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The avifauna of the Vietnamese Mekong Delta

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Summary

The Vietnamese Mekong Delta has undergone much anthropogenic change in the last 100 years, and few areas of natural or semi-natural habitat remain. Despite the likely consequent loss of biodiversity, little documentation exists about the region's avifauna at any time in its history. Here, we present a review of the avifauna of the Vietnamese part of the Mekong delta based on various surveys and other fieldwork carried out since 1988, and an assessment of the few earlier data that were available. A total of 247 species has been recorded from the Vietnamese delta since 1988. Most pre-war data are now considered to be of uncertain validity. Some 50% of the species recorded since 1988 are dependent on wetlands. Of these, 20 are listed as globally threatened or Near Threatened. The delta supports, or is likely to support, internationally important numbers of 21 species of waterbird, including two threatened and three Near Threatened species. Annotations are provided for records of globally or regionally threatened species; for those species for which the Mekong Delta holds internationally important numbers; and those for which records described herein constitute range extensions. Information on the avifauna of the Mekong Delta presented here suggests it is of regional and global importance for the maintenance of wetland biodiversity.

Introduction

The Mekong Delta, formed by branches of the Mekong and Bassac Rivers south of Phnom Penh, Cambodia, covers some 4.95 million ha, 3.9 million of which lie in Vietnam. Perhaps because of the inhospitable swamps, and subsequently the notoriety of the area as a hotbed of resistance to successive governments through much of the 20th century, few ornithological data have been published for this region of Vietnam.

The only clue to the character of the avifauna of the Vietnamese portion of the Mekong Delta (hereafter referred to as 'the delta') existing in pre-war days comes from the 19th Century collector Gilbert Tirant, whose records were listed with annotations in Tirant (1879). Although Delacour (1970) cast doubt on several of the species recorded by Tirant, in terms of both their identification and provenance, he suggested there was no reason to doubt many of the more important records. Nevertheless, the fact that several were regarded as questionable makes it difficult to judge the validity of any individual record. In many cases, we cannot be certain whether Tirant was reporting a species from the Mekong Delta, because his "Basse Cochinchine" included localities in neighbouring provinces.

For instance, "forests of Tay Ninh" in Tay Ninh province, "forests of Thu Dau Mot" in Song Be province (now split into Binh Phuoc and Binh Duong provinces) and "mountains of Ba Ria" now in Ba Ria-Vung Tau province. Whether many of the species recorded by Tirant really did occur we may never know: less than 50 years later, Jabouille (1932), who had hoped to find the species described by Tirant, found that 'the forests of the low and wet parts of the south-west have, in effect, disappeared, to make way for rice fields, and with them, no doubt, these birds with affinities to Malaysian forests'.

Lack of precision regarding localities and ranges is also attached to the many interesting distributional statements in Wildash (1968), who states of many species that they occur "throughout South Vietnam" (which equates to Cochinchina, south Annam and southern parts of central Annam; see King *et al*. 1975 and Robson 2000), or in "southern South Vietnam" (which equates to Cochinchina, an area including the Mekong Delta but extending well to the north; see King *et al.* 1975 and Robson 2000). Either of these statements could imply that the Mekong Delta is included, yet without clearer information we cannot be certain; a few species are said to occur (or have occurred) on the "lower Mekong River", which must refer to the delta.

More recently, Le Dien Duc (1989) stated the avifauna of the delta to comprise '386 species and subspecies', including 92 species of waterfowl, but did not list these. He also noted 'important … populations of cormorants, herons, egrets, storks and ibises'. The avifauna of a small number of sites was described in brief by Safford *et al*. (1998), who listed 122 species for the U Minh wetlands of Kien Giang and Ca Mau provinces in February and June 1997, and Tran Triet *et al.* (2000), who found evidence for 74 species in the grasslands of Ha Tien in June 1997. The avifauna of Tram Chim National Park, Dong Thap province, is probably the best known in the delta, as it has been the focus of attention by the International Crane Foundation (ICF) since 1988, with over 170 species recorded (ICF unpublished data), but even here little has been published.

Most of the natural wetland habitat in the delta has been converted into wet-rice cultivation or afforested with *Melaleuca cajuputi*, whilst mangroves have been destroyed during wartime and subsequently to make way for shrimp and fish ponds (Le Dien Duc 1989). The delta supported a human population of some 16.9 million in 1996 (Duong Van Ni *et al*. 2001). In recent years, more attention has been paid to the biodiversity of the delta as Vietnam has opened up to tourism, and to overseas investment. The status of the delta's wetland ecosystems has also been a cause for concern, and several wetland conservation projects funded by overseas agencies have been carried out. The authors were involved in two such projects: the Darwin *Melaleuca* Wetlands Project (Safford *et al*. 1997, 1998, Tran Triet *et al.* 2000, Duong Van Ni *et al.* 2001) and the Conservation of Key Wetland Sites in the Mekong Delta project, a delta-wide assessment of the status of wetlands of conservation importance in 1999 (Buckton *et al*. 1999). As a result of these studies, it became apparent that information on the occurrence and distribution of many bird species in the Mekong Delta was either incomplete, inaccurate or both, and most of the information given in this paper is drawn from these surveys.

Due to the lack of clarity regarding the provenance of pre-1988 records, it is difficult to draw conclusions regarding changes in status of individual species since that time, and we have not attempted to do so. Instead we here attempt only to provide an accurate baseline of information on the avifauna of the delta

(up to and including 2000), and to document other noteworthy records since 1988. Such information is important background for assessing the conservation value of sites in the delta, and provides a baseline against which future change can be measured.

Study area and methods

The Mekong Delta

For the purposes of this paper, the Mekong Delta is defined as all provinces from Long An south to Ca Mau (8°17′–11°07′ N, 103°45′–107°09′E; Figure 1).

Landforms

The three main landform types of the Vietnamese Mekong Delta have been described elsewhere (see Nguyen Huu Chiem 1993). Briefly, they consist of

i) the floodplain, covering much of the northern and central part of the delta, including the region known as the 'Plain of Reeds'. On most of these, sediments rich in pyrite (FeS_2), known as acid sulphate soils are thinly covered by fertile alluvial sediments, although locally (for example on levees) the alluvial layer is thicker. Mekong floodwaters seasonally

Figure 1. Map of the Mekong Delta, Vietnam, showing locations referred to in the text. Adapted from Buckton *et al*. (1999).

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overtop the natural levees, resulting in seasonal (locally permanent) flooding. Before widespread artificial drainage, the lower-lying depressions further from the river were permanently submerged as large areas retained ponded water, the level of which gradually lowered as the dry season progressed (Beilfuss and Barzen 1994). Such areas were reported as "very rich in biological resources" (Le Dien Duc 1991), with plant communities dominated by wetland forest and diverse grasslands.

ii) the coastal complex of sand ridges, flats and mangroves, covering the southern and easternmost parts of the delta is influenced by marine and river environments. Mangrove swamps are found primarily in the Ca Mau peninsula and around river mouths in all the east-facing (accreting) coastal provinces. In some areas, particularly the Ca Mau peninsula, mangrove spreads seawards as accretion creates intertidal mudflats suitable for colonisation.

iii) a distinct, low-lying area occupying the interior of the Ca Mau peninsula in the south of the delta, mainly in Kien Giang and Ca Mau provinces. It is largely isolated from the river systems but is kept wet by the highest rainfall in the delta. However, freshwater is scarce in the dry season, when saltwater intrudes into much of the area. Acid-sulphate soils predominate, and the delta's only extensive peat deposits exist in the U Minh region.

Alluvial sediments are ideal for rice cultivation, with triple-cropping practiced in some areas. Acid sulphate soils, which cover almost half of the Mekong Delta (State Commission for Sciences 1991), are far more problematic. Aeration of subsoil layers (inevitable during cultivation) allows oxidation of the sulphur in the pyrite, and acidity and toxic Aluminium are released as by-products (Dent 1992, van Breemen 1993, Le Quang Minh *et al.* 1997, Duong Van Ni *et al.* 2001). These soils are a major constraint on agricultural intensification, and most remaining natural and semi-natural wetlands are in acid sulphate soil areas. However, rice production has proved technically feasible on these soils and is carried out over large areas.

Climate and flooding

The Mekong Delta has a tropical monsoon climate, with distinct wet (May to November) and dry (December to March) seasons. There are local variations in climate; the south-west receives twice as much rain each year (2,500 mm) as parts of the north (1,250 mm). Seasonal variations in climate result in substantial variation in flow of the Mekong River. At its peak (typically August and September), large areas of the delta flood, particularly in the north. Depth and duration of flooding vary according to location and intensity of monsoon rains, but can be up to 3 m deep and last for 4–5 months in low-lying areas. Flows are lowest in April, and at this time seawater is able to intrude upstream, affecting approximately one third of the entire delta. Even in the wet season, saltwater intrusion occurs during high tides in parts of the south-east (Le Cong Kiet 1994).

Vegetation

Many of the bird species recorded by Tirant (1879) suggest that the delta once contained extensive forests, and there is further evidence for this from tree stump

remains (Le Cong Kiet 1993, Tran Triet *et al*. 2000). However, the character of the delta has changed to such an extent during its long occupation by humans that little is known of the original vegetation. Even by the 1930s, it was apparent that much of the forest cover had disappeared, to be replaced by rice (Jabouille 1932). Phung Trung Ngan *et al.* (1989) described nine forest types that might have occurred in the Mekong Delta (including dryland, littoral, riparian and mangrove forests), but could not estimate the area of each type.

The vegetation communities existing today have been described elsewhere (e.g. Le Cong Kiet 1994, Tran Triet 1999). To summarise, freshwater communities include swamp-forest dominated by *Melaleuca cajuputi* (Craven and Barlow 1997), extensive areas of seasonally inundated grassland, riverbank vegetation, and aquatic vegetation in waterways and waterbodies (Le Cong Kiet 1994). Saline communities consist largely of mangrove forest, which were (at least until recently) extremely diverse (Phan Nguyen Hong and Hoang Thi San 1993). *Avicennia alba* dominates frequently inundated, newly accreted land, and *Rhizophora* spp. (primarily *R. apiculata*) dominate areas that are only inundated at high tide. Where land is only inundated by particularly high spring tides, communities including *Lumnitzera racemosa*, *Ceriops tagal*, *Excoecaria agallocha* or the palm *Phoenix paludosa* can be found. Stands of the rhizomatous palm *Nypa fruticans* are characteristic of brackish areas (Euroconsult *et al*. 1996).

Key sites for conservation in the Mekong Delta

The high level of agricultural intensification in the delta has resulted in a highly fragmented network of areas of conservation interest. Buckton *et al*. (1999) visited 29 wetland sites of potential conservation importance (Figure 1). These sites were categorised as freshwater wetlands, coastal wetlands or waterbird breeding colonies. The most important freshwater sites for conservation were found in three main regions of the delta (Figure 2), all dominated by severe acid sulphate soils: (1) the Plain of Reeds, a large floodplain extending into Cambodia, once a legendary wilderness but now largely cultivated (Beilfuss and Barzen 1994); (2) the Ha Tien plain, a coastal floodplain that suffers severe acidification and saltwater intrusion, which have particularly hindered cultivation (Tran Triet *et al.* 2000); and (3) the U Minh region, where extensive *Melaleuca* forests, some on peat deposits that are unique in Indochina (Safford *et al*. 1998), survived until recently at least, when large areas were burned in March–May 2002 (Anon. 2002). Important coastal sites at Dat Mui and Bai Boi, Ca Mau province, consisted primarily of mudflats and mangrove, with human disturbance being a major factor in determining the conservation importance of individual sites. Waterbird colonies were spread throughout the delta, often in woodland groves, or coconut palm plantations, and protected under the auspices of local communities, primarily those in Buddhist monasteries (Table 1).

Sources of information

Historical records

Due to the uncertainty surrounding Tirant's records we have not included these where no other records can be found. Instead we have listed separately the

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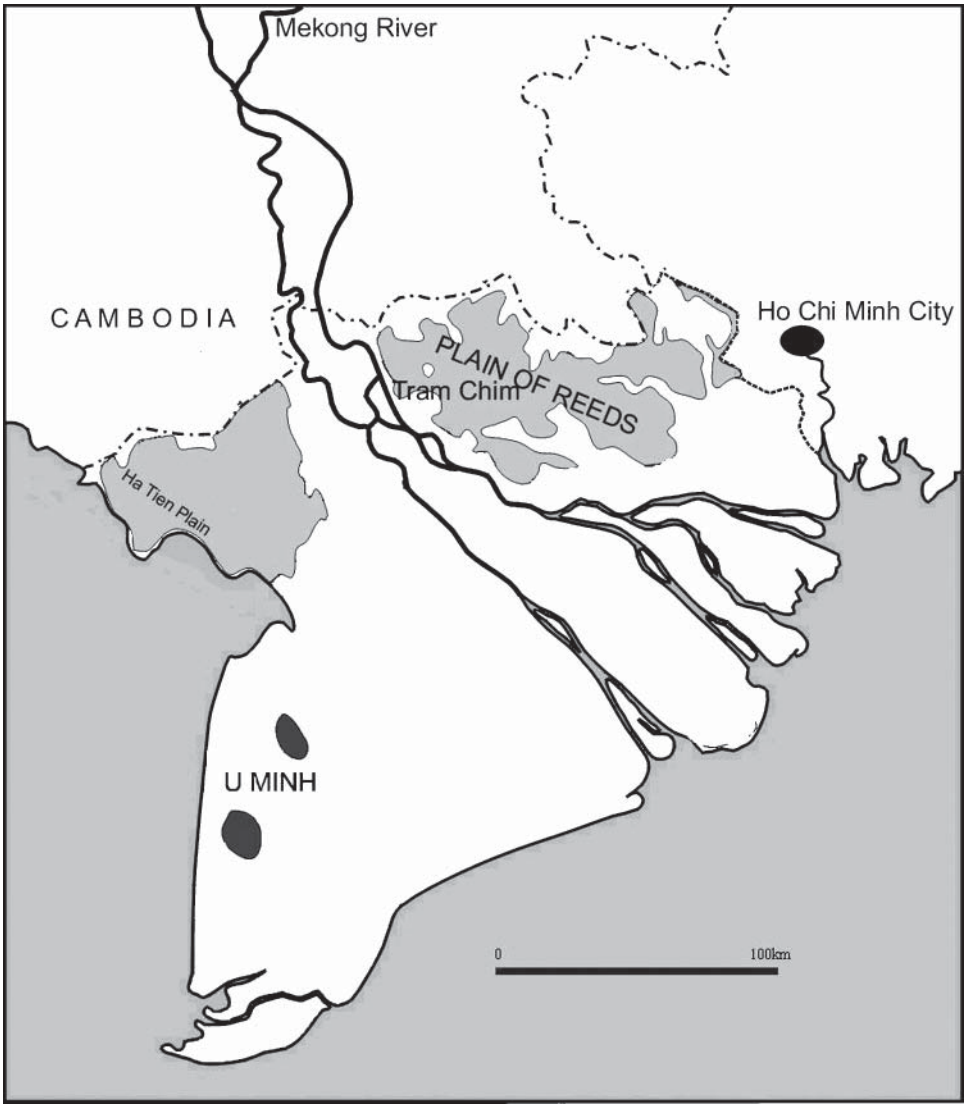

Figure 2. Map showing locations of three main regions for freshwater wetland conservation in the Vietnamese Mekong Delta.

species recorded only by him and not since (Appendix 1). Although efforts to positively identify all Tirant's collecting localities and visit his collection would help remove some of this uncertainty, it is possible that some doubt will always remain, because of difficulties surrounding associating individual specimens to precise locations.

