



A survey of coastal and marine birds at Bako National Park and Samunsam Wildlife Sanctuary, Sarawak

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**A SURVEY OF COASTAL AND MARINE BIRDS AT BAKO NATIONAL
PARK AND SAMUNSAM WILDLIFE SANCTUARY, SARAWAK**

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Introduction

Marine birds (those species that feed primarily or exclusively at sea) and wading birds (species that feed primarily or exclusively along the shoreline) are vulnerable to many human induced threats and the worldwide decline of certain species is of global concern. As marine birds lay small clutches and most lay only once each year they are prone to disturbance and easily over harvested, and recovery from population losses can take decades. In the past tern colonies in Sarawak have declined markedly due to disturbance and egg-collecting by fishermen (MacKenzie & Salter 1986). Fisheries related impacts have caused declines in the populations of many marine birds, directly due to bycatch (incidental take of birds by nets or other fishing gear) or indirectly from over harvest of the birds prey species. I am not aware of any fisheries related impacts in Sarawak waters but such impacts are likely. Elsewhere marine birds have been killed by oil spills and this must be a risk in the oil and gas fields off north-eastern Sarawak and along the shipping lanes servicing these fields. Most tropical seabirds nest on small, predator-free islands and visits by fishermen and tourists have resulted in the introduction of predators or disturbance by people, which has led to the demise of many South East Asian colonies (Wells 1991, de Korte & Silvius 1994). Wading birds have been impacted by all manner of coastal developments that have destroyed or altered favoured feeding sites. Sites important to wading birds tend to be at river mouths, in estuaries and in mangroves, all locations favoured for industrial estates, housing and agriculture. These sites are also vulnerable to pollution or sedimentation from materials that may originate far upriver.

The conservation of marine and wading birds is of some practical importance. In Asia and elsewhere seabirds are used by fishermen to indicate the location of schools of fish (de Korte & Silvius 1994). Some species of seabird and wading bird are easily censused and their populations can be used to monitor environmental changes or the impact fishing has on target fish stocks. Some species breed or feed in large numbers at fixed locations, at set times of year and are of interest to visitors. In New Zealand tourist visits to seabird colonies contribute millions of dollars to some local economies.

Little work has been done on marine or wading birds anywhere in Borneo. Distribution surveys are fragmentary and the status of seabirds in Borneo is poorly known although threats to the birds have been acknowledged (Wells 1991, de Korte 1991). The situation elsewhere in South East Asia is no better (Croxall et al 1984, Croxall 1991). De Korte (1984) highlights how little is known about marine birds anywhere in South East Asia and documents dramatic declines in the numbers breeding at those few colonies where counts have been made. In Malaysia and Indonesia populations of Pelecaniformes (boobies, tropicbirds, frigatebirds and cormorants) have declined markedly, many colonies are already extinct and if conservation measures are not taken quickly these birds will soon disappear from the region (Wells 1991, de Korte & Silvius 1994). The situation is less critical for terns although certain colonies occupied during the 1950's are no longer used and the numbers nesting at Pulau Tukong Ara, the largest colony in Sarawak declined between the 1950's and 1980's (Mackenzie & Salter 1986). The status of terns on Pulau Tukong Ara has been assessed during four of the last 12 years and numbers have increased during this latter period (Sim Lee Kheng & Japar 2000).

The status of wading birds is even more poorly documented. The only systematic survey of the Sarawak coast was carried out in 1985 and that only covered the coast between Santubong and Kuala Igan (Edwards & Polshak 1987). That paper provides a detailed summary of information on wader records in Sarawak up to 1986. The Kuching branch of the Malaysian Nature Society make annual counts of wading birds at certain locations near Kuching but that information has not yet been published (Andrew Alek Tuen pers. comm.)

In this report I record observations made during a reconnaissance survey of marine and coastal birds in Bako National Park, Samunsam Wildlife Sanctuary, the Talang-Talang Islands and certain adjacent coasts in August and September 2001. The objectives for this study were to assess the significance of each site to marine and wading birds, list the bird species present, estimate their numbers and to identify further conservation and research needs for these birds in Sarawak. In addition, while at Bako I made daily observations on the birds seen from the Telok Assam boardwalk and have prepared the text for an educational booklet.

