

A Questionnaire Survey of Ardeid Nesting Colony Distribution in Guangdong, Guangxi and Hainan, South China

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Abstracts.—A questionnaire on ardeid nesting colony distribution and nesting numbers in Guangdong, Guangxi and Hainan, South China was sent to academics, forestry officials and nature reserve staff in 2001. A total of 44 colonies was reported, of which a third was found in Pearl River Delta, the most important ardeid nesting area in south China according to this study. Although data were missing from over half of the known colonies, 2,300 nests of seven species were reported in Guangdong. In Guangxi, there were 2,365 nests of at least seven species, but little information was available for Hainan. Field counting of nests, and strengthening the protection of colonies against egg and chick collection, are recommended. *Received 6 September 2003, accepted 11 November 2003.*

Key words.—Ardeid, Black-crowned Night Heron, Cattle Egret, Chinese Pond Heron, colony, Great Egret, Little Egret, nesting, Pearl River Delta, South China.

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The distribution of ardeid nesting colonies in Guangdong, Guangxi and Hainan, South China is poorly known. Young and Cha (1995) investigated colonies in the Pearl River Delta of Guangdong and recorded six colonies, and a total of 910 nesting pairs, of which 94% were Black-crowned Night Heron (*Nycticorax nycticorax*) and the rest were Chinese Pond Heron (*Ardeola bacchus*), Little Egret (*Egretta garzetta*) and Cattle Egret (*Bubulcus ibis*). In Guangxi and Hainan, the available information is generally anecdotal. Hence, there is inadequate baseline data to assess the current status and distribution of ardeids. In addition, this part of China is a densely populated area and has one of the fastest growing economies, both of which exert great pressure on wildlife. Therefore, a study of the colony distribution and abundance in South China is needed in order to

identify important ardeid nesting areas, assess the status of ardeids, and help ensure the survival of existing colonies.

Through this survey, we planned to (1) investigate the number and locations of colonies of nesting ardeids in Guangdong, Guangxi and Hainan, primarily by means of questionnaires to ornithologists and government forestry officers, (2) estimate the number of nesting ardeids, and (3) identify threats to these colonies. We hope this information will facilitate field surveys and conservation of ardeid colonies in this region in the future.

STUDY AREA AND METHODS

Study Area

Guangdong Province (179,766 km²), Guangxi Zhuang Autonomous Region (236,700 km²) and Hainan Province (34,000 km²) are located in the southern part of China (Fig. 1). In Guangdong and Guangxi, the alti-