Recent records

A number of sources were used for more recent bird records. Most came from fieldwork visits made by the authors during 1996–2000. STB visited all Mekong

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Table 1. Numbers of waterbirds recorded at each of 10 colonies and/or roost sites in the Mekong Delta, February–August 1999.

Province		Bac Lieu		Tra Cu		U Minh Thuong		Tra Su		Vam Ho	Thoi An	Chua Hang	Ca Mau	Bai Boi	Duyen Hai	Total
		Bac Lieu		*Tra Vinh*		*Kien Giang*		*An Giang*		*Ben Tre*	*Can Tho*	*Tra Vinh*	*Ca Mau*	*Ca Mau*	*Tra Vinh*	
English name	**Scientific name**	Mar	Aug	Feb	Jul	May	Aug	Apr	Jul	Jul	Jul	Jul	Aug	Mar	Feb	
Cotton Pygmy-goose	*Nettapus coromandelianus*		2													2
Oriental Darter	*Anhinga melanogaster*		1					1	3			5	1			9
Little Cormorant	*Phalacrocorax niger*	200	700	200	400	1,063	900	50	650	50	300		1,500	103	200	4,966
Indian Cormorant	*Phalacrocorax fuscicollis*	2	930						5							930
Little Egret	*Egretta garzetta*	100	304	300	1,600	1,581	82	750	150	300	1,000	1,200	1,500	416	1,500	10,150
Pacific Reef Egret	*Egretta sacra*									1						1
Grey Heron	*Ardea cinerea*	20	42			10	5	16	8	1						69
Purple Heron	*Ardea purpurea*	25	140			152	75	10	317						1	610
Great Egret	*Casmerodius albus*	25	70	30	50	125			5				2	12	100	364
Cattle Egret	*Bubulcus ibis*		650	700	500	1,242	86	1,750	1,000	300	2,000	1,200	1,000		300	9,142
Chinese Pond Heron	*Ardeola bacchus*	5				4								2		11
Javan Pond Heron	*Ardeola speciosa*		9		11	5	17		2	6			11			56
Little Heron	*Butorides striatus*		2													2
Black-crowned Night Heron	*Nycticorax nycticorax*	3	700	300	1,600	5		33	280	350		1,200	150			4,285
Yellow Bittern	*Ixobrychus sinensis*		2						1		2					5
Cinnamon Bittern	*Ixobrychus cinnamomeus*									2						2
Black Bittern	*Dupetor flavicollis*		6			2	23									29
Glossy Ibis	*Plegadis falcinellus*		59	300	10	1,391						5	2			1,757
Black-headed Ibis	*Threskiornis melanocephalus*		4	50	50	12										66
Asian Openbill	*Anastomus oscitans*					73	5									73
Total (maximum)		3,626		4,711		5,698		3,779		1,010	3,302	3,610	4,166	533	2,101	32,536

Delta provinces in 1999 to identify wetland sites of potential conservation importance. An initial rapid assessment was made of each of 29 sites in February/March. For 10 key sites identified in the rapid assessment, fieldwork was conducted over 2–5 days in March-May and July-August, with additional opportunistic observations made throughout the field period. An additional seven sites that were small in area but held large waterbird colonies were also visited once or twice in March/May and/or July/August. RJS visited the Mekong Delta two to three times annually from 1995 to 2000, including nearly all months, on a programme of multidisciplinary research. In most areas, bird observations were opportunistic. Visits including bird counts and sometimes also more intensive and systematic bird surveys lasting 4–14 days took place on the previously un-surveyed Ha Tien plain in June 1997, the U Minh region in February and June 1997, April 1999 and March 2000, and the Plain of Reeds in March 1998.

Records for Tram Chim National Park (NP), Dong Thap province come from the ICF (unpublished data) and for the U Minh Ha region from a visit by D. A. Scott (*in litt.*), accompanied by Le Dien Duc, in 1988. Additional records have come from the results of a Wetlands International shorebird survey in 2000, which visited several areas not covered by the authors, the U Minh Thuong Nature Reserve Conservation and Community Development Project (records from both being cited under Tordoff 2002), and from personal communications and occasional published records from other observers.

Results

Species Accounts

Using only those data that were of verifiable provenance, a total of 247 species has been recorded from the Mekong Delta south of (and including) Long An province, including seven identified only to genus (Appendix 2). Species fulfilling any one or more of the following five criteria were selected for annotated comments: 1) those that are globally threatened or Near Threatened, according to BirdLife International (2000); 2) those that are threatened in either Thailand or Lao PDR (through which the Mekong River flows) according to Treesucon and Round (1990) or Duckworth *et al*. (1999) respectively, and therefore which may be threatened in the region (no such recent analysis has been carried out in Vietnam or Cambodia); 3) those species for which records presented here represent new range information cf. King *et al*. (1975) and/or Robson (2000); 4) those species for which populations in the delta represent 1% or more of the biogeographic population; 5) those species unknown in Thailand, Laos or Cambodia, and therefore known in Indochina only from Vietnam.

In the accounts, species are identified as 'at risk in Thailand' on the basis of Treesucon and Round (1990) and 'at risk …' or 'potentially at risk in Laos' on the basis of Duckworth *et al*. (1999). Records are presented for each province in order from north-east to south-west. Abbreviations of province names are as follows: LA = Long An province; TG = Tien Giang province; DT = Dong Thap province; BT = Ben Tre province; VL = Vinh Long province; TV = Tra Vinh province; AG = An Giang province; CT = Can Tho province; ST = Soc Trang province; KG = Kien Giang province; BL = Bac Lieu province; CM = Ca Mau province. Unless otherwise indicated, records refer to those of the authors, most of which are detailed in Buckton *et al*. (1999), Safford *et al*. (1998) or Tran Triet *et al.* (2000).

Comb Duck *Sarkidiornis melanotos*

A rare visitor to the delta. DT: recorded from Tram Chim NP in 1994 (numbers and month unknown) and January 1995 (ICF unpublished data). AG: a group of five were seen at Tinh Doi, in May 1999.

At risk in Thailand and Laos. Described as a rare winter visitor to Cochinchina by Robson (2000), and a resident by King *et al*. (1975). It previously bred in Thailand but may no longer do so (Lekagul and Round 1991), and it is considered to be under threat there (Treesucon and Round 1990). There is only one record for Laos, where it is possibly only an occasional visitor (Thewlis *et al*. 1998, Duckworth *et al*. 1999). It is regular around the Tonle Sap in Cambodia, with a population estimate of 50 birds for the area, but it is uncertain whether it breeds here or is just a visitor (Goes 2001). Pre-1970 records in Cambodia are patchy (Thomas and Poole 2003).

Cotton Pygmy-Goose *Nettapus coromandelianus*

Uncertain status. DT: recorded from Tram Chim NP in Jan 1988; 12 in May 1999, and 20 in March 2000. AG: one Tinh Doi, July 1999. BL: two Bac Lieu bird sanctuary, August 1999. CM: one at Vo Doi, August 1999. Four seen in territorial behaviour and apparently nest prospecting, Dam Doi, August 1999.

At risk in Laos. It was previously widespread in Laos, but has only been found recently in a small area in the south (Duckworth *et al*. 1999). Its status in the delta is uncertain; it seems to be sporadic in occurrence. It was once a common resident in Cambodia (Thomas and Poole 2003), and the largest count ever made in Indochina was from the Basset Marshes near Phnom Penh in 2002 (Goes and Poole 2002), but otherwise there is little recent information from the country.

Spot-billed Duck *Anas poecilorhyncha*

Common resident, recorded on most freshwater wetlands. Breeding records include: DT: breeding proven (female with five ducklings) at Tram Chim NP, May 1999. CM: breeding proven (female with ducklings) at Vo Doi, February 1997.

New range information; 1% criterion. Birds seen well showed characteristics of the nominate *A. p. poecilorhyncha* or *A. p. haringtoni* rather than the distinctive *A. p. zonorhyncha*. On the basis of ranges given in e.g. del Hoyo *et al*. (1992), the more likely candidate for individuals in the Mekong is *haringtoni*, which extends to southern Laos. However, neither Madge and Burn (1988), del Hoyo *et al*. (1992) nor King *et al*. (1975) included southern Indochina in the species' range, while Robson (2000) describes it as an 'uncommon resident' here. Based on numbers recorded in 1999, the Mekong Delta supported nearly 4% of the biogeographical population (*haringtoni*) (Table 2).

Common Teal *Anas crecca*

Winter visitor. DT: recorded in several winters at Tram Chim NP since 1988 (ICF unpublished data).

Table 2. Bird species and subspecies for which the Mekong Delta is likely to support 1% or more of the biogeographic population.

English name	Scientific name	Population (species or subspecies)	Estimate of global or regional popn[2]	Mekong Delta popn[3]	%	Site max.	% of popn.
Spot-billed Duck	*Anas poecilorhyncha*	E Asian *haringtoni*	10,000–100,000	376	0.4–3.8	202	0.2–2.0
Sarus Crane	*Grus antigone*	Indochina *sharpii*	1,000	400+	40.0	377	37.7
Eurasian Curlew	*Numenius arquata*	E/SE Asian *orientalis*	35,000	416	1.2	363	1.0
Asian Dowitcher[1]	*Limnodromus semipalmatus*	Global	23,000	160	0.7	144	0.6
Kentish Plover	*Charadrius alexandrinus*	E Asian *dealbatus*	100,000	1,300	1.3	1,300	1.3
Greater Sand Plover	*Charadrius leschenaultii*	E Asian *leschenaultii*	100,000	4,425	4.4	3,000	3.0
Oriental Pratincole[1]	*Glareola maldivarum*	E/SE Asian breeding	75,000	1,790	2.4	1,790	2.4
Caspian Tern	*Sterna caspia*	E/SE Asian *caspia*	10,000–25,000	250	1.0–2.5	209	0.8–2.1
Little Cormorant	*Phalacrocorax niger*	S Asian	25,000–100,000	5,017	5.0–20.1	1,696	1.7–6.8
Indian Cormorant	*Phalacrocorax fuscicollis*	Global	30,000	937	3.1	930	3.1
Little Egret	*Egretta garzetta*	SE Asian *garzetta*	100,000–1,000,000	10,402	1.0–10.4	1,600	0.2–1.6
Chinese Egret[1]	*Egretta eulophotes*	Global	2,600–3,400	96	2.8–3.7	83	2.4–3.2
Purple Heron	*Ardea purpurea*	E/SE Asian *manilensis*	10,000–100,000	1,006	1.0–10.0	1,006	1.0–10.0
Great Egret	*Casmerodius alba*	E Asian *modestus*, migratory	10,000–100,000	470	0.5–4.7	125	0.1–1.3
Cattle Egret	*Bubulcus ibis*	E/SE Asian *coromandus*	100,000–1,000,000	10,084	1.0–10.1	2,500	0.3–2.5
Chinese Pond Heron[1]	*Ardeola bacchus*	Global	25,000–1,000,000	236	0.0–0.9	102	0.0–0.4
Javan Pond Heron[1]	*Ardeola speciosa*	Mainland SE Asian *continentalis*	10,000–100,000	77	0.1–0.8	17	0.0–0.2
Black Bittern[1]	*Dupetor flavicollis*	E/SE Asian *flavicollis*	10,000–100,000	54	0.1–0.5	23	0.0–0.2
Glossy Ibis	*Plegadis falcinellus*	SE Asian *falcinellus*	10,000–25,000	1,757	7.0–17.6	1,391	5.6–13.9
Black-headed Ibis	*Threskiornis melanocephalus*	SE Asian	< 10,000	129	>1.3	63	>0.6
Painted Stork	*Mycteria leucocephala*	SE Asian	< 10,000	380	>3.8	380	>3.8

[1]species for which total numbers recorded represent < 1% of the biogeographic population, but for which it is felt that these counts are an underestimate of true figures and that it is likely that the Mekong Delta supports > 1%.
[2]estimates from Wetlands International (2002).
[3]minimum population in Mekong Delta from site surveys carried out since 1999.

Range extension. Robson (2000) does not include Cochinchina within the species' range. Thomas and Poole (2003) described it as a "fairly common winter visitor" in pre-1970s Cambodia, but all migratory Anatidae appear to have undergone substantial declines in Indochina (C.M. Poole *in litt*. 2001).

Pied Kingfisher *Ceryle rudis*

Very local, apparently restricted to the Plain of Reeds in Dong Thap and Long An provinces. LA: four Moc Hoa, March 1998. One Tan Hung, March 1998. DT: regularly recorded at Tram Chim NP, where it is a fairly common resident, with a daily maximum of eight in March 1998. Two Dong Cat / Gao Giong, March 1998.

At risk in Laos. There has been a major range contraction in Laos, with all recent records coming from just six sites (Duckworth *et al*. 1999, Duckworth *et al*. 2002). Described as 'common' along the Mekong, Tonle Sap and Bassac rivers in Cambodia prior to 1970 (Thomas and Poole 2003), but there is little recent published information.

