strix leptogrammica ticehursti</i> immatures	750-999	460-487 345	41-42 28	358-390 260	202-246 120	63 55
<i>Strix aluco novicola</i>	310-482	370-407	29-32	286-316	182-200	52-57
<i>Asio flammeus flammeus</i>	400	355-360	29	293-305	156-172	46-54

8 are mainly distributed in the Oriental region; two mainly in the Palearctic region; two in both Oriental and Palearctic Regions, one in both Oriental and Ethiopian Regions. One species has a worldwide distribution. The faunal characteristics of Strigiformes in Yunnan Province are the Oriental elements, mainly distributed in tropical and subtropical regions, and occupying a dominant position, while a few Palearctic elements can extend south to the province as well.

THREATS

Forest destruction is the main threat to owls. In the 1960s and 70s, the forest was logged for timber with government sanction, encroached on without plan for firewood, and illegally burnt to provide farmland. Now the primitive forest exists only inside the nature reserves. Outside the nature reserves nearly all forests have been replaced by monoculture crops, economic plants such as rubber and tea, shrubs and grassland. Many forest-dwelling species have lost their habitats, and it is difficult for many species which nest in tree hollows to find suitable nest sites. On the other hand the fact that no primitive forest remains outside nature reserves will also make it very difficult to form a network of reserves in the future. In addition, almost all buildings in the countryside are made of cement, so that wall cavities in which some species nest have decreased and it is impossible for them to nest as they used to. Another threat to owls is the use of insecticides on farmland, especially to those species inhabiting open country. In China it is said that owls can be used for medicine. Li Shizheng, who lived during the Ming Dynasty recorded this in his famous work *Compendium of Materia Medica*. But pharmacology was not then studied. In the remote countryside, some owls are still caught to-day to be used as medicine. This is the third threat.

CONSERVATION

From the analysis of their food, it is known that the large owls feed mainly on rats and mice, small owls mainly on insects, while the diet of intermediate-size species is wide, including insect, mice and rats, etc., Except for *Ketupa* which mainly feeds on fish, frogs etc., all other owls are very beneficial to agriculture and forestry, and important in maintaining the ecological balance. Furthermore, some species are rare in China, so all owls are protected according to the Wildlife Protection Law of the People's Republic of China and the List of the Protected Wildlife of National Importance in China.

Because of the special situation and natural environment of Yunnan Province, which covers only about 4% of China, 62% of all Strigiformes occurring in China have been recorded there. Among them, *Tyto alba stertens* was recorded only in Yunnan, *Glaucidium cuculoides brugeli* only in south Yunnan, *Glaucidium cuculoides rufescens* only in west Yunnan. Thus the conservation of Strigiformes in Yunnan Province is more important than any other part of China.

To protect owls, their habitats must also be protected. In Yunnan the establishment of nature reserves was begun in 1956. In 1959 24 such nature reserves were delimited, but due to lack of financial support, management organizations and staff, these reserves existed only in name. The forests in more than 10 reserves had been almost completely cut; in others hunting and logging were still rife. In 1980, the States Council approved the establishment of the first National Nature Reserve in Yunnan, in 1981 all nature reserves in Yunnan were delimited once again and more than 30 were established. They are now playing an important role in the protection of wildlife and natural habitats. The owls which live in these reserves have also been protected. The following three National Nature Reserve are of the greatest importance.

Xishuangbanna National Nature Reserve, established in 1981, is situated in the south of Yunnan Province (21°10'-22°24'N, 100°16'-101°50'E). The total area of the reserve is 241,776ha. The vegetation includes tropical rain forest, tropical monsoon forest, southern subtropical evergreen broadleaf forest, warm coniferous forest, bamboo forest, shrub forest and herbosa. Twelve owl species live in the reserves: *Tyto alba*, *T. capensis*, *Phodilus badius*, *Otus bakkamoena*, *Bubo bubo*, *Ketupa zeylonensis*, *K. flavipes*, *Glaucidium brodiei*, *G. cuculoides*, *Ninox scutulata*, *Strix leptogrammica* and *Asio flammeus*.

Gaoligongshan National Nature Reserve, established in 1983, is situated in the west of Yunnan

Province (24°56'-26°09'N, 98°34'-98°50'E). The total area is 123,900ha. The vegetation mainly includes savanna shrub forest, monsoon evergreen broadleaf forest, warm coniferous forest, humid evergreen broadleaf forest, cold coniferous forest, tundra, meadows, etc. There are 10 owl species living in the reserve: *Otus scops*, *O. bakkamoena*, *Bubo bubo*, *Ketupa zeylonensis*, *Glaucidium brodiei*, *Glaucidium cuculoides*, *Ninox scutulata*, *Strix leptogrammica*, *S. aluco* and *Asio flammeus*.

Ailaoshan National Nature Reserve, established in 1986, is situated in the centre of the province (23°36'-24°44'N, 100°54'-101°30'E), with a total area of 50,360ha. The vegetation includes savanna shrub forest, cold and warm coniferous forest, dry and semi-humid evergreen broadleaf forest, humid broadleaf forest, etc. Six owl species live in this reserve: *Otus scops*, *O. bakkamoena*, *Bubo bubo*, *Glaucidium brodiei*, *G. cuculoides* and *Ninox scutulata*.

The above three National Nature Reserves, with a total area of 416,036ha, provide 14 species with ideal habitats. Some, such as Bay Owl and Tawny Fish Owl, can be observed only in these reserves. The populations of some species in the reserves are larger than in other areas.

From 1982, "Love the Birds Week" was inaugurated nation-wide every spring. During this week, citizens are educated by posters, newspapers, radio and TV. A scientific film about the beneficial role of owls has been shown across the country. In Yunnan, bird-watching competitions among middle-school students, and knowledge quizzes were held for the general public on protecting birds and their habitats. Most people have come to understand the importance of protecting birds and their habitats. Thus the conservation of owls has made great achievements in Yunnan.

RECOMMENDATIONS

The common and fairly common owls can occupy various habitats; some live in open countryside and alongside human habitations, but they need trees in which to roost and from which to spot their prey. The rare and very rare owls live almost exclusively in forest, and deforestation will make them still rarer, and even lead to their extinction in Yunnan.

The nature reserves are very important for owl protection and hold large populations of some species, but the lack of natural corridors between them makes each reserve a green island among farmland, so that genetic exchange among different populations is difficult. The population in one reserve is not large enough for some species to maintain genetic diversity, so that protection of the remaining forest not only inside reserves but also outside them, and promotion of the recovery of destroyed forest, are vital in order to form a reserve network in the future.

Fan Zhongming (1965) reported Scops Owl (*Otus scops*) breeding in nest-boxes in Liaoning Province and Li Shengde & Ruan Changwu (1988) reported Collared Scops Owl (*Otus bakkamoena*) using nest-boxes in Hubei Province. Provision of nest-boxes in the breeding season is a simple and useful method of protecting several species. Because most owls roost during the day and hunt at night, it is difficult to know the status of every species. To date it is unknown whether two species, *Ketupa ketupu* and *Athene brama*, occur in Yunnan or not. There has been little study of the ecology and behaviour of owls so far, and in order to develop suitable schemes for their conservation, we must first know their distribution, numbers, ecology and behaviour. Special financial support should be provided to carry out this research.

Education concerning the protection of these birds and their habitats must be continued, and use of non-persistent insecticides in farmland is also important.

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