

Recent waterbird surveys in Cambodia

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This paper presents the findings of a ground survey of waterbirds undertaken in January 1996 by Wetlands International - Asia Pacific at two prospective Ramsar sites in Cambodia: Boeng Chhma on the Tonle Sap, and Koh Kong on the coast. Four other coastal, and three inland, sites were also surveyed. Koh Kong was confirmed as an internationally important site, with high numbers of waders including important numbers of Nordmann's Greenshank *Tringa guttifer* and Broad-billed Sandpiper *Limicola falcinellus*. Boeng Chhma was also confirmed as an internationally important site, with White-winged Duck *Cairina scutulata*, Spot-billed Pelican *Pelecanus philippensis*, Grey-headed Fish Eagle *Ichthyaetus ichthyaeus* and Oriental Darter *Anhinga melanogaster* being present. One other site, Bassac Marshes, was also identified as having international importance for its numbers of Black-winged Stilts *Himantopus himantopus*. Other sites were noted as being of more national importance.

BACKGROUND AND PREVIOUS SURVEYS

Two decades of civil war have prevented any major wildlife surveys from being undertaken in Cambodia. Although Khmer Rouge guerrillas still operate particularly in the north and west of the country, since the UN brokered elections in 1992, internal security has steadily improved and several surveys have since been completed. In March and December 1992, two brief aerial surveys of the Tonle Sap and its surrounding inundated forests and of the Mekong-Bassac region were undertaken to search for breeding Sarus Cranes *Grus antigone* (Archibald 1992, Scott 1992). In 1993 a brief series of counts were conducted in the forests surrounding Angkor (Salter 1993) near the northern end of the Tonle Sap, and a more detailed set of observations were made incidental to UN observer tasks at the southern end of Tonle Sap between April and June (Carr 1993).

These surveys showed clearly that Cambodia's wetlands held large numbers of large waterbirds, including several globally threatened species such as Greater Adjutant *Leptoptilos dubius*, Lesser Adjutant *L. javanicus* and Spot-billed Pelican *Pelecanus philippensis*. In March-April 1994, a survey was undertaken for the IUCN Species Survival Commission specifically to locate important sites for large waterbirds (Mundkur *et al.* 1995) and, concurrently, to identify wetlands of international importance for possible designation under the Ramsar Convention at the time of Cambodia's accession (Davies 1994). Aerial surveys were flown over the entire shoreline of the Tonle Sap (particularly the eastern area around Boeng Chhma), the entire length of the Mekong River and some of the adjoining forests, and most of the coastline from Kampot to the Thai border. Boat and ground surveys were made to various parts of Tonle Sap, including Boeng Chhma, the Mekong River and its tributaries, a variety of wetlands in the floodplain of the Mekong, and two sites on the coast — Stung Kâmpông Smach and Kampot saltworks. This survey resulted in confirmation of Cambodia's importance for large waterbirds with Spot-billed Pelican,

Oriental Darter *Anhinga melanogaster*, seven species of storks (Milky *Mycteria cinerea*, Painted *M. leucocephala*, Asian Openbill *Anastomus oscitans*, Woolly-necked *Ciconia episcopus*, Black-necked *Ephippiorhynchus asiaticus*, and Greater and Lesser Adjutants), and Black-headed Ibis *Threskiornis melanocephalus* and Glossy Ibis *Plegadis falcinellus* all present.

Data from these surveys, and information from maps and aerial photography, were used to identify prospective sites for designation under the Ramsar Convention, which Cambodia has recently acceded to. Three such sites were identified, Koh Kong on the coast, Boeng Chhma on the eastern shore of Tonle Sap and Stung Treng on the northern part of the Mekong River (Davies 1994).

Aims

In January 1996, Wetlands International - Asia Pacific undertook a ground survey of waterbirds as part of their Cambodia Programme. Its aims were sixfold, namely to:

- i. provide ground observations on the birds of the two prospective Ramsar sites where the security situation allowed such surveys: Koh Kong and Boeng Chhma.
- ii. corroborate (or otherwise) the importance of the prospective Ramsar sites.
- iii. provide ground observations on the birds from as much of the coast as the security situation would allow.
- iv. provide ground observations on the birds of other inland wetland sites as the security situation would allow.
- v. identify the principal threats to the wetland areas and recommend appropriate protection measures.
- vi. continue with the training of counterparts from the Ministry of Environment and Wildlife Protection Office of the Forest Department, Ministry of Agriculture, in wetland assessment and waterbird field survey techniques.

This paper provides a summary of the findings.

METHODS

Identification of study sites

Of the three candidate Ramsar sites identified by Davies (1994) in Cambodia, two were considered by the Cambodian Government as being secure enough for ground survey — Koh Kong, and Boeng Chhma on the Tonle Sap. These were given priority within the survey and consequently were allocated four days and three days, respectively, including travel time.

Other coastal sites were originally deemed as the next priority. The coast of Cambodia, although relatively short in comparison to that of its neighbours (Vietnam and Thailand) still amounts to 435 km, too much to survey in the three weeks available to the survey. Therefore, five coastal sites, excluding Koh Kong, were selected by reference to topographical maps (1:50,000), aerial photographs, and information from previous surveys. These comprised bays and inlets where mangrove habitat was present, since such muddy areas usually support the bulk of a country's wader population. One of the key sites, for which three days were allocated, was the northern part of Chhâk Kâmpông Saôm. Unfortunately, on arrival at the town of Srê Ambel that was to serve as a base, the level of Khymer Rouge activity was such that with nearby firefights and patrols, it was decided to abandon the survey of this area.

Other inland wetlands were selected largely on the basis of pragmatism, i.e. they were located close to Phnom Penh and could be visited by part of the survey team during returns to the capital to change counterparts, transport, and pick-up supplies. A second visit to Boeng Véal Samnap was made possible when a

day became spare on abandoning the survey of Chhâk Kâmpông Saôm.

The location of all sites is shown in Figure 1.

Survey methods

The surveys were undertaken between 14 January and 4 February 1996. During this time, the survey team moved between key towns or villages and made one or more day trips to wetland sites in the vicinity of each. Coastal surveys were carried out by one of three methods: (i) use of a large fishing boat to travel about 1 km offshore with a smaller boat to go close inshore to areas perceived as of interest; (ii) use of small, narrow, shallow-draft traditional inshore fishing boats with outboard motors up to 15 hp to travel close to the shoreline; and (iii) use of small, shallow-draft fibreglass speedboats with larger outboard motors of 30-50 hp.