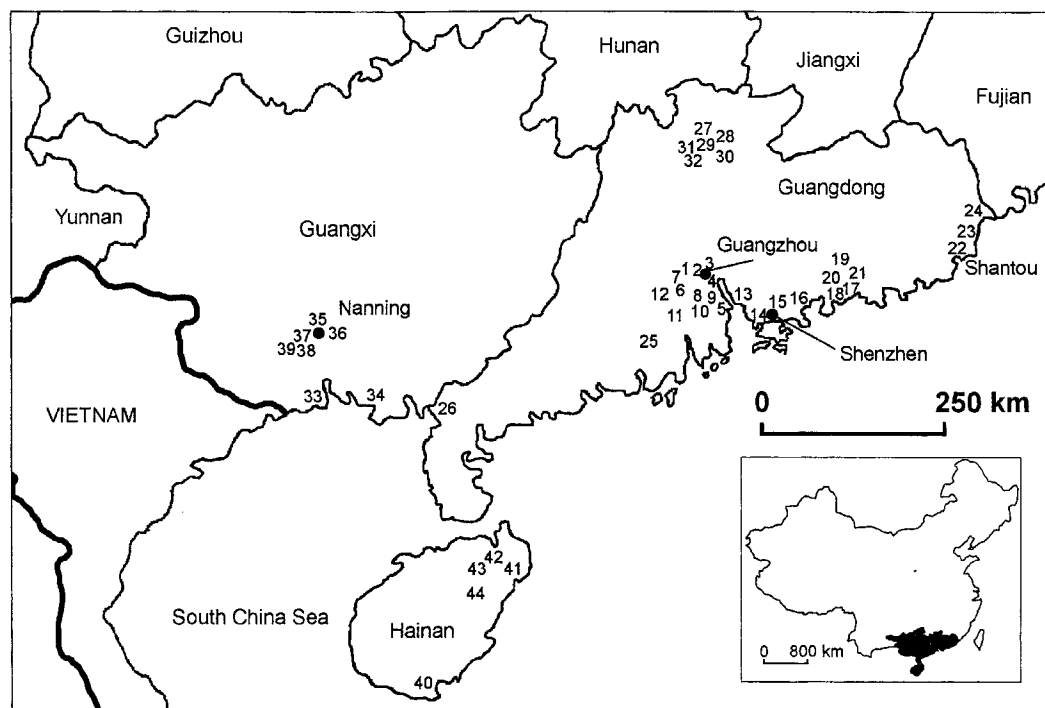


Figure 1. Distribution of ardeid nesting colonies in Guangdong, Guangxi and Hainan (Numbered as Tables 1 and 2, and the text) (Inset: the location of these provinces (shaded areas) in China).

tude increases from south to north. In Hainan, mountainous terrain in the central part takes up one third of the whole island. Sizable lowlands surround the mountains except on the southern coast. The climate of Guangdong and Guangxi is dominated by a humid subtropical monsoon, while Hainan has a tropical marine monsoon. The average annual temperature of Guangdong and Guangxi ranges from 18–23°C, while the mean annual temperature of Hainan ranges from 23–25°C.

Questionnaires were sent to ornithologists, officials of nature reserves, and government forestry officers in March and April 2001. Respondents were asked to provide locations of colonies, nesting species, number of nests and individuals, and types of human disturbance, if any. Published information about ardeids and nature reserves in this region, for instance, Fellowes *et al.* (2001) and Zhang (1997) were reviewed. Field reports of some 60 forest areas in the three provinces visited by Kadoorie Farm and Botanic Garden (KFBG) were also reviewed. In addition, a researcher in the Pearl River Delta colony survey, Dr. Lew Young, was consulted to investigate possible overlap of colonies reported in Young and Cha (1995) and in the present study. Scientific names of ardeids follow Inskipp *et al.* (1996).

RESULTS

A total of 21 questionnaires was sent and nine were completed and returned. Of the returned questionnaires, seven were from Guangdong, and one each from Guangxi

and Hainan. Questionnaires from Guangdong and Hainan were incomplete due to lack of field counts of nests and birds.

Distribution of Colonies

A total of 44 colonies was reported in the study area, of which 32 were in Guangdong, seven in Guangxi and five in Hainan (Fig. 1). In Guangdong, 14 colonies were located in the Pearl River Delta (Table 1, Figs. 1 and 2), and ten were along the coastal area between Shenzhen and Shantou. Six were also found in northern, hilly areas (Table 1, Fig. 1). The remaining two were situated in western Guangdong. In Guangxi, all colonies were distributed in the southern area around Nanning (Table 2, Fig. 1). In Hainan, colonies at Sanya River (No. 40), Qinglangang (No. 41) and Dongzhaigang (No. 42) were found in coastal areas, and Ruixi (No. 43) and Hongdoubu (No. 44) were inland (Fig. 1).

Numbers and Nesting Species

Nest and individual bird counts were only available for some of the colonies in the study

Table 1. Bird abundance and nest numbers in the 32 colonies in Guangdong. Colonies numbered from 1 to 14 are within Pearl River Delta, 15 to 24 are along the eastern coastal areas. Data are based on this questionnaire survey in 2001 (? = no information, + = present).