Study areas and methods.

- **Bako National Park.**

Bako National Park was visited from 28 August to 2 September 2001. We stayed at Telok Assam and records of marine and wading birds seen were kept throughout the stay. Land-based visits were made to Telok Delima, Telok Paku, Telok Pandan Kecil, Telok Pandan Besar, Telok Tajor, Telok Sibur and Pulau Lakei. At each of these locations all accessible habitats likely to be used by coastal birds were scanned using 10 x 40 binoculars and/or a 20 x telescope and all birds seen recorded. The survey methods differed from location to location, the objective being to conduct the most thorough survey time and circumstances permitted. At most locations the seas offshore were scanned from the best available vantage point and any birds within visible range usually within 500m of the shore (depending on the height above sea observations were made) were recorded. On 1 and 2 September I surveyed the entire coast between Pulau Lakei and Kampong Bako from a speed boat close inshore. The boat cruised slowly along all parts of the coast likely to be used by marine or wading birds, as close inshore as circumstances would allow, with frequent stops to allow the coast to be scanned using binoculars.

I visited the boardwalk at Telok Assam just after dawn and shortly before dusk daily from 28 August to 2 September 2001, and on most days made one additional visit. On each visit I walked slowly along the boardwalk stopping frequently to search for birds. All birds identified were recorded. Visits were usually of one to one and a half hours duration and the entire boardwalk would be traversed.

- **Samunsam Wildlife Sanctuary and Talang-Talang Islands**

We stayed at Samunsam Wildlife Sanctuary from 5 to 9 September 2001. During this time I surveyed all islands and rocky reefs in the Samunsam area, landing on those judged to be of potential use by marine or coastal birds. The coastline from the Samunsam River north to Tanjung Asssan was surveyed on 6 September from a boat close inshore. The coast between Sematan and Samunsam was surveyed on 5 September but due to time constraints the survey was superficial. The mangrove

boardwalk at the Samansam Sanctuary headquarters was visited daily but no systematic bird counts were made. The Talang-Talang Islands were visited on 6 September. During coastal surveys the nature of the coast was noted and all areas of potential use by coastal birds were investigated as thoroughly as circumstances allowed. All marine and coastal birds were recorded. When traveling between locations by boat all birds seen at sea were recorded. When a bird was seen the boat was stopped to allow the bird to be identified.

The wading birds on intertidal sand-mud flats at the mouth of the Samunsam River were counted on 6, 7, and 8 September. On each day the count took place within two hours of low tide but the actual area censused varied from day to day. On 6 and 8 September observations were made from the north bank of the river. On both those days the area censused extended from the sand flats adjacent to the south bank of the river mouth northwards to the rock-strewn mud flats that at low tide joined Pulau Datu to the mainland. On 8 September we crossed the river and censused all intertidal areas between the river and the sand flats that at low tide joined Pulau Badar and Pulau Krengga Besar to the mainland.

Scientific names are given in species accounts later in this report. The scientific and common names used in this report are those used by MacKinnon & Phillipps (1993).

Results

With the exception of the observations made at the Telok Assam boardwalk where all birds observed are listed only species that primarily feed in the sea or intertidal regions are included in this report. This includes all Pelecaniformes, herons, Charadriiformes and kingfishers. No petrels, storks, ibis, ducks or rails were seen during this study. Raptors that take marine foods are also included.

1. Bako National Park coastal bird survey

- **Telok Delima**, 28 August, 1710-1730 hrs, at track end in mangroves, no coastal birds seen. 30 August, 0945-1100 hrs, explored the southern end of the mangroves, no coastal birds seen. 2 September, three common sandpipers were seen on mudflats at the seaward edge of the mangroves.
- **Telok Paku**, 1 September, 1700-1730 hrs, observations made from the beach. One common sandpiper was seen on the beach plus two great crested-terns and one small tern, probably black-naped offshore.
- **Telok Pandan Kecil**, 31 August, 1300-1415 hrs, observations made from the cliffs above the beach. I scanned the beach, coastal rocks and open sea using binoculars and telescope. One large white tern, probably a great crested-tern about 750 m offshore.
- **Telok Pandan Besar**, 31 August, 1440-1540 hrs, observations made from the cliffs above the beach. Scan of the beach, coastal rocks and open sea using binoculars and telescope. One small white tern, probably a black-naped tern offshore.
- **Telok Tajor**, 29 August, 1345-1545 hrs, I walked the length of the beach, visited both stream mouths and used the telescope to scan the 'inlets' on the western side

of the bay and the open sea. Between three and five common sandpipers were present. One kingfisher, probably a collared kingfisher was heard.