Of these methods, the third one was the most effective at combining maximum area coverage with best accessibility. However, it also cost the most. Counts were made either from a moving boat or, where concentrations were found, from standing in the shallows. Counts were made using 10x40B binoculars and a 20-60x60 telescope mounted on a tripod. Records were made either by two persons taking notes simultaneously or by one person using a hand-held tape recorder with same-day transcription.

At inland sites, surveys were carried out from small local fishing boats, powered by a variety of engines, or once by punt. Counts were made solely from the boat, almost exclusively using binoculars. Records were made as above.

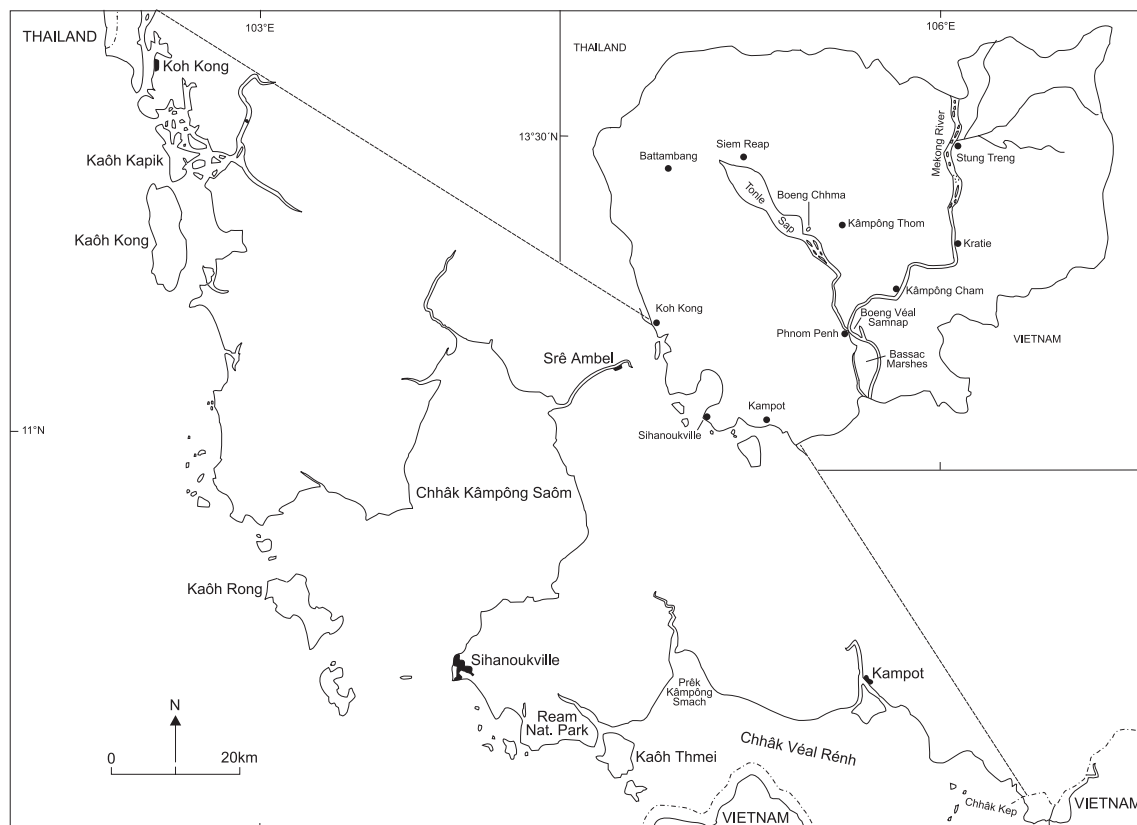


Figure 1. Location of survey sites within Cambodia and along coast. (Scale applies only to expanded map of coast).

Constraints

Coastal

The key constraint on the coastal bird survey proved to be the tide. In the northern Gulf of Thailand, there is a single diurnal tidal cycle. During January, the daylight hours coincide largely with high tide, the ebb tide not beginning until mid-afternoon at the earliest, and most mudflats at the sites visited did not begin to become exposed until late afternoon. The earliest was about 15h00 at Koh Kong late in the month. Since security in Cambodia remains a major issue, it was not possible to remain counting much after about 30-60 minutes before dusk, depending upon the distance from base. Thus, the true picture regarding the number of birds using various coastal sites could not be revealed, and most counts remain significant underestimates. Although high tide roosts were looked for in an effort to counter this, there were such extensive marshlands behind the mangrove systems, and in many cases so much mangrove habitat remaining above high water, that no high tide roosts were located – the birds were almost certainly using the marshes or remaining dispersed and unseen in the mangroves.

Inland

The major constraint at inland sites was the water level of the wetlands. Although some 3-4 months into the dry season, the water level at many sites remained too high for many of the large waterbirds, notably storks. At Boeng Chhma, for example, a local reported that the water level still had about 5-6 m to fall before reaching its lowest level in April and May – when the 1994 survey located many storks (Mundkur *et al.* 1995).

At all sites, April remains the key time to survey for birds, since it is during the dry season and the northward migration of birds; also low tides coincide with daylight hours, and inland water levels are near their lowest.

Future surveys of the sites covered here would do well to concentrate on this time of year, although coastal sites could be surveyed in August and September during the southward migration when low tide again coincides with daylight hours.

RESULTS

POTENTIAL RAMSAR SITES

Koh Kong

Area surveyed

An initial survey of a large area of this convoluted coastline with its abundant alluvial islands was carried out on 28 January 1996 between Koh Kong town and the northern end of Kaôh Kong. Extensive stands of mature mangrove forest were present with some trees exceeding 25 m in height, and in certain areas there were large mudflats. Although mostly covered by the tide at the time of survey, few of these mudflats appear likely to support many birds because of the high sand content and luxuriant growth of sea grasses. On the western shore of Kaôh Kapik, there were well-developed mudflats that had much higher silt content, particularly in the south near the village of Kaôh Kapik itself. This western shore supported the only large flocks of waterbirds, mainly waders, in the area, and so the survey

concentrated on this 10 km stretch. Counts were made for about three hours a day on an ebb tide over three days (28-30 January) each covering different adjacent sections of this western shore. The three counts were summed to arrive at estimated totals for the western shore of Kaôh Kapik.

Birds

In contrast to certain other coastal sites, there were no Brahminy Kites *Haliastur indus* and very few egrets were encountered.