Colony	City/County	Protection status (NR: Nature Reserve)	Number of birds						Total estimated no. of birds of a colony	Estimated no. of nests		
			Great Egret	Little Egret	Cattle Egret	Black-crowned Night Heron	Chinese Pond Heron	Grey Heron			Little Green Heron	
1. Liuhua Park	Guangzhou	Urban park	+	100		1500			+	+	1600	50
2. Maogang	Guangzhou	Nil		150		2000	100				2250	1000
3. Zoological Garden	Guangzhou	Urban park				+					?	10
4. Liuhuashan	Fanyu	Nil				1500	150				1650	?
5. Xinwu	Fanyu	Nil	150	300					200		650	?
6. Huangji village	Namhai	A county level NR		300	150	2500	200				3150	?
7. Namguo orchard	Namhai	Nil			100	1000	300				1400	?
8. Kunon	Shunde	Nil		1500	400	7500			50		9450	?
9. Shunde Ecological Garden	Shunde	?		+	+	+	+				?	+600
10. Nantou	Zhongshan	Nil		+	+	+	+				?	500 for the Night Heron
11. Paradise of little birds	Xinhui	A county level NR		100		1500	150				1750	?
12. Kului	Huishan	?		+							?	?
13. Lianhuashan Reservoir	Dongguan	?		300	100	2500					2900	?
14. Futian Nature Reserve	Shenzhen	Futian NR	150	3000	300	700	500	100			4750	?
15. West Lake Park	Huizhou	?		+	+	+	+				?	?
16. Baisha Village	Huidong	?		+		+					?	?
17. Luo River	Shanwei	Nil			200		300				500	?
18. Gaoluo	Haifeng	?		+	+	+	+				?	?
19. Gongpeng Reservoir	Haifeng	Dahu NR	50	100			200	50			400	?
20. Huangjiang River	Haifeng	Dahu NR	300	200	200			+			700	?
21. Great Lake	Haifeng	Dahu NR	100	300	300	2000	300				3000	?
22. Sanyutuan	Shantou	Nil	150	200	100		50	100			600	?
23. Aotou	Shantou	Nil	100	200			200	150			650	?
24. Raoping	Raoping	?		2500	300	800	300				3900	?
25. Lion Hill Reservoir	Kaipeng	?		+							?	?
26. Deyao	Chenjiang	Chiangjiang NR	500	1000	1000		500	100			3100	?
27. Xitou	Ruyuan	Nanling NR		+			+				?	50

Table 1. (Continued) Bird abundance and nest numbers in the 32 colonies in Guangdong. Colonies numbered from 1 to 14 are within Pearl River Delta, 15 to 24 are along the eastern coastal areas. Data are based on this questionnaire survey in 2001 (? = no information, + = present).

Colony	City/County	Protection status (NR: Nature Reserve)	Number of birds						Total estimated no. of birds of a colony	Estimated no. of nests	
			Great Egret	Little Egret	Cattle Egret	Black-crowned Night Heron	Chinese Pond Heron	Grey Heron			Little Green Heron
28. Hongxingping	Ruyuan	Nil						+		?	10
29. Xiangjiangshui	Ruyuan	Nil						+		?	10
30. Qinxidong	Ruyuan	Nil						+		?	20
31. Luodong	Ruyuan	?		+						?	12
32. Pingxi	Ruyuan	?		+						?	20
Total number (% of all ardeids)			1500 (3.5)	10250 (24.2)	3150 (7.4)	23500 (55.4)	3250 (7.7)	750 (1.8)	—	42400 (100)	2282
No. of colonies with that species			11	24	15	17	21	9	1		