Blue-tailed Bee-eater *Merops philippinus*

Widespread and fairly common, recorded in all but four Mekong Delta provinces and in all months, though numbers consistently greater in July and August.

Potentially at risk in Laos. The species breeds in the dry season in Laos, but is common only in the south. Duckworth *et al*. (1999) believe the accessibility of nests of this colonial breeder makes it vulnerable to nest-robbing.

Grass Owl *Tyto capensis*

Resident. DT: one seen in grassland area at Tram Chim NP, during the day, July 1999. KG: one captive individual at U Minh Thuong in 1997 was reported by its keeper to have been caught locally.

This species has not been recorded elsewhere in Indochina. Although not globally threatened, it is considered rare or very rare throughout its range (del Hoyo *et al.* 1999). Its dependence on areas of undisturbed grassland (del Hoyo *et al*. 1999) suggest it is likely to be under threat in the Mekong Delta and Vietnam as a whole.

Bengal Florican *Houbaropsis bengalensis.*

Rare, possibly resident. DT: Eames (1995) reviewed all Indochinese records up to 1994. Although there were specimen records from Tay Ninh province (just north of the Mekong Delta) in the 1920s, the first records for the delta consisted of several sight records of up to four in the vicinity of Tram Chim NP from 1990–1994. Since then, the following records are known to us: one male inside Tram Chim NP in April 1997 (J. C. Eames *in litt*.), one adult male, probably in the same area, in March 1998 and May 1999. KG: a new locality was found in 1997, when remains of one were identified from tail feathers collected from the Ha Tien plain

in June 1997 (Tran Triet *et al*. 2000). These feathers are now at The British Museum, UK.

Globally Endangered. The DT records are the only recent sightings of live birds in Vietnam (Buckton *et al*. 1999, Eames 1995). In DT, it probably no longer occurs outside Tram Chim NP as the habitat fragments described in Eames (1995) have been converted to rice agriculture (Buckton *et al*. 1999), as have all other significant grassland areas elsewhere in DT province (both authors pers. obs.). The sole KG record (above) is of feathers kept by a local farmer, but local people attest to its continued occurrence here (Tran Triet *et al*. 2000, Buckton *et al*. 1999). The extent of grassland in the Ha Tien plain is far greater than in Tram Chim NP and may therefore be the more important area for the species. However, a much larger population has recently been discovered around the Tonle Sap in Cambodia (Sam Veasna 1999, Goes *et al*. 2001), and the species has also been recorded recently in the Cambodian portion of the Mekong Delta, at Boeung Prek Lapouv, Takeo province (Seng Kim Hout *et al*. 2003).

The movements of the species in Vietnam are unknown. Although local people at Tram Chim NP reported the species breeding here, there has been no definite proof of this. Given the lengthy period of inundation of the site during the wet season, it seems likely that the few individuals remaining must make some movements at that time. On the Ha Tien plain, local people have reported breeding, giving accurate descriptions of nests and eggs (Tran Triet *et al*. 2000).

Sarus Crane *Grus antigone*

Dry season visitor, formerly bred (Archibald 1988). DT: occurs in and around Tram Chim NP in the dry season. The flock size varies between years but is normally over 400. Maximum counts between 1988 have 1999 have been: 1,052 in 1988, 665 in 1989, 741 in 1990, 814 in 1991, 365 in 1992, 187 in 1993, 271 in 1994, 302 in 1995, 631 in 1996, 511 in 1997, 503 in 1998 and 469 in 1999 (Nguyen Van Hung *in litt.* 1999). KG/AG: Sarus Cranes have long been known from the floodplain to the south of the Mekong River in An Giang and Kien Giang provinces by many long-term residents, who consistently distinguish them from other large waterbirds, but their presence has been poorly documented until recently. In An Giang province, up to 20 were recorded at Tinh Bien probably around 1990, and 30 were recorded at Tan Tuyen (Tri Ton district) in 1991 (Nguyen Van Dam and Nguyen Thi Minh Trang, in Le Dien Duc 1991). Little suitable habitat now survives in An Giang province, and we have not received reports from there since 1997. However, the Ha Tien plain in Kien Giang province has emerged as a very important dry season area for the species. In June 1997, one of us (RJS) was told by villagers and provincial officials that flocks of over 100 Sarus Cranes had occurred in two areas on the Plain (near Kien Luong and Hon Dat, the latter now planted with *Eucalyptus*) around March that year; one family reported having seen a flock of 60 (also in March). In March 1999, the Kien Luong flock was again reported to RJS, a specimen of a bird from it that had died (reportedly through disease) was inspected in Rach Gia, and the flock itself was finally seen (*c.*130 birds) by STB. In view of the total lack of ornithological information from the Ha Tien plain before 1997 (Tran Triet *et al*.

2000), but the known existence of extensive grassland there, it is possible that important numbers have used the area for many years.

Globally Vulnerable; 1% criterion. The range of the South-East Asian subspecies *G. a. sharpii* has declined dramatically, and this population is estimated to be about 1,000 individuals (Wetlands International 2002). Hence the groups spending the dry season in the Vietnamese Mekong Delta represent over 30% of this population. In 2001 and 2002 numbers were considerably lower at Tram Chim (48 and 150 respectively; Tordoff 2002), whilst numbers recorded in the Ha Tien plain increased to 251 in March 2001, 330 shortly afterwards (Tran Triet *in litt*. March 2001) and a maximum count of 377 birds in March 2002 (Tordoff 2002). Whether these trends reflected any complementarity between the sites is not known. Previously a breeding resident in Thailand but now extinct there (Lekagul and Round 1991). There are two recently (2001–2002) discovered sites important for Sarus Crane in the Cambodian portion of the Mekong Delta: Boeung Prek Lapouv IBA in Takeo province and Kampong Trach IBA in Kampot province (Seng Kim Hout *et al*. 2003). Maximum counts of Sarus Cranes at the sites to date are 155 birds in March 2002 and 48 birds in February 2003, respectively, though local people estimate the group at the latter site at 80–150 birds (Seng Kim Hout *et al*. 2003). Kampong Trach IBA is just across the international border from Vietnam, and the birds there may be part of the Kien Luong population — no synchronised counts have been made on different sides of the border (A. W. Tordoff *in litt.* 2003). Counts of up to 200 have been made in March and April in 1998 and 1999 at Ang Trapeang Thmor, Cambodia (BirdLife International 2001). Satellite-tracking evidence shows there is some movement between the Mekong Delta and north-eastern Cambodia (Goes *et al*. 2001). The species used to be widespread in central and southern Laos, but there has only been one record since 1996 (Duckworth *et al*. 1999).

Watercock *Gallicrex cinerea*

A fairly common and widespread resident, recorded in six provinces and in all months except September and December, with no clear seasonal pattern in abundance.

At risk in Laos. Large numbers are caught and either sold or consumed in the Mekong Delta of Vietnam. In Laos, Watercock have only been recently recorded at five sites, scattered throughout the country, mostly of singles. Trapping and shooting of the species are suspected to have been frequent there (Duckworth *et al*. 1999).

Purple Swamphen *Porphyrio porphyrio*

Common at many freshwater wetland sites throughout the Delta, but largely absent away from sites offered protection. KG: an estimate of *c.* 2,000 at U Minh Thuong in February 1997.

At risk in Laos. Trapping and shooting of the species is assumed to be frequent in Laos (Duckworth *et al*. 1999). The U Minh Thuong count may be of international importance, though biogeographic population estimates are not available for this species. Large numbers (hundreds) were seen on all seven visits to this

site by both authors, but the count given above was exceptional, and coincided with large areas of swamp (wet grassland areas, reedbeds and open water with floating vegetation) being churned in preparation for *Melaleuca* planting. This produced exceptional feeding conditions for many waterbirds, including jacanas (q.v.). Subsequently, a population estimate of 16,000 birds at U Minh Thuong has been made, based on extrapolation from regular point counts (Tordoff 2002).

Black-tailed Godwit *Limosa limosa*

Passage migrant and winter visitor. BT: *c.* 3,000 birds at Binh Dai in December 2000 (Tordoff 2002).

1% criterion. This count represents over 1% of the biogeographic population (Table 2).

Eurasian Curlew *Numenius arquata*

Passage migrant and winter visitor. The largest count was: CM: a minimum of 322 was counted at Dat Mui in August 1999.

1% criterion. It is likely that this count represents over 1% of the biogeographic population (Table 2).

Eastern Curlew *Numenius madagascariensis*

A winter visitor and passage migrant in small numbers. BT: small numbers (1 and 2) at Binh Dai in April and December 2000 (Tordoff 2002). CM: small numbers (< 10) were recorded at Dat Mui and Bai Boi in March and August 1999.

Globally Near Threatened. King *et al*. (1975) described it as a 'rare migrant to Malaya [and] central Thailand' but records from coastal Vietnam suggest it is a regular passage migrant (Robson 2000).

Spotted Greenshank *Tringa guttifer*

Passage migrant. TV: one observed at Duyen Hai, in July 1996 (BirdLife International 2001). BT: one to three were observed at Binh Dai in December 2000 (Tordoff 2002).

Globally Endangered; new range information. Not previously recorded in Cochinchina (Robson 1999), and only known elsewhere in Vietnam from the Red River Delta (Pedersen and Nguyen Huy Thang 1996). There is one record from Cambodia, of 13 individuals in January 1996 (BirdLife International 2001).

Grey-tailed Tattler *Heteroscelus brevipes*

Passage migrant. CM: two at Dat Mui, August 1999.

New range information. Cochinchina is not listed as being within the migratory range by Robson (2000) or King *et al*. (1975). However, the species is known to occur in northern Vietnam (e.g. Pedersen and Nguyen Huy Thang 1996), and to the south in Indonesia and the Philippines (Robson 2000).

Asian Dowitcher *Limnodromus semipalmatus*

Passage migrant. BT: small numbers (<10) at Binh Dai in April and December 2000 (Tordoff 2002). CM: 16 at Bai Boi in March 1999, and 144 at Dat Mui in August 1999.

Globally Near Threatened, new range information. Based on most recent population estimates, and allowing for site turnover, Dat Mui is likely to hold over 1% of the global population of this species (Table 2). Not listed for Cochinchina by King *et al*. (1975).

Spoon-billed Sandpiper *Calidris pygmaeus*

Passage migrant and winter visitor. BT: Up to five, Ba Tri, December 2000 (Tordoff 2002).

Globally Vulnerable. Not previously recorded in Cochinchina (Robson 2000). It is a regular passage and winter visitor to the Red River Delta in northern Vietnam (Pedersen and Nguyen Huy Thang 1996), and is a rare visitor to Thailand (BirdLife International 2001).

Kentish Plover *Charadrius alexandrinus*

Winter visitor and passage migrant. BT: At least 1,300 at Binh Dai, December 2000 (Tordoff 2002).

Recorded at several other sites in the delta, but this count represents 3% of the biogeographic population (Table 2).

Malaysian Plover *Charadrius peronii*

Resident. BT: 4 at Binh Dai in April and December 2000; 13 at Ba Tri, December 2000 (Tordoff 2002).

Globally Near Threatened. The species is believed to be dependent on quiet, sandy beaches which are becoming increasingly rare (BirdLife International 2000).

Greater Sand Plover *Charadrius leschenaultii*

Winter visitor and passage migrant. BT: At least 3,000 at Binh Dai, December 2000; 1,425 at Ba Tri, December 2000 (Tordoff 2002).

1% criterion. These counts represent 3% and 1.5% of the biogeographic population respectively (Table 2).

Grey-headed Lapwing *Vanellus cinereus*

Winter visitor. DT: a regular at Tram Chim NP in small numbers; six Dong Cat, March 1998. CT: 11 Hoa An, February 1997; eight Hoa An, February 1999. CM: one Dat Mui, March 1999.

Potentially at risk in Laos. Previously listed as globally Near Threatened (Collar *et al*. 1994), this species has since been down-listed (BirdLife International

2000). It is still considered to be nationally threatened in Laos (Duckworth *et al*. 1999). Records from Hoa An came from rice paddies, although uncultivated wetland exists nearby.

Oriental Pratincole *Glareola maldivarum*

Common but somewhat erratic in appearance. DT: counts of up to 300 at Tram Chim NP, January 1997. KG: 1,790 birds at U Minh Thuong in September 2000 (Tordoff 2002). This species has been recorded from many sites in the delta, in both protected areas and in the wider countryside. Injury-feigning mobile distraction display, as described in Cramp and Simmons (1983) for Collared Pratincole *G. pratincola* with eggs or small young, was seen at Ha Tien plain, June 1997.

New range information; 1% criterion. Described as a breeding visitor to Cochinchina by Robson (2000), but there are records in all months from January to September, so some may be resident. Seasonality is uncertain however, as little fieldwork has been carried out in October–December, but it has been recorded in October in neighbouring Tay Ninh province (A. W. Tordoff *in litt*. 2003). Although no one site held internationally important numbers, it is likely that the Mekong Delta as a whole holds over 1% of the biogeographic population (Table 2).

Small Pratincole *Glareola lactea*

Uncertain status. DT: one record from just outside Tram Chim NP, in January 1994 (J.C. Eames *in litt*. 2001).

At risk in Thailand, potentially at risk in Laos. Wildash (1968) noted that large groups could be found along the "lower Mekong River" (in Vietnam), which must refer to the Mekong Delta, but the species now seems to be no more than accidental in the area. However, Small Pratincole is a sandbar-nesting riverine specialist (unlike Oriental Pratincole), and in the absence of recent detailed ornithological surveys of the lower Mekong River, the Vietnamese portion of the Bassac, or of any of the other major rivers in the delta, the apparent absence of the species may not be surprising. It is widespread in Laos in most areas of suitable habitat, especially along the Mekong, and is still a common bird, although there do appear to have been local declines (Duckworth *et al*. 1999, 2002).

Caspian Tern *Sterna caspia*

Uncertain status. BT: one, Thanh Phu, 8 July 1999. KG: one, Hon Chong peninsula, and 45, Dong Ho lagoon, Ha Tien, both June 1997. CM: a count of 209 at Dat Mui, in March 1999.

New range information; 1% criterion. Both the large counts could represent over 2% of the biogeographic population (Table 2). Robson (2000) describes it as predominantly a coastal winter visitor, with an inland record from Cochinchina in June. All our records were coastal, but the June and July records above suggest that over-summering is regular.