The western shore of Kaôh Kapik supported almost all of the 3,787 waterbirds counted at this site. This was the largest number encountered at any site during the survey (Appendix). Two species occurred in internationally important numbers (i.e. exceeding 1% of the flyway population): thirteen Nordmann's Greenshank *Tringa guttifer*, an Endangered species (Collar *et al.* 1994), were counted over the three days, constituting the first record for Cambodia, and the fifth largest number encountered at any site to date (300 in Bangladesh in winter 1988/89; estimated total of 98-135 in South Korea, May 1988; 58 in Hong Kong spring 1993; 21 in Sumatra, no date; 11 in Thailand, no date (Collar *et al.* 1994). About 190 Broad-billed Sandpipers *Limicola falcinellus* were present along this section of coast, although the total may have been higher, given that 218 sandpipers remained unidentified. This is only the second record and the largest number for Cambodia, the first sighting having been made earlier in the survey, at Kampot.

Six other species occurred in numbers which exceeded the criteria for birds staging at a site, enabling that site to qualify as part of the new East Asia/Australasian Shorebird Reserve Network. These were: Bar-tailed Godwit *Limosa lapponica* (526 cf. criterion of 300); Lesser Sand Plover *Charadrius mongolus* (466+ cf. 250); Greater Sand Plover *C. leschenaultii* (448+ cf. 248); Terek Sandpiper *Xenus cinereus* (136 cf. 90); Common Greenshank *Tringa nebularia* (129 cf. 100); and Grey Plover *Pluvialis squatarola* (97 cf. 63).

In each case, except for Common Greenshank, these are the highest numbers recorded within Cambodia. For Terek Sandpiper, this was the only site on the survey from which this species was recorded. Similarly, for both Asian Dowitcher *Limnodromus semipalmatus* and Ruff *Philomachus pugnax*, this was the only record of each from this survey and, for the former, a near-threatened species (Collar *et al.* 1994), only the second record for Cambodia. The previous record was of 34 from Prêk Kâmpông Smach in 1994 (Mundkur *et al.* 1995).

In addition to waders, a small number of terns and Brown-headed Gulls *Larus brunnicephalus* were observed. Of note amongst the four species of tern present were five Lesser Crested Terns *Sterna bengalensis* — the first record for Cambodia and Indo-China.

Conclusion

This is the most important coastal site yet surveyed in Cambodia. The extent, health, and maturity of the mangrove and *Melaleuca* communities probably make this the best representative of these habitats remaining within the Gulf of Thailand. As such, the site is of international importance and rightly deserves its candidate Ramsar status. From the ornithological

standpoint, it appears to hold the largest concentration and diversity of waders in the country. This includes internationally important numbers of Nordmann's Greenshank and Broad-billed Sandpiper. Additionally, on the basis of the numbers of six other species counted during this survey, the site has been added to the East Asia/Australasian Shorebird Reserve Network launched at the Ramsar Conference in Brisbane Australia on 26 March 1996. Further surveys are needed, preferably during migration periods when, coincidentally, the low tide occurs during daylight hours, and should be included in any follow-up work programme. If possible, the site should become the first in Cambodia to be counted regularly as part of the Asian Waterbird Census.

However, of particular concern is the extensive logging of the mature mangrove forests at this site. Although much of the area is currently protected under the Royal Decree, *The Creation and Designation of Protected Areas*, as the Péam Krasop Wildlife Sanctuary, and is bounded to the south by Botum-Sakor National Park, the area is under severe threat from felling for charcoal with 200 illegal kilns known to be present within the boundaries of the Wildlife Sanctuary. In addition, a few prawn ponds have also been created. At the time of the survey, the Ministry of Environment had six protection officers present within the Wildlife Sanctuary, but lacked the funds to provide the transport necessary for them to carry out effective law enforcement. This poses one of the most serious conservation problems in Cambodia.

Boeng Chhma

Area surveyed

Boeng Chhma is a 4,000 ha permanent freshwater lake on the north-eastern shore of the Tonle Sap, surrounded by a maze of river and creek systems and their associated marshes and inundated forests. Detailed accounts of the vegetation are given in Davies (1994). The area possible to survey was restricted by security considerations, as the land to the north and east of Boeng Chhma was largely under the control of Khymer Rouge guerrillas. Thus, survey work was confined to the creek system to the south and south-west of the lake on 25 January 1996, and the south-eastern corner of the lake itself on 26 January 1996. The area surveyed was divided into 15 sections using obvious landmarks, and birds were counted separately in each section. Where sections were visited more than once, the maximum count was used for each species in that section. Counts were then totalled over the different sections to arrive at estimated totals for the area surveyed (Appendix).

Birds

The most important finding at this site was the rediscovery in Cambodia of the White-winged Duck *Cairina scutulata*, classified as Endangered (Collar *et al.* 1994). Possibly as many as six birds were observed, all on 25 January 1996. Two males and a female were seen flying NNE over the channel Prêk Ânlung Ta Ao towards Boeng Chhma at a height of about 30 m during mid-morning. Later, a single female was flushed from along Prêk Piêm Bang to the west, while in the late afternoon a pair was flushed from a secluded dead-end creek east of Phum Ânlung Sândan, south-east of the first two sightings. White-winged Duck is known from several sites

in Thailand (Parr *et al.* 1994) and was recently rediscovered in Vietnam (Robson *et al.* 1993) and the Lao PDR (Duckworth *et al.* 1993), but was not observed in Cambodia during any of the 1990s' surveys (Archibald 1992, Scott 1992, Carr 1993, Salter 1993). The species had been reported as occurring in the vicinity by local people during the 1994 survey (Mundkur *et al.* 1995), but these records constitute the first confirmed sightings in the country since the early 1960s, when Thomas (1964) noted it as 'apparently less uncommon than the Indian Comb Duck *Sarkidiornis melanotus*, particularly in the coastal provinces'.

Other globally threatened or near-threatened species (Collar *et al.* 1994) encountered at Boeng Chhma included:

- Spot-billed Pelicans: at least five – one circling over the river just east of Piêm Bang on 25 January and four thermalling over the southern part of Boeng Chhma itself during the morning of 26 January. Additionally, there were another eight pelicans swimming on the centre of Boeng Chhma simultaneous with the latter record, but they were too far away to be properly identified. At least three looked much paler than the rest and could have been Great White Pelicans *Pelecanus onocrotalus*. The total, however, is markedly less than the 125 counted here on 7 April 1994 (Mundkur *et al.* 1995) but this was probably due to seasonally different water levels;
- Oriental Darter: at least 19 – three along Prêk Ânlung Ta Ao and five along Prêk Piêm Bang on the morning of 25 January and at least 11 along the southern and south-eastern shores of Boeng Chhma on 26 January; and
- Grey-headed Fish Eagle *Ichthyophaga ichthyaetus*: two – one adult along the river about 1 km east of Piêm Bang on the evening of 25 January and a sub-adult in the same vicinity but slightly further north in the early morning of 26 January.