- **Telok Sibur**, 29 August, 1515-1530 hrs, waded around the point between T. Tajor and T. Sibur and using the telescope scanned the beach from an observation point at the western end of the beach. Five common sandpipers were seen near the stream mouth at the western end of the beach.
- **Pulau Lakei**, 1 September, 1130-1145 hrs, inspected the beach on the island and from the park buildings scanned all visible parts of the mainland coast. No coastal birds seen.
- **Coastal survey Pulau Lakei to Telok Assam**, 1 September, 1215-1315 hrs, all beaches, rock stacks, and shelving rocky coastal areas plus the foreshore of all mangrove areas were inspected from a boat. One common sandpiper was seen on the sand beach at Telok Limau.
- **Coastal survey Telok Assam to Kampong Bako**, 2 September, 1100-1200 hrs, the beaches and mud flats were inspected from a boat. Particular attention was paid to the tidal mud flats at the mouth of the Bako River. Mudbank south-west of Telok Delima; 1 Mongolian plover, 2 Eurasian curlew, 1 common redshank, 3 common sandpipers, 9 black-naped terns, 2 unidentified large waders, 1 unidentified plover and 1 unidentified tern. Mudbanks western side of the river mouth, 1 unidentified white egret, 1 Mongolian plover, 3 Eurasian curlew, 2 whimbrel, 8 common redshank, 5 common sandpipers, 1 unidentified plover. Eastern side of rivermouth not surveyed but birds including at least 1 curlew and 2 common sandpipers were present. Bako River from mouth to Kampong Bako, 2 stork-billed kingfishers.

2. Telok Assam boardwalk

The birds recorded during the 11 observation sessions on the Telok Assam boardwalk are listed in Table 1. This data has been used to draft the text for an educational booklet on the birds of the Telok Assam boardwalk, which will be co-authored with Asha Kaushal of the Sarawak Biodiversity Centre. The working text for this booklet comprises Appendix 1 of this report.

Table 1. Bird observations on the Telok Assam Board Walk, Bako National Park. The board walk was visited on 11 occasions, the table shows the number of those visits on which each species was observed.

Species	No. Records
Osprey	1
White-bellied sea eagle	2
Common sandpiper	10
Black-naped tern	1
<i>Teron</i> pigeon sp.	3
Cinnamon-headed pigeon	1
Silver-rumped swift	2
Glossy swift	2
Little swift	5
Grey-rumped treeswift	6
Stork-billed kingfisher	2
Collared kingfisher	4
Pied triller	1
Common iora	8
Streaked bulbul	3
Olive-winged bulbul	3
Cream-vented bulbul	3
Red-eyed bulbul	1
Asian fairy-bluebird	2
Velvet-fronted nuthatch	6
Magpie robin	8
Ashy tailorbird	7
Asian paradise flycatcher	1
Tiger shrike	1
Hill myna	2
Olive-backed sunbird	2

3. Samansam Wildlife Sanctuary coastal bird survey

- **Low tide wading bird counts, mouth of the Samunsam River and adjacent coasts.** Seven species of wading bird, black-naped terns and a collared kingfisher were seen on the sand flats either side of the Samunsam River mouth (Table 2).

- **Bird counts on the Batu Burong Islands**

The Batu Burong islands were visited at high tide on 5 and 8 September 2001 and on each occasion brief landings were made on both islands. Batu Burong Kecil is used by wading birds as a high tide roost and the birds seen there are listed in Table 3. On both visits a single dark phase reef heron was the only bird present on Batu Burong Besar.