Great Crested Tern *Sterna bergii*

Uncertain status, probably resident. KG: only recorded from near the Hon Chong peninsula, where four were seen in April 1999.

At risk in Thailand. In Thailand, this species is considered under threat due to eggs and young of species nesting on islands being taken by fishermen (Treesucon and Round 1990), a factor likely to influence this species in Vietnam.

Black-naped Tern *Sterna sumatrana*

Resident. KG: only recorded from the Hon Chong peninsular. E.g. 20 around the 'Father and Son' rocks in June 1997 were landing on ledges on limestone islands just offshore, which are very likely to provide breeding habitat.

At risk in Thailand. Treesucon and Round (1990) listed this species as under threat in Thailand for the same reasons as the previous species.

Black Kite *Milvus migrans*

Uncertain status. KG: two U Minh Thuong, February 1997. CM: at Vo Doi, where D.A. Scott (pers. comm.) recorded 14 in one day in March 1988, just one was recorded in March 1999; two were seen in nearby U Minh Ha in February 1997.

At risk in Thailand and Laos. In Thailand, Treesucon and Round (1990) describe it as on the brink of extinction as a breeding species. In Laos there are very few recent records, though it was formerly abundant in winter (Duckworth *et al*. 1999). Wildash (1968) found Black Kites very common throughout south Vietnam. Robson (2000) describes it as a former resident in Cochinchina, but currently probably only a winter visitor. Individuals we recorded (all in the U Minh region) have not been identified to either the resident subspecies *M. m. govinda* or the migratory *M. m. lineatus*, which are sometimes considered separate species (e.g. Sibley and Monroe 1990). Without subspecific identification, and with no confirmed records outside the northern winter, it is not known whether a relict resident population survives. Resident *govinda* has suffered considerable regional declines (C.M. Poole *in litt*. 2001).

Brahminy Kite *Haliastur indus*

Resident. KG: frequently recorded in single figures in coastal areas. It has also been recorded at U Minh Thuong and is described as an uncommon resident there (Tordoff 2002). DT: regularly recorded at Tram Chim NP until 1988, but not since (ICF unpublished data). CM: frequently recorded, especially in coastal areas, with up to seven seen in a day at Bai Boi and Dat Mui. At Vo Doi, where a daily count of 15 was made in March 1988 (D.A. Scott *in litt*.), only one was seen in February 1997 but none in 1999. Two seen at U Minh Ha, February 1997.

At risk in Laos. Together with the possible decline at Vo Doi, the absence at Tram Chim NP since 1991 suggests it has declined in the delta, especially away from the coast. It has also apparently declined throughout the rest of Vietnam, as there are recent records from only a handful of sites (A. W. Tordoff *in litt*. 2003). Brahminy Kite has declined substantially in Laos where it was previously

abundant, but where the population has collapsed (Thewlis *et al*. 1998, Duckworth *et al*. 1999). It has also declined in other South-East Asian countries (Lekagul and Round 1991, van Balen *et al*. 1993).

White-bellied Sea Eagle *Haliaeetus leucogaster*

Resident. KG: regularly seen around coastal limestone outcrops on the Hon Chong peninsula, the only location for which there are records.

At risk in Laos. There are no recent Laos records, though formerly it was not rare along the southern Mekong River (Engelbach 1932). It is still found widely in suitable coastal habitat in Vietnam (A. W. Tordoff in litt. 2003).

Grey-headed Fish Eagle *Ichthyophaga ichthyaetus*

Resident. KG: Single adults (presumably the same bird) have been recorded at UMT on several occasions, and a single juvenile was recorded there in 2000 (Tordoff 2002).

Globally Near Threatened. It has declined in Laos where it is now rare (Duckworth *et al*. 1999). It was previously fairly common in the Mekong-Tonle Sap floodplain of Cambodia (Thomas and Poole 2003), but has declined and is now scarce (BirdLife International 2001). Declines have been attributed to loss of flooded forest habitat (BirdLife International 2001).

Greater Spotted Eagle *Aquila clanga*

Rare winter visitor. DT: several winter records from Tram Chim NP (ICF unpublished data). KG: one U Minh Thuong, February 1997. KG: singles at U Minh Thuong in April and August 2000 (Tordoff 2002).

Globally Vulnerable. It is described as 'little known' in Laos, where there have been few records (Duckworth *et al*. 1999). In Cambodia it is largely confined to the north-west, and appears to have declined significantly since the 1960s (BirdLife International 2001, Goes *et al*. 2001). Davidson (2001) points out that Imperial Eagle *A. heliaca* and Steppe Eagle *A. nipalensis* may also occur, and that it should not be assumed that all *Aquila* eagles are this species. The U Minh Thuong record above was of an adult, and was positively identified as *A. clanga* (RJS pers. obs.).

Oriental Darter *Anhinga melanogaster*

Mainly resident, with some local movements likely. LA: one Vinh Hung district, September 1998. DT: regularly recorded at Tram Chim NP, with 93 counted here by park staff in January 1999 (Nguyen Van Hung *in litt*. 1999) and a maximum count of 141 birds (J. Barzen *in litt.* 2002 to Tordoff 2002). One Dong Cat / Gao Giong, March 1998. TV: five Chua Hang bird sanctuary, July 1999. BT: one bird at Binh Dai in December 2000 (Tordoff 2002). AG: two Tinh Doi, April 1999; four Tra Su, April 1999 and three in the breeding colony there, July 1999. BL: two Bac Lieu bird sanctuary March 1988 (D.A. Scott *in litt*.), and one there August 1999. CM: two at Ca Mau bird sanctuary February 1997, and one in August 1999. KG:

several records of singles and pairs at U Minh Thuong between 1997 and 2001 (Safford *et al.* 1998, Tordoff 2002).

Globally Near Threatened. At risk in Laos, where it was previously widespread and numerous, but where numbers have plummeted and there have been only sporadic records recently (Duckworth *et al*. 1999). The stronghold in South-East Asia is Cambodia, where at least 300 pairs breed at Prek Toal, and it is regularly observed around the Bassac Marshes (Goes 2001, Goes and Poole 2002). There are also recent records from Boeung Prek Lapouv, Takeo province, bordering the Vietnamese part of the delta (Seng Kim Hout *et al*. 2003).

Great Cormorant *Phalacrocorax carbo*

Uncertain status. DT: there are several records from Tram Chim NP between 1988 and 1990 (ICF unpublished data).

At risk in Laos and Thailand. No confirmed records in the delta since 1990, and there are only a handful of recent winter records from northern and central Vietnam, with only two sites known to support significant wintering numbers. Conceivably, the species is extinct as a breeding bird in Vietnam (A. W. Tordoff *in litt*. 2003). There has been an apparent decline in both Laos and Thailand during the 20th century (Thewlis *et al*. 1998). The first Lao records for 60 years were made in 1998–2000 (Duckworth *et al*. 2002), where hunting may have been a factor in its decline (Duckworth *et al*. 1999). It formerly bred in Thailand, but is now only known as a non-breeding visitor (Treesucon and Round 1990).

Little Cormorant *Phalacrocorax niger*

Resident. Several large breeding colonies are found throughout the delta, the largest counts being DT: *c.* 1,000 in a colony in Tram Chim NP, March 1998. KG: 1,348 at U Minh Thuong, May 1999, 1,696 here in May 2000 and 1,541 in June 2001 (Tordoff 2002). CM: 1,500 at Ca Mau bird sanctuary, August 1999.

At risk in Laos; 1% criterion. The common *Phalacrocorax* species in the delta, found in most freshwater and coastal wetlands. It is one of the few large waterbirds that occurs in highly disturbed areas adjacent to rice fields. Ca Mau bird sanctuary and U Minh Thuong may each support 6% of the biogeographic population, and the delta as a whole over 20% (Table 2). The species has been declining in Laos since the 19th century, where it was previously common, and there are few recent records (Thewlis *et al*. 1998, Duckworth *et al*. 1999). It may also have declined in Cambodia, although there are recent regular counts of over 1,000 birds from the Bassac marshes, near Phnom Penh (Goes and Poole 2002).

Indian Cormorant *Phalacrocorax fuscicollis*

Resident, with some local movements. BL: the waterbird colony at Bac Lieu bird sanctuary supports substantial numbers of breeding individuals, with over 900 recorded here in August 1999.

At risk in Thailand; 1% criterion. Although small numbers were recorded elsewhere, this count represents by far the highest concentration in the delta, and may constitute over 3% of the global population (Table 2). In Cambodia, Little

Cormorant is the commoner species around the Bassac Marshes south of Phnom Penh, whereas Indian Cormorant is the commoner of the two around the Tonle Sap, where counts regularly surpass 4,000 birds (Goes 2001, Goes and Poole 2002).

Little Egret *Egretta garzetta*

Common resident and possibly winter visitor. Several large breeding colonies are located in the delta, e.g. TV: *c.* 1,600 Tra Cu, July 1999; 1,200 Chua Hang, July 1999; 1,500 Duyen Hai bird sanctuary, February 1999. CT: *c.* 1,000 Thoi An, July 1999. KG: 1,581 U Minh Thuong, May 1999. BL: 3,000 Bac Lieu bird sanctuary, March 1988. CM: 1,500 Ca Mau, August 1999.

1% criterion. The commonest egret in the delta, and one of the commonest large waterbirds. Counts at breeding colonies throughout the delta revealed over 10,000 individuals in 1999, representing as much as 10% of the biogeographic population (Table 2).

Chinese Egret *Egretta eulophotes*

Passage migrant and winter visitor. BT: two birds at Ba Tri in April 2000 and three in December 2000; 11 birds at Binh Dai in April 2000 and 13 in December 2000 (Tordoff 2002). CM: at least 15 were recorded at Bai Boi and Dat Mui in March 1999. Subsequently, larger numbers have been recorded in the area, including at least 83 recorded in March 2000 and 36 in December 2000 (BirdLife International 2001, Nguyen Duc Tu *in litt*. 2000).

Globally Vulnerable; 1% criterion. Access at the CM sites was difficult, and allowing for site turnover, it is likely that these are underestimates and that they support > 1% of the global population (Table 2), especially given the size of subsequent counts. It seems likely therefore that the southern Mekong Delta is of international importance as a staging post and wintering area for the species. King *et al*. (1975) only mentions peninsular Thailand and Malaysia as migration sites in South-East Asia, together with Hong Kong. Robson (2000) lists it as a 'rare to scarce passage migrant' in Cochinchina.

Grey Heron *Ardea cinerea*

Mainly a winter visitor, with some resident. Recorded in small numbers at most wetlands throughout the delta. Largest site counts were: DT: 46 Tram Chim NP, January 1997. BT: one Vam Ho, July 1999. AG: 16 Tra Su, April 1999; 12 Tinh Doi, April 1999. KG: two Hon Chong, April 1999. 20 U Minh Thuong, February 1997, and six in a breeding colony with Purple Herons, although breeding could not be confirmed (see below) in April 1999. BL: 22 Bac Lieu bird sanctuary, August 1999. CM: eight Bai Boi, March 1999; six Dat Mui, March 1999. 19 Vo Doi, August 1999.

At risk in Thailand, potentially at risk in Laos. It formerly bred in Thailand, but is now only known from migrant or wandering individuals (Treesucon and Round 1990). It is likely that a decline has occurred in Laos, as it was previously described as 'common', but has recently only been recorded in small numbers (Duckworth *et al*. 1999).

Purple Heron *Ardea purpurea*

Resident and winter visitor. Recorded in all months and most provinces, this species is found at most wetland sites other than highly disturbed areas. Large concentrations included the following: AG: 317 in the waterbird colony in a *Melaleuca* plantation at Tra Su, July 1999. KG: 75 counted in a colony in a large *Phragmites vallatoria* bed at U Minh Thuong, including breeding individuals, August 1999, and a daily maximum of 52 there in April 1999. A maximum count of 1,006 individuals was made at U Minh Thuong in May 2001 (Tordoff 2002). BL: 140 in the Bac Lieu bird sanctuary waterbird colony, August 1999.

At risk in Thailand, potentially at risk in Laos; 1% criterion. It is considered at risk in Laos for the same reason as Grey Heron (q.v.). The counts at Bac Lieu and Tra Su could represent 1.4% and 3.2% of the biogeographic population, respectively, whilst the delta as whole supported at least 6% (Table 2).

Great Egret *Casmerodius albus*

Common resident and winter visitor. Several breeding colonies were located in the delta, e.g. TV: 50 at Tra Cu, July 1999. KG: 125 at U Minh Thuong, May 1999. BL: 300 at Bac Lieu bird sanctuary, March 1988, though only 70 here August 1999. CM: 200 at Ca Mau bird sanctuary in November 1997. Other large concentrations include 40 at Bai Boi in March 1999 and 49 at Dat Mui in March 1999.

1% criterion. Over 450 individuals were recorded in the delta in 1999, representing over 4% of the biogeographic population (Table 2).

Cattle Egret *Bubulcus ibis*

Common resident and possibly winter visitor. Several large breeding colonies are located in the delta, e.g. TV: 1,200 Chua Hang July 1999. Over 1,000 Thot Not, June 1997 and March 1998. CT: *c.* 2,000 Thoi An July 1999. AG: 1,750 Tra Su April 1999. KG: 1,242 U Minh Thuong May 1999. CM: 1,000 Ca Mau August 1999.

1% criterion. One of the commonest large waterbirds in the delta. Over 10,000 individuals were recorded in total in the delta in 1999, representing as much as 10% of the biogeographic population (Table 2).

Black-crowned Night Heron *Nycticorax nycticorax*

Common resident, though largely confined to protected sites. Small numbers (<10) observed at most sites, but large concentrations recorded as follows: BT: 350 in the waterbird colony at Vam Ho, July 1999. TV: 1,600 in the waterbird colony at Tra Cu, July 1999. 1,200 in the colony/roost at Chua Hang, July 1999. AG: 280 in the colony at Tra Su, July 1999. BL: In the waterbird colony at Bac Lieu bird sanctuary, 100 in March 1988, 200 in February 1996 and 700 in August 1999. CM: 150 in the colony at Ca Mau bird sanctuary, August 1999.

Potentially at risk in Laos. It is threatened by disturbance and persecution at roost and nest sites in Laos (Duckworth *et al*. 1999).

Black Bittern *Dupetor flavicollis*

Fairly common at most freshwater sites, and apparently a resident, being recorded in all seasons.