In marked contrast to the 1994 survey (Mundkur *et al.* 1995), no storks were observed. This is undoubtedly because in January the flood waters of the Tonle Sap have not receded sufficiently for habitat suitable for storks to have been uncovered. In January 1996, the local people thought that the water was still 5–6 m above its lowest point. In contrast, the numbers of Lesser Whistling-ducks *Dendrocygna javanica* and of herons, especially white egrets was far higher on this survey (558 cf. 191 and 944 cf. 495 respectively). In particular, large numbers (about 600) were present feeding from perches in the trees along the southern shore of Boeng Chhma on 26 January and feeding in the marshes along the south-eastern shore. A flock of seven Glossy Ibises flying over the river south-east of Phum Saaôt were the only ibis encountered at this site.

Conclusion

Boeng Chhma is clearly one of the most important inland wetland sites in Cambodia. The unique habitat of the surrounding inundated forest, dominated by *Barringtonia* spp., and the presence of at least seven globally threatened bird species (total from 1994 and 1996 surveys) confirm its candidacy as a Ramsar site. While it is protected under the Multiple-use Area designation conferred on the Tonle Sap and its

surroundings through the Royal Decree, *The Creation and Designation of Protected Areas* dated 1 November 1993, it has been suggested that extra protection should be afforded to Boeng Chhma through the designation *Strict Nature Reserve* outlined in Article 18 of the 1993 draft sub-decree entitled *Policy, Organization and Administration of a National Protected Areas System* as soon as the sub-decree is adopted (Edwards 1995). Such designation would remove the commercial fishing pressure currently administered through a series of fishing lots covering the lake and its surroundings, bid for by auction biennially, and likely to be the biggest threat to the site's well-being.

OTHER INLAND SITES

Tonle Sap

Area surveyed

A transect of the Tonle Sap was made during both boat crossings between Phum Kâmpông Loûng on the southern shore and Piêm Bang on the northern shore near Boeng Chhma, a distance of about 18 km. The northbound crossing was made on 24 January between 15h25 and 16h30 (65 minutes) and the southbound crossing on the 26 January between 12h05 and 13h30 (85 minutes). In both cases, it was assumed that the boat was travelling at a constant speed during the journey between the mouths of each river, although that speed was different between the two journeys. Counts were made in 5 minute periods from the front of the boat of all birds within about 200 m either side. Care was taken to avoid double-counting wherever possible, but while this undoubtedly occurred, the systematic approach was thought to provide good estimates.

Birds

Three species of bird were encountered. A total of 1,332 Whiskered Terns *Chlidonias hybridus* were counted on the northward crossing. They were fairly evenly distributed across the lake with the exception of a large concentration in the 4 km nearest the southern shore. Most of these were feeding, and it may be that in this area the concentration of human and fishing detritus provides rich pickings. On the southward crossing, 381 Whiskered Terns were counted, again with a slight bias towards the southern part of the lake. However, during this count what was most noticeable was that, with the exception of two birds, all were flying strongly in a south-easterly direction as if some diurnal or seasonal migration might have been underway.

The other two species were observed only on the northward crossing about 1 km south of Piêm Bang. A flock of 140 Brown-headed Gulls was feeding in the shallows east of the navigation channel into the village. Of much greater significance was a single Great White Pelican swimming about 500 m east of the navigation channel. This is the first record of this species in Cambodia since the early 1960s when Thomas (1964) noted it as 'Apparently confined to the Great Lake [Tonle Sap] and the coastal region, where it is common along the coast in inlets'. Mundkur *et al.* (1995) considered its continued presence in Cambodia as 'doubtful' since it 'has become very rare or extinct in the rest of Southeast Asia'. An unconfirmed report of a

flock of 4-6 Great White Pelicans with a single Lesser Adjutant in February or March 1995 flying over Fishing Lot #2 on the Tonle Sap near Kompong Thom was made (verbally) by Nicolaas P. van Zalinge, a fisheries biologist working with the Mekong River Commission.

Conclusion

Little of substance can be drawn from these results. The Tonle Sap is clearly important for Whiskered Terns, those counted during the two crossings probably being only a small part of the total numbers present. Apart from the above results, a large number of Whiskered Terns and unidentified terns (but probably Whiskered) were encountered resting on mudflats on the northern shore of Tonle Sap at the river mouth south of Phum Saaôt. Thus, not surprisingly, waterbirds appear to be more concentrated along the shores than near the middle of the lake. The northern shore appears to be more important, probably because it is less disturbed. The presence of Great White Pelican should be investigated further when improved security along the northern shore and associated marshes allows.

Boeng Véal Samnap

Area surveyed

Boeng Véal Samnap is a permanent lake close to Phnom Penh that becomes flooded from the Mekong River during the wet season and thus is surrounded by extensive marshlands. Beyond this is agricultural land, mainly rice but also rushes cultivated for a company making furniture. The marshes comprise various grasses and sedges, while other emergent species and rafts of floating vegetation cover extensive areas of the lake. Within the marshes, large areas were being taken over by *Mimosa pigrosa*, to the detriment of other vegetation. Two surveys were made — the first of about four hours in the morning of 16 January 1996, the second of about seven hours in the morning and early afternoon of 3 February 1996. Although different areas were visited on the two surveys, the departure point was the same for both and, between visits, the water level had fallen by just over 1 m and the edge of the lake had receded by about 100 m. The first survey concentrated on the south-western part of the lake where birds were abundant in the marshes but where there were far fewer on the open water. The second survey concentrated on the marshes and pools along the eastern shore. The area north of Kh Barông was not visited.

Birds

Large numbers of birds were present during the two surveys (Appendix). Whiskered Terns were abundant and numbers had to be estimated. White egrets were also abundant, and while counted more accurately, most were too distant to identify to species, although about half were thought to be Great Egrets *Casmerodius albus*, which would be the second highest number recorded after Boeng Chhma. As well as large numbers of herons, Boeng Véal Samnap held the widest variety of herons of any site surveyed with 10 out of the 12 species encountered being present. Large numbers of Purple Swampheens *Porphyrio porphyrio* were present on the floating vegetation and at the edge of the marshes, particularly towards the south-western end — the

highest count at any site. Large numbers of Little Cormorants *Phalacrocorax niger* were present in the north-eastern end of the marsh — with the exception of one bird at Boeng Chhma, the only place they were encountered during the entire survey. Their numbers here may be considerably higher — a large flock of dark birds numbering at least 1,000 individuals was seen in the far distance flying low over the trees at the edge of the north-eastern end of the marsh during the late morning of 3 February. Because of the great distance and intense heat-haze, they could be identified only tentatively as cormorant sp., and even though they were searched for, they could not be found again.