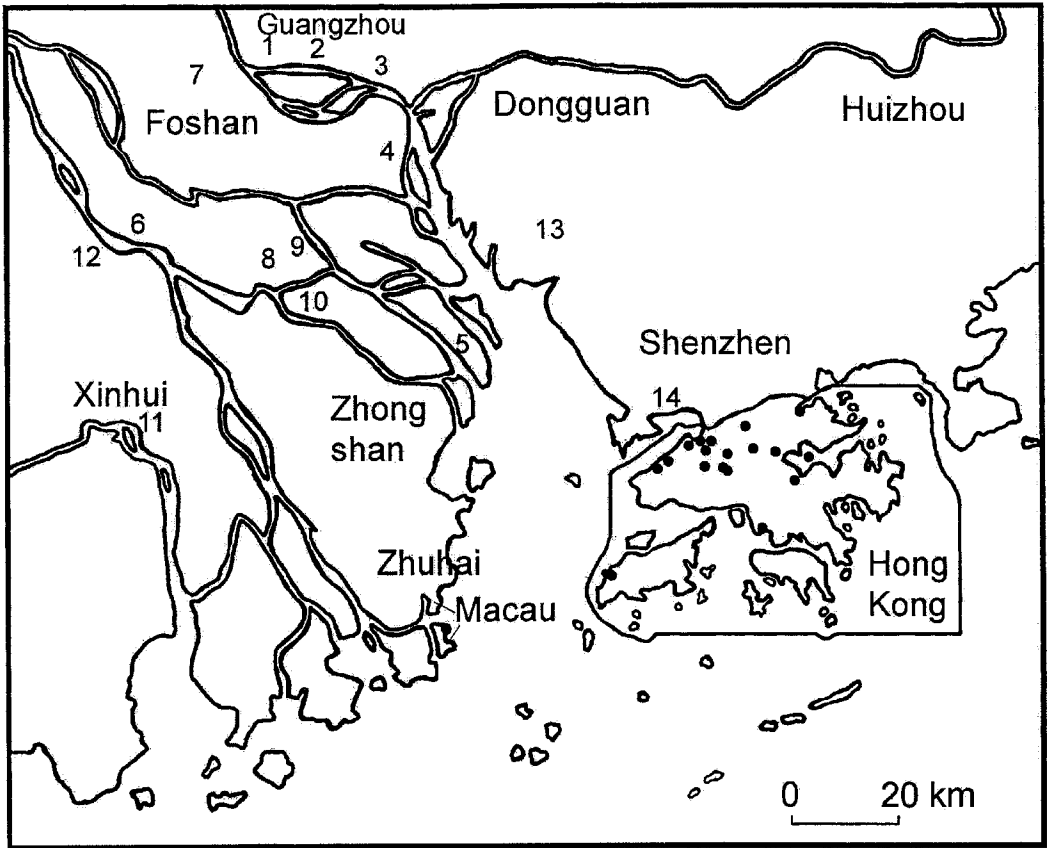


Figure 2. Ardeid nesting colonies in Pearl River Delta including those in Guangdong (Numbered 1-14 as Table 1), Hong Kong and Macau (black spots). A total of 19 colonies were found in Hong Kong and one in Macau in the 2002 breeding season.

area. In Guangdong, over half of colonies were not counted. Approximately 42,000 birds and 2,300 nests of seven ardeid species were reported in the other colonies, of which the Black-crowned Night Heron and Little Egret were the dominant species (Table 1). In Guangxi, over 2,300 nests were reported and the Black-crowned Night Heron and Chinese Pond Heron were the dominant nesting species (Table 2), while small numbers of the forest dependent Malayan Night Heron (*Gorsachius melanolophus*) also bred there. In addition, the endangered White-eared Night Heron (*Gorsachius magnificus*) was suspected to breed in the two Malayan Night Heron colonies (Fellowes *et al.* 2001). In Hainan, the bird count at the Hongdoubo colony revealed that the dominant species was the Cattle Egret (250 individuals) but the Little Egret (4) and Chinese Pond Heron (8) were also found (KFBBG 2001).

Disturbance

Information about disturbance was available in 18 colonies in Guangdong and Guangxi only (Table 3). Only five colonies in Guangdong were reported to be disturbed. In the Huangji colony, Guangdong, controlled harvesting of chicks and shooting of adults was conducted (Woodward and Carey 1996). In 1994, about 10,000 chicks were collected from that colony. In Guangxi, the major disturbances were caused by the collection of eggs and chicks, and cutting of vegetation in colonies (Table 3), while chick collection was reported in Nazao and Nahuang colonies (Fellowes *et al.* 2001).

Protection of Colonies

Fourteen colonies (32%) were situated in nature reserves (Tables 1 and 2). In Guang-

Table 2. Nest number of ardeids in Guangxi. Data are based on this questionnaire survey in 2001.

Colony	County	Protection status (NR: Nature Reserve)	Species						Total	
			Great Egret	Little Egret	Cattle Egret	Black-crowned Night Heron	Chinese Pond Heron	Little Green Heron		Malayan Night Heron ¹
33. Liyujiang	Fangcheng	Fangcheng Wanhesan Heron NR	20	100	360	200	250		930	
34. Shanhu	Hepu			70		30			100	
35. Xinlian	Sub-urban area of Nanning (capital of Guangxi)					230			230	
36. Nalan	Yonging	Nanin Nalan Heron NR		10		180	330	130	650	
37. Nabu	Shangsi					100	300		400	
38. Nazao	Shangsi							40	40	
39. Nahuang	Fusui	Fusui White-eared Night Heron Reserve						15	15	
Total			20	180	360	740	880	130	55	2365

¹White-eared Night Herons were suspected to nest with Malayan Night Herons at Nazao and Nahuang colonies in 1998.

Table 3. Disturbance to ardeid nesting colonies in Guangdong and Guangxi (+: present). No information was available to other colonies. Data are based on this questionnaire survey in 2001 and literature review.