New range information. Robson (2000) described its status in Cochinchina as 'uncertain', but it appears to be a fairly common resident, with records from all months except October and December. Thomas and Poole (2003) described it as 'uncommon and not conspicuous' in pre-1970s Cambodia.

Glossy Ibis *Plegadis falcinellus*

Although very local and generally scarce, substantial numbers have been recorded in the Mekong Delta. DT: recorded sporadically at Tram Chim NP, maximum 20 in March 1998; one Gao Giong Forest Enterprise, February 1998. TV: 300 roosting at Tra Cu bird sanctuary, February 1999. Five roosting at Chua Hang bird sanctuary in July 1999. KG: *c.* 500 recorded at U Minh Thuong in June 1997, and a maximum count of 1,391 in April 1999, in the large waterbird colony here. In April 2000, however, only 527 birds were counted (Tordoff 2002). BL: 59 roosting in Bac Lieu bird sanctuary, August 1999. CM: two coming to roost at Ca Mau bird sanctuary, August 1999.

1% criterion. The only other known Indochinese breeding site is in the Prek Toal bird colony of the Tonle Sap, Cambodia, where the population totalled only about 50 pairs in 2001 (Goes and Hong Chamnan 2002); none breed in Lao PDR or Thailand and, although it was once resident in central Myanmar, its status there is now unknown (Robson 2000). The U Minh Thuong colony is therefore of considerable regional importance, representing as much as 18% of the entire mainland South-East Asian population based on estimates in Wetlands International (2002).

Black-headed Ibis *Threskiornis melanocephalus*

Local resident. TV: 50 at Tra Cu in February and July 1999, with several nests and well-grown young in July. KG: five at U Minh Thuong in June 1997, and up to 44 in the large waterbird colony here in April 1999 (Tordoff 2002). Subsequently, maximum counts here were four in 2000 and five in 2001 (Tordoff 2002). BL: four in the colony at Bac Lieu bird sanctuary, August 1999. CM: 63 at Dat Mui, August 1999, and 30 there in December 2000 (Tordoff 2002).

Globally Near Threatened; 1% criterion. The Mekong Delta population as whole may constitute over 1% of the biogeographic population (Table 2), although it is clearly rare and has declined: Wildash (1968) described it as "very common" in southern South Vietnam. The distribution in Cambodia is centred on the Tonle Sap and Ang Tropeang Thmor in the north-west (Goes *et al*. 2001).

White-shouldered Ibis *Pseudibis davisoni*

Uncertain status. KG: a single individual was seen in an area of seasonally inundated grassland in Kien Luong district in April 1999, and a pair seen feeding in agricultural fields nearby in August of the same year.

Globally Critical. Although King *et al*. (1975) includes Cochinchina within the range of this species, and Le Dien Duc (1989) lists it as previously occurring in the Mekong Delta, these appear to be the first substantiated records for the delta, although there are records from adjacent provinces (BirdLife International 2001). The species has a very small population (such that two birds may represent more than 1% of the global population), and has undergone a decline of a scale and magnitude greater than other large waterbirds in mainland South-East Asia. The causes of the decline are not fully understood, but it has probably declined as a result of a combination of the factors that have affected other large waterbirds (disturbance from increased human activity around feeding areas, incidental killing and nest robbery, and, to a lesser degree, habitat loss. In addition, some species-specific factor(s) may be involved, such as changes in micro-habitat at pools, as a result of the collapse of wild ungulate populations and changes in livestock husbandry practices (BirdLife International 2001). In Laos and Cambodia, the species has declined dramatically; it was previously common and widespread (Duckworth *et al*. 1999, Goes *et al*. 2001, Thomas and Poole 2003).

Black-faced Spoonbill *Platalea minor*

One substantiated record. DT: a single individual amongst a group of Painted Storks *Mycteria leucocephala* just outside Tram Chim NP, in January 1994, photographed (J. C. Eames *in litt*. 2001).

Globally Endangered. Surveys in coastal areas of the delta have failed to locate the species, suggesting its occurrence here is at most sporadic (Nguyen Cu, verbally to STB, February 1999). There is however an additional record from Can Gio district, Ho Chi Minh city, just outside the Mekong Delta, in March 1996 (BirdLife International 2001). A significant number spend the winter in the Red River Delta in northern Vietnam (Pedersen and Nguyen Huy Thang 1996), and there are occasional winter records from Thailand (BirdLife International 2001).

Spot-billed Pelican *Pelecanus philippensis*

Uncommon visitor. Most recent records have been of single birds. DT: recorded at Tram Chim NP, January 1989. KG: one Ha Tien, August 1999; a group of six at U Minh Thuong, October 2000 (Tordoff 2002). CM: one captive at Ca Mau Zoo in November 1997 was said to have been captured nearby shortly before; 26 observed feeding inshore at Dat Mui in September 1993 (Tordoff 2002), and one here in August 1999.

Globally Vulnerable. Whilst this species was previously common and may have bred in the Mekong Delta (Le Dien Duc 1989) it seems now to be an uncommon visitor. Most records are in the wet season, likely involving birds that disperse from breeding sites in Cambodia in times of peak flooding (C. M. Poole verbally to STB 1999, Goes *et al*. 2001). The Tonle Sap population in Cambodia is estimated at about 3,000 birds (Goes 2001).

Painted Stork *Mycteria leucocephala*

Non-breeding visitor. DT: several records from Tram Chim NP (ICF unpublished data, RJS), including a flock of 92 in January 1994 (J.C. Eames *in litt*.). BT: nine

birds at Ba Tri in December 2000 and at least two birds at Binh Dai in December 2000 (Tordoff 2002). AG: one flying over Tra Su, January 1999. KG: one in Kien Luong district of the Ha Tien plain, August 1999; maximum count of 380 birds at U Minh Thuong in October 2000 (Tordoff 2002). CM: 46 at Dat Mui and one at nearby Bai Boi, August 1999; 50 circling between Dat Mui and Dam Doi Nature Reserve, August 1999.

Globally Near Threatened; 1% criterion. These counts indicate that the delta supports more than 1% of the biogeographic population (Table 2). Most, if not all Mekong Delta records may refer to birds dispersing in the wet season from the large breeding colonies (minimum 1,000 pairs) of the Tonle Sap, Cambodia (C. M. Poole *in litt*. 2001), and there is no recent evidence of breeding in the delta. Numbers have plummeted in Laos (Duckworth *et al*. 1999).

Asian Openbill *Anastomus oscitans*

Resident, with some local movements. DT: recorded at Tram Chim NP in 1992 (ICF unpublished data). CT: two at Hoa An, November 1997. KG: 20 at U Minh Thuong in June 1997, 79 coming into waterbird colony at dusk here in April 1999, with several seen on nests with well-grown young, and five at the same site in August 1999.

At risk in Laos. The only Laos records are presumed to involve birds dispersing from Cambodian breeding colonies (Duckworth *et al*. 1999). The maximum recorded at Prek Toal in Cambodia is 6,300 birds in 1998 (Goes 2001).

Woolly-necked Stork *Ciconia episcopus*

Resident, with some local movements. AG: two at Tinh Doi, April 1999. KG: four captive individuals in a village near Kien Luong in June 1997 were said to have been taken from nests nearby; eight in Kien Luong district of the Ha Tien plain, April 1999. Three at U Minh Thuong, February 1997 and one there in June of the same year. CM: one at Vo Doi, March 1988. One at U Minh Ha, February 1997.

At risk in Thailand and Laos. The decline in Laos has been amongst the most dramatic of all Lao birds. It was previously common and widespread, but is recently known only from a few sites in the south (Duckworth *et al*. 1999). In Cambodia, it was common throughout the Mekong-Tonle Sap area between 1859 and 1970, but by 2001 only small numbers were scattered around the margin on the Tonle Sap, and it was unclear whether the species bred there (Goes and Hong Chamnan 2002).

Black-necked Stork *Ephippiorhynchus asiaticus*

Rare visitor. DT: the most recent report seems to be three individuals at Tram Chim NP in 1995, with additional records in 1990 and 1991 from the same site (ICF, unpublished data).

Globally Near Threatened. Previously a widespread but scarce winter visitor to Laos, but there have been few records since 1996 (Duckworth *et al*. 1999). Like many of the large waterbird species, it is possible that the Mekong Delta records

were birds wandering from Cambodia. However, the Cambodian population is now very small (perhaps only 50 birds) and it no longer breeds at the Tonle Sap (Goes 2001). Robson (2000) states only that the species formerly occurred in Cochinchina, and it is considered the rarest stork in Asia (Goes 2001).

Lesser Adjutant *Leptoptilos javanicus*

Rare resident and visitor. DT: occasional individuals or small groups appear sporadically at Tram Chim NP. BT: three birds at Binh Dai in December 2000 (Tordoff 2002). KG: regularly recorded at U Minh Thuong, with small numbers (<10) apparently present all year round. CM: occasional records from Vo Doi and adjacent parts of the lower U Minh peatlands, e.g. one in the centre of U Minh Ha in February 1997.

Globally Vulnerable. U Minh Thuong is the only site where Lesser Adjutant has been regularly recorded in recent years. Local forest guards report this species breeds in the mature, semi-natural *Melaleuca* forest on the site. However, access difficulties hinder detailed exploration of this area. The species also occurs, and may nest, in U Minh Ha. Robson *et al*. (1993a) stated that the only known breeding site in Vietnam was Cat Tien National Park. In Laos, it was formerly abundant in the south and centre, but recently only small numbers have been recorded at a few sites (Duckworth *et al*. 1999). It is still taken into captivity in Laos, where there is also direct harvesting of the species (Duckworth *et al*. 1999). A minimum of 100 pairs remains around the Tonle Sap in Cambodia, and it is under threat from egg and chick collection, but population trends are unclear (Goes 2001).

Greater Adjutant *Leptoptilos dubius*

Rare visitor. DT: various reports of Greater Adjutant or Adjutant sp. have been made from Tram Chim NP since 1989, but there have been no confirmed records since (Tordoff 2002).

Globally Endangered. There is some confusion regarding records of this species, due to potential confusion with Lesser Adjutant. Additionally, there are records simply of 'Adjutant sp.' from Tram Chim NP, some of which may refer to this species. Formerly occurred regularly, and is generally believed to have bred in the Mekong Delta (Le Dien Duc 1989), but there have been no recent substantiated breeding records. Certain local people claimed to recognise Greater Adjutant from illustrations, but following closer questioning these records were not convincing as Lesser Adjutant was not eliminated. Two of the most knowledgeable and reliable informants in the U Minh region independently claimed that Greater Adjutants had not nested in the area since the 1970s. We know of no convincing reports since then, although it would not be surprising if some of the recent reports were valid, relating to birds wandering from the Tonle Sap in Cambodia, where the only remaining viable breeding colony in South-East Asia is found (Goes 2001). The species used to be common in parts of southern Laos: hunting has been the main factor in its decline there (Duckworth *et al*. 1999).

Golden-bellied Gerygone *Gerygone sulphurea*

One of the commonest passerines in the Mekong Delta, recorded in both mangrove and *Melaleuca* forest of all ages, both natural and artificial.

New range information. For such a common species it is interesting that King *et al*. (1975) only mentions an 'old breeding record' from Cochinchina, but otherwise does not include it in the known range, and that neither Tirant (1879) nor Jabouille (1932) list it. Whether the species was overlooked in the past or has recently expanded its range, perhaps helped by the proliferation of *Melaleuca* plantations in recent decades, is unclear. It is not found elsewhere in Vietnam, and there are no records yet from Cambodia, despite preliminary visits to potential areas (C. M. Poole *in litt.* 2001). It does, however, occur in coastal and southern Thailand (Robson 2000).

Large-billed Crow

Scarce resident. KG: two Ha Tien, June 1997. two U Minh Thuong, Feb 1997. CM: 10 recorded at Vo Doi in March 1988 (D.A. Scott *in litt.*), but only one here in August 1999. One between U Minh Ha and U Minh Thuong, Feb 1996.

In Laos, Duckworth *et al*. (2002) believe it is vulnerable to human pressure in various forms, and its conservation status should be reconsidered at regular intervals. It is clearly a rare bird in the Mekong Delta, and records from Vo Doi in particular suggest that it may have declined in the last decade or so.

Ashy Tailorbird *Orthotomus ruficeps*

A common species of mangrove forest of all ages throughout the delta. It also occurs locally in mature *Melaleuca* plantations inland (e.g. AG: Tra Su; CT: Thoi An).

New range information. Recorded as very common at Thu Dau Mot (north of Ho Chi Minh City, and so just outside the Mekong Delta as defined here) by Tirant (1879), but Delacour (1970) states that there have been no further records. Similarly King *et al*. (1975) does not list it for Cochinchina. There are no records from Cambodia, and preliminary visits to potential areas have not yet recorded it (C. M. Poole *in litt.* 2001).

House Sparrow *Passer domesticus*

Recent colonist. LA: a pair at the Tan Hung District People's Committee building in March 2000 was seen by N. Moores and RJS.

New range information. Not listed for Vietnam by Robson (2000). Although listed by Tirant (1879; as *Passer (domesticus) indicus*), there is some doubt about his record (Delacour 1970) and the March 2000 record is presumably the first for Vietnam. It follows the spread across Thailand into Laos, where it was first recorded at Vientiane in 1995 (Duckworth *et al*. 1999). It has also been recently recorded in Cambodia, including at Kompong Thom in April 2000 (RJS, Goes *et al*. 2001).

Baya Weaver *Ploceus philippinus*

Although many weavers go unidentified, the following records were positively attributed to this species, often based on the distinctive shape of the nests. LA: five individuals at nests, Lang Sen, July 1999. DT: 30 seen at Tram Chim NP, September 1998. Small colony located here in July 1999, but no birds seen. Four individuals and several active nests, Xeo Quyt, July 1999. TV: Duyen Hai mangroves, one seen, July 1999. KG: one nest located at U Minh Thuong, June 1997. BL: at least 50 individuals and many nests at Bac Lieu bird sanctuary, August 1999.

Potentially at risk in Laos. The few localities and low number of birds in Laos may reflect loss of habitat, trapping and persecution, and nest collection for decoration (Duckworth *et al*. 1999).

Asian Golden Weaver *Ploceus hypoxanthus*

Local resident, with local movements. Recorded at several sites in the delta. DT: 13 at Tram Chim NP, May 1999, five here in July 1999, and one nest located. AG: 13 at Tra Cu, May 1999, and 30 here in July 1999, including several nests. KG: one at U Minh Thuong, February 1997, and four in June 2000 (Tordoff 2002).