A number of other species were notable at this site. Seven Spot-billed Pelicans was the highest definite count from any site — a flock of five on the 16 January comprising three adults and two immatures (probably last year's young) raises interesting questions about breeding sites. Local people did not know of any nests. A flock of nine Glossy Ibises flying south-east over the marshes on 3 February was the largest number seen during the survey. In the easternmost point of the marsh, 10 River Terns *Sterna aurantia* was the only record of the species during the survey. A flock of about 20 Garganey *Anas querquedula* feeding in the eastern part of the marshes were the only ones encountered during the survey, and nine Spot-billed Ducks *A. poecilorhyncha* was the highest total from the two sites where it occurred — considerably fewer than in the 1994 survey (Mundkur *et al.* 1995).

Conclusion

This is an important floodplain wetland with a wide diversity of birds, some of which are present in large numbers. It may also be an important breeding site for some species, e.g. egrets and cormorants. Further surveys should be carried out during the beginning of the wet season when egrets are believed to breed, and when the water level should be at its lowest and habitat available to storks and waders; and also at the start of the dry season when Little Cormorants breed and the water level would be at its highest.

The site has great potential for conservation awareness and education programmes because of its proximity to Phnom Penh. It could provide for eco-tourism since the area is secure and access to the site from the city is relatively quick, cheap and easy. Local villagers could supplement their income as guides and boatmen. Boeng Véal Samnap should be considered for protection under the suggested long-term development of a regionally important reserve network (Edwards 1995). There are problems with the wetland, however. Local people voiced their concern, unbidden, over the deterioration in the fish catch and in the number of birds present. They complained that poison, introduced deliberately as an illegal fishing method by non-local people was the main cause.

Bassac Marshes

Area surveyed

The Bassac Marshes form an extensive area of seasonally-inundated herbaceous, shrub and savannah swamp (Davies 1994) lying between the Mekong and Bassac Rivers, south of Phnom Penh. The marsh is

interlaced by narrow channels and wider pools of open water with a rich flora of floating and submerged macrophytes, the water all flowing very slowly in a generally southward direction. Around the edges of the marsh, the land is extensively cultivated for rice and vegetables. The survey was conducted around Phum Prék Dach during the morning and early afternoon of 23 January 1996 from a narrow, hand-punted boat.

Birds

Birds were not particularly numerous on the marshes, but a good variety was present (Appendix). The numbers of Whiskered Terns and white egrets were surprisingly low, and the most numerous bird was Indian Cormorant *Phalacrocorax fuscicollis*. Purple Swampphen was also notable by its near absence, and although Watercock *Gallixrex cinerea* was not seen, several were heard calling, making this the only site at which their presence was definitely noted. The most important finding was the presence of 80 Black-winged Stilts *Himantopus himantopus*. This is very close to the criterion for international importance, and easily exceeds the staging criterion (25) necessary for the site to qualify as part of the new East Asia/Australasian Shorebird Reserve Network. It is also the highest number counted from any site in Cambodia to date.

Apart from Black-winged Stilts, a number of other waders inhabiting freshwater habitats occurred here, the only site on the survey where they were encountered, including four Grey-headed Lapwings *Vanellus cinereus*, a near-threatened species (Collar *et al.* 1994); also Wood Sandpiper *Tringa glareola*, Common Snipe *Gallinago gallinago*, Black-tailed Godwit *Limosa limosa*, Red-wattled Lapwing *Vanellus indicus* and Little Ringed Plover *Charadrius dubius*.

A number of other species were notable at this site: Pheasant-tailed Jacanas *Hydrophasianus chirurgus* were much in evidence, a total of 24 counted being the highest at any site on the survey, and the more secretive Bronze-winged Jacana *Metopidius indicus* was also present; Yellow Bittern *Ixobrychus sinensis* was also comparatively common, five being the largest count made, and a Black Bittern *Dupetor flavicollis* was one of only two encountered during the survey; four Common Moorhens *Gallinula chloropus* represented the highest number at any site; a single Little Tern *Sterna albifrons* was the only one recorded during the survey.

Conclusion

The extent of the Bassac Marshes suggests that they are likely to be of great importance for waterbirds. The presence of large numbers of Black-winged Stilts in the small area surveyed suggests that the site should be of international importance for this species. Certainly it qualifies for inclusion in the East Asia/Australasian Shorebird Reserve Network. While no large species were present during this or the 1994 survey (Mundkur *et al.* 1995), on both occasions locals reported that pelicans (presumably Spot-billed) used the site during the period of flood. Oriental Darters, a near-threatened (sub)species (Collar *et al.* 1994), were seen in 1994 around Prasat Tuyo (Mundkur *et al.* 1995). Albeit in small numbers, this survey located a wide variety of species here that were not found elsewhere, and larger numbers may be expected elsewhere in the marshes.

Further systematic survey of the entire site during both wet and dry seasons should be a priority for any future work programme.

Phum Véal Rénh Marsh

Area surveyed

A freshwater marsh and reedbed, amounting to at least 200 ha, lies on either side of Highway 3, 1–3 km east of Phum Véal Rénh, and then merges into rice fields which extend to the bridge over Prêk Kâmpông Smach. The site was surveyed from the road, mainly from the viewpoints afforded by the two bridges over the creeks, at 1.25 km and 2 km east of the village, on the evening of 19 January and in the morning of 21 January 1996. Because the same area was counted twice, the maximum of the two counts for each species was taken rather than combining them. In practice, this resulted in only the records from the second day's survey being used (Appendix).

Birds

Most of the birds present were herons, notably white egrets, but only 15 species of waterbird were recorded, including two species of raptor. Two species were notable: Great-billed Heron *Ardea sumatrana* — a single bird represented the only one encountered during the survey; and Eastern Marsh Harrier *Circus aeruginosus pilonotus* — a single immature male hunting over the marsh on both occasions was also the only one encountered during the survey.

Conclusion

This site, while holding a number of interesting species, is probably at most of provincial importance.

Phnom Penh Airport

One casual record involved c. 220 Common Redshanks *Tringa totanus* and 50 Common Greenshanks feeding in a pool alongside the taxiway at Phnom Penh Airport on 27 January 1996.