Table 2. Low tide counts of wading birds at the mouth of the Samunsam River and adjacent areas, September 2001.

	Malaysian plover	Greater sand plover	Unid. Plover	Eurasian curlew	Whimbrel	Common sandpiper
6 Sept, south side of rivermouth	2	1		3		5
6 Sept, north side of river to P Datu	2					1
7 Sept, south side of river to P. Badar	2	13	2	4		7
7 Sept, north side of rivermouth	3	1				2
8 Sept, south side of rivermouth	1	3	3			4
8 Sept, north side of river to P datu	3				2	3

	Ruddy turnstone	Rufous-necked stint	Unid. wader	Black-naped tern	Collared kingfisher
6 Sept, south side of rivermouth			5		
6 Sept, north side of river to P Datu					
7 Sept, south side of river to P. Badar	4			12	1
7 Sept, north side of rivermouth		1			
8 Sept, south side of rivermouth			2	3	
8 Sept, north side of river to P datu				2	

Table 3. Wading birds counted at the high tide roost on Batu Burong Kecil, Samunsam Wildlife Sanctuary, September 2001.

	Pacific golden plover	Malaysian plover	Greater sand plover	Common sandpiper	Eurasian Curlew	Ruddy turnstone	Rufous-necked stint
5 September, 1640-1650 hrs	13			5		2	
8 September, 1730-1740 hrs	2	2	14		8	5	3

• **Observations at other islands and islets in the Samunsam area**

On 5 and 6 September all islets and islands in the Samunsam area were inspected. At high tide the islets seaward of Kampong Limo are small rocks only a few metres in length and less than 3m high. Two black-naped terns were seen roosting on one of the smaller and most seaward of the rocks.

Pulau Badar, Batu Krengga Kecil, Batu Krengga Besar and Pulau Datu are all joined to the mainland at low tide. Wading birds feed on the sand flats on the landward side

of the islands but no other use by coastal birds was detected. We waded out to Batu Krengha Kecil at low tide on 7 September and landed briefly on Pulau Datu at high tide on 6 September. At low tide terns roosted on a small rocky reef at the mouth of the Samunsam River (Table 4).

I landed on Pulau Gador at high tide on 6 September. This island consists of a ring of boulder beach circling a small area of *Pandanus* dominated forest. One collared kingfisher was recorded. Pulau Kerah was only inspected from a distance but did not appear to be of interest. The islets north of Tanjung Serabang are bare rocks joined to the mainland for much of each tidal cycle. The coastal survey finished at Tanjung Assam. The islands and islets in the vicinity of the Samunsam River should be investigated during the tern breeding season.

Table 4. Low tide counts of the tern roost at the Samunsam River mouth, September 2001.

	Black-naped tern	Great crested tern	Unidentified tern
6-September 2001	30	9	4
7-September 2001	28		5
8-September 2001	2	1	

- **Coastal survey Sematan to Samunsam Wildlife Sanctuary**

On 5 September we followed the coast from Sematan to Samunsam remaining where possible 250 – 400m offshore. It was not practical to travel this distance slowly enough to count birds but I did note the habitats available. The coast is mostly sand beach with a few rocky points, backed by land used for dwellings and agriculture. Assuming that the birds present were similar to those using the sand beach habitat at Samunsam it may be expected that a few common sandpipers and perhaps Malaysian plovers would be found along this coast. The tide was fairly high when this area was surveyed so areas important to wading birds may have been overlooked. The most interesting area appeared to be Sungai Belinsah where there is an extensive area of mangrove forest extending up the river. On 5 September one black-naped tern was seen in Sematan Harbour and on our return on 9 September 10 black-naped terns and four turnstones were recorded.

4. Talang-Talang Islands coastal bird survey

On 6 September I circumnavigated both Talang-Talang Islands and searched for birds from a boat about 150m offshore. I landed at the turtle beach on the south end of Talang-Talang Besar. The only coastal birds observed were collared kingfishers, however among the other birds observed were 15-20 pied imperial pigeons (*Ducula bicolor*). The workers on Talang-Talang Besar informed me that sea eagles often visited the island.