Globally Near Threatened. At Tra Cu, breeding territories were held in close proximity to those of Streaked Weaver *Ploceus manyar*, and apparent aggressive interactions were noted. It may be that the site will become unsuitable for this species as the *Melaleuca* scrub here spreads, perhaps providing a habitat more suitable to Streaked Weaver in the future. The species is under threat from habitat loss and persecution (BirdLife International 2000). In Laos it is absent from many apparently suitable sites (Duckworth *et al*. 1999).

Discussion

As would be expected from an area dominated by wetland habitats, a significant proportion (50%) of the species that have been recorded in the delta are wetland-dependent. About one third are classed as migrants to the delta, including most of the shorebirds recorded. Most of these are non-breeding visitors to Vietnam. Twenty species listed as globally threatened or Near Threatened by BirdLife International (2000) have been recorded, of which one is classed as Critical, five as Endangered, five as Vulnerable and nine as Near Threatened (see species accounts).

The passerine avifauna of the delta is relatively species poor. Most species recorded are common and widespread throughout much of Asia, and only three species of conservation concern are known to occur: Large-billed Crow, and Baya and Asian Golden Weavers (see species accounts above). Particularly common and widespread resident species included Golden-bellied Gerygone, Pied Fantail *Rhipidura javanica*, Common Iora *Aegithina tiphia*, Oriental Magpie Robin *Copsychus saularis*, Yellow-vented Bulbul *Pycnonotus goiavier*, Streak-eared Bulbul *Pycnonotus blanfordi*, Oriental White-eye *Zosterops palpebrosus* and Olive-backed Sunbird *Nectarinia jugularis*. Several winter visitors were recorded,

the commonest being Brown Shrike *Lanius cristatus*, Black Drongo *Dicrurus macrocercus* and Oriental Reed Warbler *Acrocephalus orientalis*. Wetland-dependent passerines included Oriental Reed Warbler, Black-browed Reed Warbler *Acrocephalus bistrigiceps*, Rusty-rumped Warbler *Locustella certhiola* and Zitting Cisticola *Cisticola juncidis*. Very few species typical of terrestrial forest were found: those recorded (e.g. Scarlet Minivet *Pericrocotus flammeus* and Indochinese Cuckoo-shrike *Coracina polioptera*) were restricted to mature *Melaleuca* forest (e.g. Vo Doi, U Minh Thuong), or small areas of woodland (e.g. Bac Lieu, Xeo Quyt).

Threatened species and congregations

The Mekong Delta provides habitat for a significant proportion of the regional or global population of 21 species (Table 2). Most notably, at least 40% of the population of South-East Asian Sarus Crane (race *sharpii*) spends at least part of the dry season in the delta. A significant proportion (3%) of the global population of Indian Cormorant is found at just one site. Other species for which the delta is of particular importance include Little Cormorant (up to 20% of the biogeographic population), Little Egret (10%), Cattle Egret (10%) and Glossy Ibis (up to 18%). At Bai Boi and Dat Mui up to 3.2% of the world population of the Endangered Chinese Egret and up to 0.7% of the Near Threatened Asian Dowitcher have been recorded. Allowing for the incomplete coverage of the site and likely turnover of individuals using the site, at least 1% of the population of the latter is probably supported. Over 1% of the biogeographic population of two additional Near Threatened species, Black-headed Ibis (1.3%) and Painted Stork (3.8%) are also supported.

For several other widespread species it is likely that the delta provides important habitat for significant proportions of their regional populations, even if the numbers recorded during site visits did not exceed 1% of the estimated biogeographic population. For example, the minimum estimates by Wetlands International (2002) of the South-East Asian populations of Chinese Pond Heron, Javan Pond Heron and Black Bittern are each less than 25,000, and each species is common in the wider Mekong Delta, outside the natural and semi-natural sites visited as part of these studies (authors own observations). The Mekong Delta population of each species is therefore likely to constitute > 1% of its biogeographic population.

A number of globally threatened large waterbirds are said to have occurred in the delta in the past, most notably Great-billed Heron *Ardea sumatrana*, Giant Ibis *Pseudibis gigantea*, Milky Stork *Mycteria cinerea*, White-winged Duck *Cairina scutulata* and Indian Skimmer *Rhynchops albicollis* (Le Dien Duc 1989, Wildash 1968). All are now almost certainly extinct here (if they ever occurred, although this seems plausible), whilst others that had previously been reported to have bred (e.g. Greater Adjutant and Black-necked Stork) are now only rare and occasional visitors. In all cases, populations in South-East Asia have declined considerably (BirdLife International 2001).

There are several other species whose historic status in the Vietnamese Mekong Delta is uncertain, but whose current regional status is cause for

concern. These include River Lapwing *Vanellus duvaucelii*, Black-bellied Tern *Sterna acuticauda*, White-rumped Vulture *Gyps bengalensis*, Long-billed Vulture *G. indicus*, Red-headed Vulture *Sarcogyps calvus* and Red Avadavat *Amandava amandava*. These species were all listed by Tirant (1879), but there are no recent confirmed records in the Vietnamese delta. Given the uncertainty surrounding Tirant's records few conclusions can be drawn from this, but as these species have declined elsewhere in the region (e.g. Duckworth *et al*. 1999, Treesucon and Round 1990), their apparent absence from the Vietnamese portion of the delta might suggest there have been declines to the point of extinction here. There must also be concern over status of birds in the wider countryside of the delta. Our personal observations have suggested that many species that are frequent in the wider countryside elsewhere are scarce in the delta (and in fact Vietnam as a whole), and the general scarcity of wild birds in towns and villages is striking. However, attributing causes to the apparent declines observed in any of the bird species of the delta is difficult, especially given the uncertainty surrounding pre-1988 status of almost all species. Nevertheless, some generic causes are evident as being likely factors, and some of these are outlined below.

Conservation

The Mekong Delta is the major agricultural and fisheries production zone in Vietnam. Increasing human demand for natural resources, particularly land for agriculture and aquaculture, coupled with agricultural intensification, has significantly reduced the extent of natural and semi-natural habitats in the delta. In 1986, continuing economic and environmental difficulties in Vietnam led to the adoption of a fundamental change in governance with the introduction of the *Doi Moi*, or 'renovation', policy (United Nations Development Programme/ Ministry of Planning and Investment 1999). This led to further and continuing expansion of land under cultivation, intensification of food production, and migration into the delta. Rice grown in the delta accounts for about half the total national production, and the country now stands as one of the world's leading rice-exporting nations. Fisheries production is also increasingly important as a source of foreign exchange.

This economic feat has been achieved at great environmental cost. Few areas of natural or semi-natural habitat remain in the delta that are not subject to increasing levels of human exploitation, many of which are likely to be unsustainable. For example, areas of seasonally inundated grassland, which support the last remaining populations of wild rice, are rapidly being converted to rice paddy, while poorly regulated development of aquaculture ponds has led to the widespread destruction of mangrove forests. The apparent declines in populations of several bird species in the delta described in this paper provide evidence of the impacts of such change.

Currently, the protected areas in the Mekong Delta safeguard less than 1% of the total wetland area (Buckton *et al*. 1999). Certain important habitats (most notably seasonally inundated grassland) are poorly represented in the protected area system of Vietnam. Eleven sites in the Mekong Delta have been identified as Important Bird Areas (IBAs) by BirdLife International (Tordoff 2002). The listing

of these sites as IBAs is an important step to their recognition under the protected area system in Vietnam. However, a total of sixteen different threat types are listed for these sites, the most common and severe being agricultural intensification and expansion, disturbance, aquaculture and fisheries, hunting and afforestation. Conservation recommendations have been made by Buckton *et al*. (1999), Safford *et al*. (1998) and Tran Triet *et al*. (2000), centring on enhanced protected area designation and management. These recommendations recognise the importance of sustaining human livelihoods within biodiversity conservation efforts and are dependent on sound scientific information (Dudgeon 2003, Hudson-Rodd and Shaw 2003). The data presented here not only highlight sites and species of conservation importance, but also provide a baseline against which future anthropogenic change can be assessed.

Wetland ecosystems outside protected areas in the Mekong Delta are currently widely exploited in an unsustainable way. Although their economic value is not currently quantified the contributions made by natural and semi-natural habitats would appear vital in maintaining the agricultural and aquacultural output of the Mekong Delta. For example, reserves of biodiversity can act as sinks for the highly polluted waters of the delta, thereby maintaining basic ecosystem functions (Duong Van Ni *et al.* 2001). We recommend that all wetlands in the Mekong Delta should be managed sustainably and wisely in accordance with Vietnam's obligations under the Convention on Biological Diversity and the Ramsar Convention.

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Appendix 1. Species listed by Tirant (1879) that have not been recorded in any recent survey.

Scaly-breasted Partridge *Arborophila charltonii*
Red Junglefowl *Gallus gallus*
Siamese Fireback *Lophura diardi*
Germain's Peacock Pheasant *Polyplectron germaini*
Green Peafowl *Pavo muticus*
Barred Buttonquail *Turnix suscitator*
Fulvous-breasted Woodpecker *Dendrocopos macei*
Rufous Woodpecker *Celeus brachyurus*
White-bellied Woodpecker *Dryocopus javensis*
Black-headed Woodpecker *Picus erythropygius*
Common Flameback *Dinopium javanense*
Buff-rumped Woodpecker *Meiglyptes tristis*
Great Slaty Woodpecker *Mullerpicus pulverulentus*
Red-vented Barbet *Megalaima lagrandieri*
Lineated Barbet *Megalaima lineata*
Green-eared Barbet *Megalaima faiostricta*
Blue-eared Barbet *Megalaima australis*
Oriental Pied Hornbill *Anthracoceros albirostris*
Black Hornbill *Anthracoceros malayanus*
Great Pied Hornbill *Buceros bicornis*
White-crowned Hornbill *Aceros comatus*
Wreathed Hornbill *Aceros undulatus*
Hoopoe *Upupa epops*
Scarlet-rumped Trogon *Harpactes duvaucelii*
Oriental Dwarf Kingfisher *Ceyx erithacus*
Ruddy Kingfisher *Halcyon coromanda*
Blue-bearded Bee-eater *Nyctyornis athertoni*
Blue-throated Bee-eater *Merops viridis*
Indian Cuckoo *Cuculus micropterus*
Violet Cuckoo *Chrysococcyx xanthorhynchus*
Drongo Cuckoo *Surniculus lugubris*
Black-bellied Malkoha *Phaenicophaeus diardi*
Blue-rumped Parrot *Psittinus cyanurus*
Vernal Hanging Parrot *Loriculus vernalis*
Alexandrine Parakeet *Psittacula eupatria*
Rose-ringed Parakeet *Psittacula krameri*
Blossom-headed Parakeet *Psittacula roseata*
Red-breasted Parakeet *Psittacula alexandri*
Long-tailed Parakeet *Psittacula longicauda*
Germain's Swiftlet *Collocalia germani*
Silver-backed Needletail *Hirundapus cochinchinensis*
Bay Owl *Phodilus badius*
Brown Fish Owl *Ketupa zeylonensis*
Spotted Wood Owl *Strix seloputo*
Asian Barred Owlet *Glaucidium cuculoides*
Brown Hawk Owl *Ninox scutulata*
Grey Nightjar *Caprimulgus indicus*
Savannah Nightjar *Caprimulgus affinis*
Nicobar Pigeon *Caloenas nicobarica*
Cinnamon-headed Pigeon *Treron fulvicollis*
Orange-breasted Pigeon *Treron bicincta*
Pompadour Pigeon *Treron pompadora*
Thick-billed Pigeon *Treron curvirostra*
Yellow-footed Pigeon *Treron phoenicoptera*
Yellow-vented Pigeon *Treron seimundi*
Jack Snipe *Lymnocryptes minimus*
Dunlin *Calidris alpina*
River Lapwing *Vanellus duvaucelii*
Black-bellied Tern *Sterna acuticauda*
Sooty Tern *Sterna fuscata*
Brown Noddy *Anous stolidus*
White Tern *Gygis alba*
Oriental Honey-buzzard *Pernis ptilorhynchus*
Pallas' Fish Eagle *Haliaeetus leucoryphus*
White-rumped Vulture *Gyps bengalensis*
Long-billed Vulture *Gyps indicus*
Red-headed Vulture *Sarcogyps calvus*
Short-toed Snake Eagle *Circaetus gallicus*
Chinese Sparrowhawk *Accipiter soloensis*
Besra *Accipiter virgatus*
Eurasian Sparrowhawk *Accipiter nisus*
Black Eagle *Ictinaetus malayensis*
Bonelli's Eagle *Hieraaetus fsciatus*
Collared Falconet *Microhierax caerulescens*
Kestrel *Falco tinnunculus*
Great-billed Heron *Ardea sumatrana*
Indian Pond Heron *Ardeola grayii*
Malayan Night Heron *Gorsachius melanolophus*
Giant Ibis *Pseudibis gigantea*
White Pelican *Pelecanus onocrotalus*
Streaked Shearwater *Calonectris leucomelas*
Bar-bellied Pitta *Pitta ellioti*
Hooded Pitta *Pitta sordida*
Blue-winged Pitta *Pitta moluccensis*
Black-and-Red Broadbill *Cymbirhynchus macrorhynchos*
Banded Broadbill *Eurylaimus javanicus*
Green Broadbill *Calyptomena viridis*
Asian Fairy Bluebird *Irena puella*
Blue-winged Leafbird *Chloropsis cochinchinensis*
Golden-fronted Leafbird *Chloropsis aurifrons*
Long-tailed Shrike *Lanius schach*
Eurasian Jay *Garrulus glandarius*
Ratchet-tailed Treepie *Temnurus temnurus*
Black-billed Magpie *Pica pica*
House Crow *Corvus splendens*
Ashy Woodswallow *Artamus fuscus*
Black-naped Oriole *Oriolus chinensis*
Black-hooded Oriole *Oriolus xanthornus*
Large Cuckoo-shrike *Coracina macei*
Black-winged Cuckooshrike *Coracina melaschistos*
White-throated Fantail *Rhipidura albicollis*
Crow-billed Drongo *Dicrurus annectans*
Bronzed Drongo *Dicrurus aeneus*
Spangled Drongo *Dicrurus hottentottus*
Asian Paradise Flycatcher *Terpsiphone paradisi*