OTHER COASTAL SITES

Kampot and Kep

Area surveyed

Sections of the coast between the estuary of the Prêk Kâmpông Bay (Kampot River) and the Vietnamese border, including part of Kaôh Tûnsay were surveyed between 18 and 19 January 1996, using a large fishing vessel and small boats to access interesting-looking areas. The area comprised a number of stretches of mangrove in varying states of health, interspersed with long sandy beaches. Generally, the sandy areas were not surveyed, but those areas scanned from <500 m offshore showed no birds present. The mangrove ranged from being healthy, but fairly young, to recently felled areas. The latter were mostly being converted into salt pans.

Birds

Counts were made at high tide but no high tide roosts were found. The Appendix gives the number of birds

observed. On the 18 January 1996 counts were made by walking through abandoned salt lagoons where mangrove was recolonizing. Trees were no higher than about 1.5 m. Waders were feeding and roosting in small numbers amongst these, with very few using the active saltworks on the landward side. Greater and Lesser Sand Plovers, Whimbrel *Numenius phaeopus* and Common Redshank predominated and, while a total of 124 waders of 12 species is definitely an underestimate, this section of coast does not appear to be important for waders at this time of year. A small number of egrets were feeding while wading in the shallows on the seaward shore of the mangroves.

On the 19 January 1996 counts were made from a small boat, of a narrow band of mud along the seaward edge of a healthy stand of mature mangroves, and of a number of sand and mud banks at the mouth of the Prêk Kâmpông Kândal. Whimbrel and Eurasian Curlew *Numenius arquata* predominated amongst the nine species of waders identified and, also of note, were 24 Broad-billed Sandpipers, which represented the first record of this species for Cambodia. A flock of terns totalling 127 birds was the largest number observed during the survey, and included 101 Caspian Terns *Sterna caspia*, the largest recorded single-site count for the species in Cambodia.

Conclusion

No significant numbers of waterbirds were found between Kampot and the Vietnamese border. A total of 280 waders from approximately 22 km of coastline is very low, although the 16 species observed represents modest diversity. Although the survey definitely underestimated the number of waterbirds present, it does appear that during this time of year this section of coast is of low importance for them. It is probable that some of the mudflats in the area hold higher numbers during migration periods.

Prêk Kâmpông Smach

Area surveyed

The eastern shore of Prêk Kâmpông Smach was surveyed from small fishing boats on 20 January 1996, northwards from Phum Trâpeàng Rôpôu #1 to the point where the river narrows sharply, near Phum Boeng Chhuk on the western bank. North of this, the river is narrow enough that both shores can be surveyed together, and this was done as far as the road bridge of Highway 3 at Phum Kâmpông Smach Thom. The eastern shore comprised healthy stands of mature mangroves with little sign of cutting, but the associated mudflats could not be assessed because it was high tide at the time of the survey. North along the narrower part of Prêk Kâmpông Smach, the mangroves became a narrow fringe along the river, particularly on the western bank, with frequent large scale clearance for agriculture. The centre of this part of the river comprised mudflats, becoming exposed early on the ebb tide, which had once been cultivated for rice production. This had been possible because of the large quantities of freshwater flowing down river during the wet season. Although now abandoned, the habitat proved to be very attractive to waders.

Birds

Counts were made along the eastern shore at high tide, but no high tide roosts were located. Few birds were encountered here — a few Great Egrets wading in the shallows along the front of the mangrove, several Caspian Terns resting on wooden posts, and occasional Brahminy Kites and an Osprey *Pandion haliaetus* flying over the water. The Appendix gives the numbers of birds observed.

While only 410 waders were counted, all of them along the abandoned rice cultivations on the mudflats becoming exposed during the early stages of an ebb tide, this represented the second largest number of waders encountered at any of the 10 sites surveyed. The moderately large numbers of Common Redshank and Common Greenshank, and smaller numbers of Pacific Golden Plover *Pluvialis fulva* and Marsh Sandpiper *Tringa stagnatilis* all represented the highest numbers of each of these species encountered during the survey. In a small undisturbed side channel, about 2 km due south of the highway bridge, large numbers of white egrets and pond herons *Ardeola* were found feeding, including the largest number of Little Egrets *Egretta garzetta* located at any site on the survey. At the same place, a flock of 42 Great Crested Terns *Sterna bergii*, roosting on a mudflat, was similarly the largest number counted during the survey.

Conclusion

Prêk Kâmpông Smach is clearly an important coastal wetland both in Cambodian and international terms. Previous surveys, notably in 1994 (Mundkur *et al.* 1995), recorded several globally threatened species mainly along the western shore, including Greater and Lesser Adjutants, Milky Stork, Asian Openbill and Asian Dowitcher. Limitations on time, a single ebb tide only close to evening, and the associated security implications of surveying along this shore at that time of day, meant that no additional bird data could be collected from that shore during this survey. However, observations by telescope revealed an undisturbed shore of very large, mature mangroves that would be expected to have productive mudflats associated with them. Similarly, the eastern shore had healthy mangroves, and large numbers of waders and other waterbirds could be expected to feed on these mudflats at low tide if the indications from further upstream are anything to go on. Although the present survey adds only a little to our knowledge of the site, mainly in the form of higher numbers of common species, it does highlight its potential. Further surveys of Prêk Kâmpông Smach, preferably during migration periods when coincidentally the low tide occurs during daylight hours, should be viewed as a priority in any follow-up work programme.

Preah Sihanouk (Ream) National Park

Area surveyed

The north-eastern shore of the estuary Prêk Toek Sap in Preah Sihanouk National Park and the adjacent shore to the east of Phum Srê Cham were surveyed from small fishing boats on 21 January 1996. The north-eastern shore of Prêk Toek Sap supported healthy stands of mature mangroves with some localized clearance, mainly around security posts, while the opposite bank had been

cleared more extensively. Further east, the mangrove was accreting rapidly and six years' annual recruitment of *Avicennia* could be seen in the layered seaward edge. The remaining coastline comprised sandy and rocky shores backed by *Casuarina* trees and partially-logged lowland forest. These shores are of little value for waterbirds. Again, an accurate assessment of the mudflats and associated birds could not be made because of high tide at the time of survey.