Colony	Disturbances				Other disturbances
	Hunting	Eggs & chicks collection	Loss of vegetation in colony	No disturbance	
Guangdong					
1. Liuhua Park					Visitors
2. Maogang		+			Habitat destruction
3. Zoological Garden					Visitors
6. Huangji village		+			
9. Shunde Ecological Garden				+	
27. Xitou				+	
28. Hongxingping	+		+		
29. Xiangjiangshui				+	
30. Qinxidong				+	
31. Luodong				+	
32. Pingxi				+	
Guangxi					
33. Liyujiang				+	
34. Shanhu	+	+	+		
35. Xinlian		+	+		
36. Nalan				+	
37. Nabu		+	+		
38. Nazao		+			
39. Nahuang		+			

dong, eight were inside nature reserves and two were in urban parks, while one colony in Guangxi was officially protected, and two were designated as nature reserves in May 2003 (Zhou 2003). In Hainan, three were situated in Sanyahe Mangrove Nature Reserve (No. 40), Qinglangang Mangrove Nature Reserve (No. 41), and Dongzhaigang National Nature Reserve (No. 42), which is a Ramsar Site of international importance.

DISCUSSION

As the survey methods of the respondents are not standardized, the results of bird and nest counts should be considered as relative abundance, rather than absolute value. Nevertheless, the result provides a scenario of ardeids in South China.

This study identified 44 known nesting sites and eight ardeid species in Guangdong, Guangxi and Hainan. Including the 19 in Hong Kong (Wong 2003) and one in Taipa, Macau (Leung and Kwok 2002) in 2002, there were at least 62 nesting sites in South China. Of these 62 sites, 24 were in the Pearl

River Delta (14 in China, 9 in Hong Kong and 1 in Macau), i.e., 39% of the total number of colonies. This makes it the most important ardeid nesting area in this region. This finding reinforces the view of Lansdown *et al.* (2000), who identified this delta as one of four important heron areas in South China. Another important nesting area revealed by this study is the coast between Shenzhen and Shantou in Guangdong, which accounted for 15% of reported colonies in this region.

Colonies were reported mainly in coastal areas, where wetland feeding habitats, e.g. mangroves, fishponds and paddy fields, which are concentrated in these areas. In addition, the better road systems in these areas may also help explain the reported distribution pattern, as it improves the accessibility to coastal colonies by researchers. In contrast, the road system in the north is less well developed and therefore, the number of colonies, in particular of the forest dependent ardeids, in the north may be underestimated.

Both this study and Young and Cha (1995) reported that the Black-crowned Night Heron was the numerical dominant

nesting ardeid in the Pearl River Delta. Its dominant status may be explained by its nocturnal feeding habits: it has a lower risk of being shot compared to egrets that feed in daytime (Young and Cha 1995). In addition, the preference of this species for overgrown habitats, such as mangroves and well-vegetated fishponds (Wong *et al.* 2001), may help reduce the shooting pressure because they are more difficult to be seen by hunters.

From the information received, collections of eggs and chicks were not common in Guangdong. However, surveys of wildlife markets from 2000 to 2003 indicate that chicks of the study species, Purple Heron (*Ardea purpurea*) and Grey Heron (*Ardea cinerea*) are sold, although some of them may be imported from other provinces in China (Kadoorie Farm and Botanic Garden, unpubl. data). Even the endangered White-eared Night Heron has been found on sale in Guangxi (Lee 1998). Thus, collection of chicks is thought to be one of the major threats to the survival of ardeids in this region. Since a safe nesting site is a key requirement of nesting birds and their young (Hafner 2000), strengthening the protection of these disturbed colonies is recommended. Designation of these colonies as Restricted Areas guarded by nature wardens during the breeding season is recommended. In Hong Kong, egg and chick collection almost disappeared after the implementation of such a "no-go" measure in the breeding season at the Yim Tso Ha colony since 1971.

This survey revealed that ardeids colonies may still be widely distributed in the study area. It is recommended that field surveys should be undertaken to verify the locations of reported colonies in the study area. Priority should be given to Hainan as there is a general lack of information. Also, recording of the extent and type of human disturbance, if any, is needed to assess the sustainability of use of current ardeid nesting sites. Attempts should also be made to spread the value of conservation to nearby villagers, in particular the younger generation, during fieldwork.

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