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Green Iora *Aegithina viridissima*
Rufous-winged Philentoma *Philentoma pyrhopterum*
Large Woodshrike *Tephrodornis gularis*
Blue Rock Thrush *Monticola solitarius*
Orange-headed Ground Thrush *Zoothera citrina*
Grey-streaked Flycatcher *Muscicapa griseisticta*
Asian Brown Flycatcher *Muscicapa dauurica*
Ferruginous Flycatcher *Muscicapa ferruginea*
Verditer Flycatcher *Eumyias thalassina*
Blue-throated Flycatcher *Cyornis rubeculoides*
Green Cochoa *Cochoa viridis*
Asian Glossy Starling *Aplonis panayensis*
Purple-backed Starling *Sturnus sturninus*
Gold-crested Myna *Ampeliceps coronatus*
Hill Myna *Gracula religiosa*
Pacific Swallow *Hirundo tahitica*
Black-crested Bulbul *Pycnonotus melanicterus*
Red-whiskered Bulbul *Pycnonotus jocosus*
Sooty-headed Bulbul *Pycnonotus aurigaster*
Stripe-throated Bulbul *Pycnonotus finlaysoni*
Grey-eyed Bulbul *Iole propinqua*
Streaked Bulbul *Ixos everetti*
Two-barred Warbler *Phylloscopus plumbeitarsus*
Eastern Crowned Warbler *Phylloscopus coronatus*
Masked Laughingthrush *Garrulax perspicillatus*
White-crested Laughingthrush *Garrulax leucolophus*
Chestnut-winged Babbler *Stachyris erythroptera*
Scarlet-breasted Flowerpecker *Prionochilus thoracicus*
Yellow-vented Flowerpecker *Dicaeum chrysorrheum*
Orange-bellied Flowerpecker *Dicaeum trigonostigma*
Copper-throated Sunbird *Nectarinia calcostetha*
Purple Sunbird *Nectarinia asiatica*
Little Spiderhunter *Arachnothera longirostra*
Spectacled Spiderhunter *Arachnothera flavigaster*
Yellow-eared Spiderhunter *Arachnothera chrysogenys*
Grey-breasted Spiderhunter *Arachnothera affinis*
Forest Wagtail *Dendronanthus indicus*
Red Avadavat *Amandava amandava*
Java Sparrow *Lonchura oryzivora*
Chestnut Bunting *Emberiza rutila*

Appendix 2. Species recorded in the Mekong Delta, Vietnam, since 1988, giving source, provinces and months in which each species has been recorded to date, and to the authors' knowledge.

Species	Scientific name	Source	LA	TG	DT	BT	VL	TV	CT	ST	AG	KG	BL	CM	Months recorded
Chinese Francolin	*Francolinus pintadeanus*	1										x			4
Blue-breasted Quail	*Coturnix chinensis*	2										x			6
Lesser Whistling Duck	*Dendrocygna javanica*	1,2	x		x	x			x		x	x		x	1–12
Comb Duck	*Sakridornis melanotos*	1			x						x				1,4
Cotton Pygmy-goose	*Nettapus coromandelianus*	1			x						x		x	x	1,5,7–8
*Eurasian Wigeon	*Anas penelope*	3			x										1–2
*Spot-billed Duck	*Anas poecilorhyncha*	1,2	x		x				x		x	x		x	1–12
*Northern Shoveler	*Anas clypeata*	2,3			x										1–3,
*Northern Pintail	*Anas acuta*	3			x										1–3,12
Garganey	*Anas querquedula*	1,2			x						x				1–4, 12
Common Teal	*Anas crecca*	3			x										1–3,12
Small Buttonquail	*Turnix sylvatica*	2										x			6
Grey-capped Pygmy Woodpecker	*Dendrocopos canicapillus*	1										x		x	3–4
Laced Woodpecker	*Picus vittatus*	1												x	3
Greater Flameback	*Chrysocolaptes lucidus*	1												x	3,8
Coppersmith Barbet	*Megalaima haemacephala*	1						x							7
Indian Roller	*Coracias benghalensis*	1,2			x							x			2,4,6,8–9
Dollarbird	*Eurystomus orientalis*	1			x									x	1–3
Common Kingfisher	*Alcedo atthis*	1,2	x	x	x				x		x	x	x	x	1–4,8–12
Blue-eared Kingfisher	*Alcedo meninting*	2							x						3
Stork-billed Kingfisher	*Halcyon capensis*	1,2			x						x	x	x	x	1–4,6,8,11
White-throated Kingfisher	*Halcyon smyrnensis*	1,2			x				x		x	x		x	1–4,6–11
Black-capped Kingfisher	*Halcyon melanorhyncha*	1,2	x		x				x		x			x	1–5,9–12
Collared Kingfisher	*Todiramphus chloris*	1,2	x		x	x		x	x			x	x	x	1–9,11
Pied Kingfisher	*Ceryle rudis*	1,2	x		x										1–5,7, 9–10,12
Green Bee-eater	*Merops orientalis*	1,2	x		x							x	x		1–5, 9–10,12
Blue-tailed Bee-eater	*Merops philippinus*	1,2	x		x	x		x	x		x	x	x	x	1–12

Appendix 2. (Continued)

Species	Scientific name	Source	LA	TG	DT	BT	VL	TV	CT	ST	AG	KG	BL	CM	Months recorded
Chestnut-headed Bee-eater	*Merops leschenaulti*	1										x			4
Cuckoo sp.	*Cuculus* sp.	1			x						x	x			3–4
Plaintive Cuckoo	*Cacomantis merulinus*	1,2	x		x	x		x	x		x	x		x	1–10
Asian Emerald Cuckoo	*Chrysococcyx maculatus*	2			x										1
Asian Koel	*Eudynamys scolopacea*	1,2	x		x				x			x	x	x	2–4,6,8,11
Green-billed Malkoha	*Phaenicophaeus tristis*	1,2	x		x				x			x		x	2–8,11
Greater Coucal	*Centropus sinensis*	1,2	x		x	x		x	x		x	x	x	x	1–11
Lesser Coucal	*Centropus bengalensis*	1,2	x		x				x		x	x		x	1–9,11
Parakeet sp.	*Psittacula* sp.	1,2			x							x			1,6,8
Edible-nest Swiftlet	*Collocalia fuciphaga*	2										x			2
Swiftlet sp.	*Collocalia* sp.	1										x		x	2, 4
Needletail sp.	*Hirundapus* sp.	1,2							x			x		x	2,3
Asian Palm Swift	*Cypsiurus balasiensis*	1,2	x		x				x		x	x	x		4–9
Fork-tailed Swift	*Apus pacificus*	1										x			4
House Swift	*Apus affinis*	1,2			x						x	x		x	2,5–8
Grass Owl	*Tyto capensis*	1,2			x							x			7
Barn Owl	*Tyto alba*	1,2							x		x				4
Collared Scops Owl	*Otus bakkamoena*	1							x			x			4
Large-tailed Nightjar	*Caprimulgus macrurus*	1,2	x		x							x		x	1–3,5–6
Oriental Turtle Dove	*Streptopelia orientalis*	3			x										1–2
Spotted Dove	*Streptopelia chinensis*	1,2	x	x	x	x	x	x	x	x	x	x	x	x	1–10,12
Red Collared Dove	*Streptopelia tranquebarica*	1,2	x		x	x		x	x		x	x	x	x	1–10,12
Emerald Dove	*Chalcophaps indica*	1										x			8
Pink-necked Green Pigeon	*Treron vernans*	1,2	x		x				x			x	x	x	2–9
Bengal Florican E	*Houbaropsis bengalensis*	1,2			x							x			2–3,5
Sarus Crane V	*Grus antigone*	1,2			x							x			1–8,12
Slaty-breasted Rail	*Gallirallus philippensis*	1,2			x				x			x		x	2–3,6,8
White-breasted Waterhen	*Amaurornis phoenicurus*	1,2	x		x						x	x		x	1–6,8,10

Appendix 2. (Continued)

Species	Scientific name	Source	LA	TG	DT	BT	VL	TV	CT	ST	AG	KG	BL	CM	Months recorded
Baillon's Crake	*Porzana pusilla*	6			x										4
Ruddy-breasted Crake	*Porzana fusca*	1,2	x		x				x		x	x		x	1–5
*White-browed Crake	*Porzana cinerea*	6			x										4
Watercock	*Gallicrex cinerea*	1,2	x		x				x		x	x		x	1–8,10–11
Purple Swamphen	*Porphyrio porphyrio*	1,2			x				x		x	x		x	1–10
Common Moorhen	*Gallinula chloropus*	1,2	x		x						x	x		x	1–8,10–11
Common Coot	*Fulica atra*	3			x										10
Pintail Snipe	*Gallinago stenura*	1,2			x			x		x		x			1,3–4
Common Snipe	*Gallinago gallinago*	2,3			x				x			x			1–3,11
*Black-tailed Godwit	*Limosa limosa*	1,2,8			x	x		x		x		x		x	1,3,8,12
*Bar-tailed Godwit	*Limosa lapponica*	1												x	3,8
Whimbrel	*Numenius phaeopus*	1,5		x				x						x	2–3,7–8
Eurasian Curlew	*Numenius arquata*	1, 5								x				x	3,8
*Eastern Curlew NT	*Numenius madagascariensis*	1,8				x		x						x	3–4,8,12
*Spotted Redshank	*Tringa erythropus*	2	x		x										3
Common Redshank	*Tringa totanus*	1,2,5			x			x		x		x		x	1–3,7–8
Marsh Sandpiper	*Tringa stagnatilis*	1,2,5			x			x		x			x	x	1–3,8,12
Common Greenshank	*Tringa nebularia*	1,2, 5		x	x			x	x	x		x	x	x	1–4, 6–8,11–12
Spotted Greenshank E	*Tringa guttifer*	8				x		x							7,12
Green Sandpiper	*Tringa ochropus*	1,2			x				x				x		2–3
Wood Sandpiper	*Tringa glareola*	1,2	x		x			x	x	x	x	x	x	x	1–4, 7–9,11–12
Terek Sandpiper	*Xenus cinereus*	1												x	3
Common Sandpiper	*Actitis hypoleucos*	1,2,5	x	x	x			x		x		x	x	x	1–3,8,11
Grey-tailed Tattler	*Heteroscelus brevipes*	1								x				x	8
*Ruddy Turnstone	*Arenaria interpres*	1,5												x	8
*Asian Dowitcher NT	*Limnodromus semipalmatus*	1,8				x		x		x				x	3–4,8,12
Spoon-billed Sandpiper V	*Calidris pygmeus*	8				x									12
Red-necked Stint	*Calidris ruficollis*	2,5						x					x	x	3

Appendix 2. (Continued)

Species	Scientific name	Source	LA	TG	DT	BT	VL	TV	CT	ST	AG	KG	BL	CM	Months recorded
Temminck's Stint	*Calidris temminckii*	2											x		3
Curlew Sandpiper	*Calidris ferruginea*	1,2,5			x			x		x			x	x	1,3,8
Broad-billed Sandpiper	*Limicola falcinellus*	2											x		3
Greater Painted-snipe	*Rostratula benghalensis*	1,2			x							x			1,3,5–6
Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	1,2			x						x	x		x	1–5,12
Bronze-winged Jacana	*Metopodius indicus*	1,2			x				x			x		x	1–9
Black-winged Stilt	*Himantopus himantopus*	1,2			x				x		x	x		x	1–8,11–12
Pacific Golden Plover	*Pluvialis fulva*	1,2,5			x			x		x			x	x	1–3,8
Grey Plover	*Pluvialis squatarola*	1,5		x										x	2–3,8
Little Ringed Plover	*Pluvialis dubius*	2,5	x		x			x	x			x			1–3,9,11
Malaysian Plover NT	*Charadrius peronii*	8				x									4,12
Kentish Plover	*Charadrius alexandrinus*	1,2,5,8			x	x		x	x	x			x		1,3,7,11–12
Lesser Sand Plover	*Charadrius mongolicus*	1,2,5						x		x		x	x	x	2–3,7–8
Greater Sand Plover	*Charadrius leschenaultii.*	1,2,8		x		x		x		x			x	x	3–4,8,12
Grey-headed Lapwing	*Vanellus cinereus*	1,2			x				x					x	1–3,12
Red-wattled Lapwing	*Vanellus indicus*	1,2	x		x							x			1–8,9,12
Oriental Pratincole	*Glareola maldivarum*	1,2	x		x				x	x	x	x		x	1–9
*Small Pratincole	*Glareola lactea*	4			x										1
Brown-headed Gull	*Larus brunnicephalus*	1,2												x	3
Gull-billed Tern	*Gelochelidon nilotica*	1,2,5											x	x	3
Caspian Tern	*Sterna caspia*	1,2,5										x	x	x	3,6,7
Great Crested Tern	*Sterna bergii*	1										x		x	3–4
Black-naped Tern	*Sterna sumatrana*	1,2										x			6,8
*Common Tern	*Sterna hirundo*	1,2										x		x	2,7–8
Whiskered Tern	*Chlidonias hybridus*	1,2,5			x							x	x	x	1–3,9–10
*White-winged Tern	*Chlidonias leucopterus*	1,2										x	x		3–4
Osprey	*Pandion haliaetus*	1,2,5	x									x		x	1–3,6,8,11
Black Baza	*Aviceda leuphotes*	2,3	x		x				x					x	1–3,11
Black-shouldered Kite	*Elanus caeruleus*	1,2	x	x	x				x		x	x	x	x	1–10,12
Black Kite	*Milvus migrans*	1,2										x		x	2,3

Appendix 2. (Continued)