Birds

Counts were made along the north-eastern shore of Prêk Toek Sap at high tide, but no high tide roosts were located. Few birds were present here, mostly several Great Egrets in the shallows, but large numbers of Brahminy Kites and the only White-bellied Sea Eagles *Haliaeetus leucogaster* of the survey were hunting over the water. The Appendix gives the number of birds observed. At the north-western end of Prêk Toek Sap, at the early stages of the ebb tide, over 100 white egrets had congregated to feed in the shallows and on the gradually uncovering mudflats. Pond herons were notable by their absence. At the easternmost point of the coast, where it turns north into Chhâk Véal Rénh, a flock of about 300 waders was roosting right up against the mangroves, but the distance, fading light, and remaining heat haze made identification impossible. Great Egrets were present along this section of coast as well. A flock of 17 Common Terns *Sterna hirundo* at the north-western end of Prêk Toek Sap was the largest number located during the survey and is the highest count in Cambodia to date.

In addition, another survey of the Park's northern island (Kaôh Thmei) and of Prêk Toek Sap was made as part of another project, on 14 October 1995. Birds seen during that survey included two Painted Storks flying east over Prêk Toek Sap, which were the only ones recorded on either survey; four White-bellied Sea Eagles was the highest recorded number; and a single Gull-billed Tern *Gelochelidon nilotica* flying over Prêk Toek Sap was the only one recorded on either survey.

Conclusion

Preah Sihanouk National Park is of limited importance as a coastal wetland within a Cambodian context. The mangrove areas along Prêk Toek Sap are healthy and fairly extensive, but do not appear to have any large mudflats associated with them. The most productive area for waterbirds appears to be the rapidly accreting coast east of Phum Srê Cham. Given the perceived importance of Prêk Kâmpông Smach, the section of coast between it and this headland on the edge of Preah Sihanouk National Park should be another priority for further survey at low tide.

Prêk Kâmpông Saôm

Area surveyed

Three areas in the northern part of Chhâk Kâmpông Saôm were intended for survey: the marshes and mudflats at the mouths of the main rivers flowing into the bay, namely the Prêk Kâmpông Saôm near Srê Ambel; the Stoeng Doh near Phum Chméat/Prêk Thnung; and the Stoeng Ta Ak/Stoeng Kol on the western side of the bay. In the event, the level of Khymer

Rouge activity around the northern end of the Bay restricted survey work to a very brief visit to the mudflats at the mouth of the Prêk Kâmpông Saôm and the tidal sandbanks within the river between the coast and Srê Ambel. The extensive area of lakes and marshland north of the river also could not be visited. The survey was conducted during the late afternoon of 31 January 1996, from small boats and by standing in the shallows. The mud/sandflat to the south of the river held very few birds since large numbers of people were collecting shellfish from it at the time of survey. The coast either side of the river, and the river banks and islands within it, were fringed with mangrove, but this was badly degraded in places and rice fields were present in places.

Birds

This site held the fewest birds of any site surveyed, although this may well have been due to human disturbance and the fact that only a small area of mudflat had begun to be exposed on the early ebb tide (see Appendix). Most of the sand plovers and all of the Common Greenshanks were feeding on the sandbanks in the river channel. The total of 84 Whimbrel, mainly on the mudflat north of the river mouth was the largest number located during the survey.

Conclusion

This site, and the associated wetlands around the northern end of Chhâk Kâmpông Saôm, appear to be potentially very good for waterbirds. Although the 1994 aerial survey did not locate any large waterbirds at any of the three sites (Mundkur *et al.* 1995), the area is apparently little disturbed and the habitat appears good. Unfortunately, the poor timing of the tidal cycle and bad security situation during this survey meant that little new information could be gathered. Although the security situation may not improve for some time, these sites should be a priority for survey when it does.

FURTHER SURVEYS

Several sites held significant species or numbers of birds (Table 1). Some, which while not of international importance in their own right, either suggest that further surveys would be fruitful or, when combined with previous survey results, confirm a national or international status. Table 1 summarizes the importance of those sites surveyed for waterbirds and gives a suggested priority rating for further survey.

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Table 1 : Summary of survey findings and recommendations for further surveys

Site	Dates of 1996 survey	Main habitats surveyed	Significant bird species	Importance for waterbirds	Priority for further survey
Koh Kong	28-30 January	Coastal mudflats; mature mangroves around creek and islet system.	Internationally important numbers of Nordmann's Greenshank and Broad-billed Sandpiper. High numbers of six other waders. Variety of terns inc. Lesser Crested.	☉☉☉	★★
Boeng Chhma	25-26 January	Permanent open lake, maze of creek systems, inundated forest, savannah.	White-winged Duck, Spot-billed Pelican, Oriental Darter, Grey-headed Fish Eagle. Large numbers of egrets.	☉☉☉	★★★
Boeng Véal Samnap	16 January & 3 February	Permanent floodplain lake with rafts of floating vegetation, surrounded by seasonally inundated marsh.	Spot-billed Pelican, Glossy Ibis, large numbers of egrets, cormorants, terns and Purple Swamphen.	☉☉	★★
Bassac Marshes	23 January	Seasonally inundated marsh, creeks choked with floating and emergent vegetation.	Important numbers of Black-winged Stilt, variety of freshwater waders.	☉☉☉	★★★
Phum Véal Rénh	19 & 21 January	Permanent marsh and reedbeds.	Medium numbers of egrets, Great-billed Heron.	☉	
Kampot and Chhâk Kep	18-19 January	Coastal mudflats, mangroves, saltpans.	Good variety of waders but in small numbers, high number of Caspian Terns.	☉	★
Prêk Kâmpông Smach	20 January	Coastal and riverine mangroves, <i>Melaleuca</i> , riverine mudbanks, abandoned rice fields.	Moderate numbers of herons and waders.	☉☉☉ (based on 1994 survey)	★★★
Preah Sihanouk (Ream) National Park	21 January	Coastal and riverine mangroves and mudbanks.	White-bellied Sea Eagle. Moderate numbers of egrets and waders.	☉	
Chhâk Kâmpông Saôm	31 January	Coastal and riverine mangroves, riverine sand/mudbanks.	Small number of waders.	☉ (projected)	★★★

Importance: ☉☉☉ = international; ☉☉ = national; ☉ = provincial
Further survey: ★★★ = priority; ★★ = high; ★ = low

A brief explanation of the above ratings follows:

Koh Kong: clearly an internationally important site; further survey work will add to knowledge about it but will not alter its status.

Boeng Chhma: clearly an internationally important site; further survey work could add much to the ecological knowledge of this complex and difficult-to-survey site.

Boeng Véal Samnap: probably of national importance; further survey work would provide information from other times of the year and would help in establishing conservation programmes there.

Bassac Marshes: probably of international importance at least for Black-winged Stilt; the size of the site means further systematic surveys need to be undertaken to establish its real importance.