Species	Scientific name	Source	LA	TG	DT	BT	VL	TV	CT	ST	AG	KG	BL	CM	Months recorded
Brahminy Kite	*Haliastur indus*	1,2			x							x		x	1–3,6,8
White-bellied Sea-eagle	*Haliaeetus leucogaster*	1,2										x			6,8
Grey-headed Fish-Eagle NT	*Ichthyophaga ichthyaetus*	8										x			10
Crested Serpent Eagle	*Spilornis cheela*	1,2										x		x	1–4,11
Eastern Marsh Harrier	*Circus spilonotus*	1,2			x				x		x	x		x	1–4,10–12
Pied Harrier	*Circus melanoleucos*	2,3			x									x	1–3,10,12
Shikra	*Accipiter badius*	1,2			x									x	1–3,11–12
Japanese Sparrowhawk	*Accipiter gularis*	1,2									x		x		3,4
Rufous-winged Buzzard	*Butastur liventer*	2							x						3
Grey-faced Buzzard	*Butastur indicus*	1							x					x	3
*Common Buzzard	*Buteo buteo*	3			x										1–3
Greater Spotted Eagle V	*Aquila clanga*	2,8			x							x		x	1–4
Changeable Hawk-Eagle	*Spizaetus cirrhatus*	1	x								x	x			4
*Amur Falcon	*Falco amurensis*	3			x										10
*Peregrine Falcon	*Falco peregrinus*	1,2			x							x		x	3–4
*Little Grebe	*Tachybaptus ruficollis*	1,2	x		x						x	x		x	1–10,12
Oriental Darter NT	*Anhinga melanogaster*	1,2,8	x		x	x					x	x	x	x	1–9,12
Little Cormorant	*Phalacrocorax niger*	1,2	x	x	x	x		x	x		x	x	x	x	1–12
Indian Cormorant	*Phalacrocorax fuscicollis*	1,2			x						x		x	x	2–3,7–8
Great Cormorant	*Phalacrocorax carbo*	3			x										1–2
Little Egret	*Egretta garzetta*	1,2	x	x	x	x		x	x		x	x	x	x	1–12
*Chinese Egret V	*Egretta eulophotes*	1,8				x				x				x	3–4,12
Pacific Reef Egret	*Egretta sacra*	1,5				x									7
Grey Heron	*Ardea cinerea*	1,2			x	x					x	x	x	x	1–12
Purple Heron	*Ardea purpurea*	1,2,8	x	x	x			x	x		x	x	x	x	1–12
Great Egret	*Casmerodius albus*	1,2,8	x	x	x	x		x	x		x	x	x	x	1–12
Intermediate Egret	*Mesophoyx intermedia*	1,2			x							x	x		1–12
Cattle Egret	*Bubulcus ibis*	1,2	x		x	x		x	x		x	x	x	x	1–11
*Chinese Pond Heron	*Ardeola bacchus*	1,2	x		x				x		x	x	x	x	3–5
Javan Pond Heron	*Ardeola speciosa*	1,2,5			x	x		x			x	x	x	x	3–8
Little Heron	*Butorides striatus*	1,2	x		x			x			x	x	x	x	1–10

Appendix 2. (Continued)

Species	Scientific name	Source	LA	TG	DT	BT	VL	TV	CT	ST	AG	KG	BL	CM	Months recorded
Black-crowned Night Heron	*Nycticorax nycticorax*	1,2		x	x	x		x	x		x	x	x	x	2–4,6–8,11
Yellow Bittern	*Ixobrychus sinensis*	1,2	x		x				x		x	x	x	x	1–10,12
Cinnamon Bittern	*Ixobrychus cinnamomeus*	1,2	x		x	x			x		x	x		x	1–12
Black Bittern	*Dupetor flavicollis*	1,2	x		x				x		x	x	x	x	2–9,11
Glossy Ibis	*Plegadis falcinellus*	1,2,8			x			x				x	x	x	1–8,12
Black-headed Ibis NT	*Threskiornis melanocephalus*	1,2,8			x			x		x		x	x	x	2–8,12
White-shouldered Ibis C	*Pseudibis davisoni*	1										x			4,8
Black-faced Spoonbill E	*Platalea minor*	4			x										1
*Spot-billed Pelican V	*Pelecanus philippensis*	1,2,8			x							x		x	1,8–11
Painted Stork NT	*Mycteria leucocephala*	1,2,5,8			x	x					x	x		x	1–3,7–8,10–12
Asian Openbill	*Anastomus oscitans*	1,2			x				x			x			3–4,6,8,11
Woolly-necked Stork	*Ciconia episcopus*	1,2									x	x		x	2–4,6
Black-necked Stork NT	*Ephippiorhynchus asiaticus*	3			x										3
Lesser Adjutant V	*Leptoptilos javanicus*	1,2,8			x	x						x			1–4,5–8,12
Greater Adjutant E	*Leptoptilos dubius*	3,8			x										3,12
*Lesser Frigatebird	*Fregata ariel*	7												x	9
Frigatebird sp.	*Fregata* sp.	1										x			4
*Golden-bellied Gerygone	*Gerygone sulphurea*	1,2	x	x	x	x	x	x	x	x	x	x	x	x	1–9,11–12
*Tiger Shrike	*Lanius tigrinus*	3			x										3,5
Brown Shrike	*Lanius cristatus*	1,2	x	x	x				x		x	x	x	x	1–5,9,10,12
Racket-tailed Treepie	*Crypsirina temia*	1,2	x		x	x		x	x		x	x	x	x	2–9,11
Large-billed Crow	*Corvus macrorhynchos*	1,2										x		x	2–3,6,8
Slender-billed / Black-naped Oriole	*Oriolus chinensis / tenuirostris*	3			x										1
Indochinese Cuckoo-shrike	*Coracina polioptera*	1,2			x							x		x	2–5
Ashy Minivet	*Pericrocotus divaricatus*	2												x	2
Small Minivet	*Pericrocotus cinnamomeus*	1,2										x		x	1–2,8
Scarlet Minivet	*Pericrocotus flammeus*	1,2										x		x	2–4
Bar-winged Flycatcher-shrike	*Hemipus picatus*	2												x	1–2

Appendix 2. (Continued)

Species	Scientific name	Source	LA	TG	DT	BT	VL	TV	CT	ST	AG	KG	BL	CM	Months recorded
Pied Fantail	*Rhipidura javanica*	1,2	x	x	x	x	x	x	x	x	x	x	x	x	1–11
Black Drongo	*Dicrurus macrocercus*	1,2	x		x				x		x	x	x	x	1–6,9–12
Ashy Drongo	*Dicrurus leucophaeus*	1,2												x	2–4,8
Spangled Drongo	*Dicrurus hottentottus*	2,3			x										9
Greater Racket-tailed Drongo	*Dicrurus paradiseus*	1,2										x		x	2–4,8
Black-naped Monarch	*Hypothymis azurea*	2												x	11
Common Iora	*Aegithina tiphia*	1.2	x	x	x	x	x	x	x	x	x	x	x	x	1–9,11
Common Woodshrike	*Tephrodornis pondicerianus*	3			x										3
Red-throated Flycatcher	*Ficedula parva*	2,5			x							x		x	3–4,11
*Bluethroat	*Luscinia svecica*	2			x										1–3
Oriental Magpie Robin	*Copsychus saularis*	1,2	x	x	x	x	x	x	x	x	x	x	x	x	1–9
White-rumped Shama	*Copsychus malabaricus*	1											x		8
Common Stonechat	*Saxicola torquata*	1,2			x				x			x		x	1–4,11–12
Pied Bushchat	*Saxicola caprata*	1,2	x		x				x			x			1–12
Grey Bushchat	*Saxicola ferrea*	3			x										1
Chestnut-tailed Starling	*Sturnus malabaricus*	1,2			x				x		x	x		x	2–4,7–8
White-shouldered Starling	*Sturnus chinensis*	1,2	x					x					x		2–3
Black-collared Starling	*Sturnus nigricollis*	1,2										x	x	x	2–4,6,8,11
Vinous-breasted Starling	*Sturnus burmannicus*	1,2	x		x							x			3,5,7–8
*Common Myna	*Acridotheres tristris*	1,2						x			x	x	x	x	2–4,6–8
White-vented Myna	*Acridotheres cinereus*	1				x		x				x	x	x	2–4,7–8
Great Tit	*Parus major*	1						x						x	7
Pale/Sand Martin	*Riparia diluta/riparia*	1,2	x		x				x		x	x		x	1–5
Barn Swallow	*Hirundo rustica*	1,2	x	x	x	x	x	x	x	x	x	x	x	x	1–12
Red-rumped Swallow	*Hirundo daurica*	1,2	x		x				x		x	x	x	x	1–5
House Martin sp.	*Delichon* sp.	3			x										1
Yellow-vented Bulbul	*Pycnonotus goiavier*	1,2	x	x	x	x	x	x	x	x	x	x	x	x	2–9,11
Streak-eared Bulbul	*Pycnonotus blanfordi*	1,2	x		x				x		x	x	?	x	2–8,10
*Zitting Cisticola	*Cisticola juncidis*	1,2	x		x				x		x	x	x	x	1–9,11–12
*Bright-headed Cisticola	*Cisticola exilis*	2										x			6

Appendix 2. (Continued)

Species	Scientific name	Source	LA	TG	DT	BT	VL	TV	CT	ST	AG	KG	BL	CM	Months recorded
Rufescent Prinia	*Prinia rufescens*	1			x								x		7–8
Yellow-bellied Prinia	*Prinia subflava*	1,2	x	x	x	x			x			x	x	x	2–3,5–8
Plain Prinia	*Prinia inornata*	1,2	x	x	x	x	x	x	x	x	x	x	x	x	1–12
Oriental White-eye	*Zosterops palpebrosus*	1,2	x	x	x	x		x	x		x	x	x	x	1–8
Lanceolated Warbler	*Locustella lanceolata*	1,2			x				x			x		x	1–5
*Rusty-rumped Warbler	*Locustella certhiola*	1,2			x				x		x	x		x	2–5
*Black-browed Reed Warbler	*Acrocephalus bistrigiceps*	1,2	x		x				x		x	x		x	1–5,10–11
Oriental Reed Warbler	*Acrocephalus orientalis*	1,2,5	x		x				x		x	x	x	x	1–5,10–11
Thick-billed Warbler	*Acrocephalus aedon*	1,2			x				x						3
Common Tailorbird	*Orthotomus sutorius*	1,2	x		x			x	x		x	x	x	x	1–8,11
Dark-necked Tailorbird	*Orthotomus atrogularis*	1	x		x							x		x	5,7–8
*Ashy Tailorbird	*Orthotomus ruficeps*	1,2				x		x	x		x			x	2–4,7–8,11
Dusky Warbler	*Phylloscopus fuscatus*	1,2,5			x								x	x	1,3–4
Yellow-browed Warbler	*Phylloscopus inornatus*	1,2			x				x			x		x	1–3,11
Arctic Warbler	*Phylloscopus borealis*	3			x										1,10
*Pale-legged Leaf Warbler	*Phylloscopus tenellipes*	1									x				4
Striated Grassbird	*Megalurus palustris*	1,2	x	x	x				x		x	x		x	1–12
Puff-throated Babbler	*Pellorneum ruficeps*	1				x			x					x	7–8
Striped Tit-babbler	*Macronous gularis*	1,2	x		x			x				x		x	2–8,11
Chestnut-capped Babbler	*Timalia pileata*	1,2							x			x		x	2–4,6–8
Singing Bush Lark	*Mirafra javanica*	2										x			6
Rufous-winged Bush Lark	*Mirafra assamica*	1,2										x			6,8
Oriental Skylark	*Alauda gulgula*	1,2			x				x			x		x	1–6,8,11–12
Scarlet-backed Flowerpecker	*Dicaeum cruentatum*	1,2	x		x			x	x			x		x	2–5,7–9,11
Brown-throated Sunbird	*Anthreptes malacensis*	1,2	x		x				x					x	1–3,5,7–8
Ruby-cheeked Sunbird	*Anthreptes singalensis*	2										x		x	2–3
Purple-throated Sunbird	*Nectarinia sperata*	1,2									x	x		x	2–4,8
Olive-backed Sunbird	*Nectarinia jugularis*	1,2	x	x	x	x	x	x	x	x	x	x	x	x	1–11
Plain-backed Sparrow	*Passer flaveolus*	1,2,5	x		x				x		x	x		x	1–9,11

Appendix 2. (Continued)

Species	Scientific name	Source	LA	TG	DT	BT	VL	TV	CT	ST	AG	KG	BL	CM	Months recorded
Eurasian Tree Sparrow	*Passer montanus*	1,2	x	x	x	x	x	x	x	x	x	x	x	x	1–9
*House Sparrow	*Passer domesticus*	2			x										3
White Wagtail	*Motacilla alba*	3			x										1–3,5,9–10
*Citrine Wagtail	*Motacilla citreola*	3			x										3
Yellow Wagtail	*Motacilla flava*	1,2	x		x							x	x	x	1–5,9
Grey Wagtail	*Motacilla cinerea*	1			x							x		x	1–3,8,12
Richards' Pipit	*Anthus richardi*	1,2			x									x	3,8
Paddyfield Pipit	*Anthus rufulus*	1,2	x		x	x					x	x			1–8
Olive-backed Pipit	*Anthus hodgsoni*	3			x										1,10
Red-throated Pipit	*Anthus cervinus*	2,3			x										1,3
Streaked Weaver	*Ploceus manyar*	1,2			x				x		x		x		1,3–5,7
Baya Weaver	*Ploceus philippinus*	1,2	x		x			x				x	x		6–9
Asian Golden Weaver NT	*Ploceus hypoxanthus*	1,2,8			x						x	x			2,4–7
White-rumped Munia	*Lonchura striata*	1,2			x				x			x		x	1,3–8
Scaly-breasted Munia	*Lonchura punctulata*	1,2	x		x				x		x	x		x	1–6,8
Black-headed Munia	*Lonchura malacca*	1,2			x			x			x	x		x	1–10
Yellow-breasted Bunting	*Emberiza aureola*	1,2			x							x		x	2–4

*species that were not included by King *et al*. (1975) for Cochinchina, but that were included in Robson (2000). Provinces: LA = Long An, TG = Tien Giang, DT = Dong Thap, BT = Ben Tre, VL = Vinh Long, TV = Tra Vinh, CT = Can Tho, ST = Soc Trang, AG = An Giang, KG = Kien Giang, BL = Bac Lieu, CM = Ca Mau. Major sources: 1 = Buckton *et al*. (1999) and S.T. Buckton (unpublished data); 2 = Safford *et al*. 1998, Tran Triet *et al*. 2000 and R.J. Safford (unpublished data); 3 = International Crane Foundation (unpublished data); 4 = J.C. Eames (unpublished data); 5 = Robson *et al*. (1993a and b); 6 = Photographic evidence from Tram Chim National Park staff; 7 = Eames (1996); 8 = Tordoff (2002).