Phum Véal Rénh: surveyed in 1994 and 1996; no waterbirds of any great significance, no further surveys required imminently.

Kampot and Chhâk Kep: seemingly of little importance; surveys during migration periods may reveal more.

Prêk Kâmpông Smach: from 1994 survey appears to be of international importance on account of Greater Adjutant not recorded in this survey; further surveys urgently required to establish level of use by threatened species and significance at migration times.

Preah Sihanouk National Park: of limited importance for waterbirds; well-surveyed already, no further surveys required imminently.

Chhâk Kâmpông Saôm: likely to be of at least national importance; security considerations mitigated against survey, further surveys should be a priority once security improves.

	Koh Kong	Boeng Chhma	Tonle Sap	Boeng Véal Sannap	Bassac Marshes	Phnum Véal Rénh Marsh	Phnom Penh Airport	Kampot and Chhák Kep	Prék Kámpông Smach	Ream Nat. Park	Prék Kámpông Saóm	Total birds
Wood sandpiper <i>Tringa glareola</i>					10							10
Terek Sandpiper <i>Xenus cinereus</i>	136											136
Common Sandpiper <i>Actitis hypoleucos</i>	1							8				9
Ruddy Turnstone <i>Arenaria interpres</i>								3				3
Asian Dowitcher <i>Limnodromus semipalmatus</i>	16											16
Red-necked stint <i>Calidris ruficollis</i>	6							1				7
Curlew Sandpiper <i>Calidris ferruginea</i>	180							12				192
Broad-billed Sandpiper <i>Limicola falcinellus</i>	190							24				214
UNIDENTIFIED SANDPIPER	218											218
Ruff <i>Philomachus pugnax</i>	27											27
Pheasant-tailed Jacana <i>Hydrophasianus chirurgus</i>		2		19	24							45
Bronze-winged Jacana <i>Metopidius indicus</i>		3			1							4
Black-winged Stilt <i>Himantopus himantopus</i>				4	80	13		3				100
Pacific Golden Plover <i>Pluvialis fulva</i>	15							1	19			35
Grey Plover <i>Pluvialis squatarola</i>	97							9		2		108
Little Ringed Plover <i>Charadrius dubius</i>					1							1
Lesser Sand Plover <i>Charadrius mongolus</i>	466							17			6	489
Greater Sand Plover <i>Charadrius leschenaultii</i>	448							24			45	517
UNIDENTIFIED SAND PLOVERS	667										86	753
Grey-headed Lapwing <i>Vanellus cinereus</i>	2	4							6			
Red-wattled Lapwing <i>Vanellus indicus</i>					1							1
UNIDENTIFIED WADERS	394							19	5	300	9	300
TOTAL WADERS	3,649	5	0	26	138	33	275	280	410	318	257	5,391

	Koh Kong	Boeng Chhma	Tonle Sap	Boeng Veal Sannap	Bassac Marshes	Phnum Veal Rénh Marsh	Phnom Penh Airport	Kampot and Chhák Kep	Prék Kámpóng Smach	Ream Nat. Park	Prék Kámpóng Saôm	Total birds
Brown-headed Gull <i>Larus brunnicephalus</i>	23	22	140									185
Caspian Tern <i>Sterna caspia</i>	10			4				106	12			132
River Tern <i>Sterna aurantia</i>				10								10
Lesser Crested Tern <i>Sterna bengalensis</i>	5											5
Great Crested Tern <i>Sterna bergii</i>	17							5	42			64
Common Tern <i>Sterna hirundo</i>	1	3		10				12		17		43
Little Tern <i>Sterna albifrons</i>					1							1
Whiskered Tern <i>Chlidonias hybridus</i>	2	380	1,332	850	54							2,618
UNIDENTIFIED TERNS		670						9				679
Osprey <i>Pandion haliaetus</i>	1			2					1		2	6
Brahminy Kite <i>Haliaeetus indus</i>		28			1	3			6	15	8	61
White-bellied Sea Eagle <i>Haliaeetus leucogaster</i>										2		2
Grey-headed Fish Eagle <i>Ichthyaelus ichthyaelus</i>		2										2
Eastern Marsh Harrier <i>Circus aeruginosus spilonotus</i>						1						1
Little Grebe <i>Tachybaptus ruficollis</i>				22	18							40
Oriental Darter <i>Anhinga melanogaster</i>		19		1								20
LITTLE CORMORANT <i>Phalacrocorax niger</i>		1		232								233
INDIAN CORMORANT <i>Phalacrocorax fuscicollis</i>		113		100	103							316
GREAT CORMORANT <i>Phalacrocorax carbo</i>		35										35
Little Egret <i>Egretta garzetta</i>	1	156		6		13		41	187	6	2	412
Grey Heron <i>Ardea cinerea</i>	1	20		3	1	1		3	1			30
GREAT-BILLED HERON <i>Ardea sumatrana</i>						1						1
PURPLE HERON <i>Ardea purpurea</i>		11		14		4		2				31
Great Egret <i>Casmerodius albus</i>	3	140		1	3	57		10	46	17		277
Intermediate Egret <i>Mesophoyx intermedia</i>		20		8	9	3		6	10	12		68
Cattle Egret <i>Bubulcus ibis</i>				8		11		25				44
UNIDENTIFIED WHITE EGRETS		628		650		160		10	33	107	4	1,592

	Koh Kong	Boeng Chhma	Tonle Sap	Boeng Véal Samnap	Bassac Marshes	Phnum Véal Rénh Marsh	Phnom Penh Airport	Kampot and Chhák Kep	Prék Kámpông Smach	Ream Nat. Park	Prék Kámpông Saôm	Total birds
Chinese/Javan Pond Heron <i>Ardeola bacchus/speciosa</i>	53	256		80	26	13		25	131			584
Little Heron <i>Butorides striatus</i>		2		7				2		1	1	13
Yellow Bittern <i>Ixobrychus sinensis</i>		1		1	5							7
Cinnamon Bittern <i>Ixobrychus cinnamomeus</i>		1										1
Black Bittern <i>Dupetor flavicollis</i>				1	1							2
Glossy Ibis <i>Plegadis falcinellus</i>		7		9								16
GREAT WHITE PELICAN <i>Pelecanus onocrotalus</i>			1									1
SPOT-BILLED PELICAN <i>Pelecanus philippensis</i>		5		7								12
UNIDENTIFIED PELICANS		8										8
TOTAL WATERBIRDS	3,787	3,114	1,473	2,607	403	306	275	541	897	495	275	14,173