5. Seabirds at sea

Whenever we were traveling by boat from one place to another I kept watch for birds at sea. Each time a bird was sighted the boat was stopped and the bird identified.

These records, Table 5, do not include birds seen in the immediate vicinity of the coastal localities and islands reported on in previous sections. The encounter rate for terns in the Sematan-Samunsam- Talang-Talang area was 1.9 terns/hour or 0.75 terns per 10 km. The sighting of a lesser frigate bird is significant as frigatebirds and other Pelecaniformes are now rare in Malaysian and Indonesian seas. Flocks of pied imperial pigeons were seen flying between Talang-Talang islands and the mainland.

Table 5. Birds observed at sea off the coast of Bako National Park and in the Samunsam, Sematan and Talang-Talang area. September 2001.

	Date	Observation duration	Lesser frigatebird	Black-naped tern	Great crested tern	Pied imperial pigeon
Telok Assam to Pulau Lakei, Bako	1-Sep	45 minutes				
Sematan to Islets south of Samunsam	5-Sep	60 minutes		2		
Tg. Assam to Talang-Talang B.	6-Sep	30 minutes	1			
Talang-Talang K to Samunsam	6-Sep	25 minutes				3
Samunsam to Sematan	9-Sep	40 minutes			3	4

6. Species accounts

In this section I summarize the sightings and status of each species of marine and coastal bird observed during this survey.

Lesser frigatebird, (*Fregata ariel*). One seen north-west of Talang-Talang B. The lesser frigatebird is the most common frigatebird around the coast of Borneo. In the 1950's they regularly roosted on Pulau Satang Kecil and were regularly seen in Santubong Bay (Smythies 1999).

Pacific reef egret, (*Egretta sacra*). One dark phase reef egret was present on Batu Burong Besar on both occasions this island was visited. This species is widely distributed around the coast of Borneo (Smythies 1999). The only other heron seen during this survey was a white egret at the mouth of the Bako River on 2 September. The bird was too far away to allow me to identify it further.

Osprey, (*Pandion haliaetus*). One osprey was seen flying along the coastline at Telok Assam, Bako National Park on 1 September 2001.

Brahminy kite (*Haliastur indus*) One was seen from Telok Assam, Bako National Park and two sightings were made near the mouth of the Samunsam River. This is probably the most common raptor in Borneo (Smythies 1999).

White-bellied fish eagle (*Haliaeetus leucogaster*). One was seen from Telok Assam, Bako National Park. White-bellied fish eagles have suffered persecution from local people and numbers may be in decline (Smythies 1999). All three of these raptors frequent coastlines, include fish in their diet and are widespread in South East Asia as well as other parts of the World.

Pacific golden-plover (*Pluvialis fulva*). These were only seen on Batu Burong Kecil, Samunsam where 13 were present on 5 September but only two were seen on 8 September. The difference in numbers present on these two visits suggests that they were passage migrants that merely rested at Samunsam on their southward migration. This species breeds in the Arctic during the northern summer and spends their non-breeding months in the Southern Hemisphere with some over-wintering in Borneo (Smythies 1999). Pacific golden plovers made up only 0.55% of the waders recorded by (Edwards & Polshek 1987).

Malaysian plover (*Charadrius peronii*). Between one and three Malaysian plovers were seen each time I visited sandy beaches on either side of the Samunsam River. The birds were mobile frequently flying from one side of the river to the other. The total number in the Samunsam area was probably about five or six. This species is resident and occurs from southern Thailand, Indochina, the Philippines, Sulawesi and the Sunda Islands (MacKinnon & Phillipps 1993). They were not recorded on the turtle islands and are absent from long stretches of sandy coastline in Sarawak and other parts of Borneo (Smythies 1999). Only four Malaysian plovers were recorded during the extensive wader survey conducted by Edwards & Polshek (1987). They appear to prefer small bays with coralline sand and have been reported from nearly Tanjung Datu (Smythies 1999).

Mongolian plover (*Charadrius mongolus*). Two Mongolian plovers were seen on mud flats at the mouth on the Bako River on 2 September.

Greater sand-plover (*Charadrius leschenaultii*). Greater sand-plovers were common at the mouth of the Samunsam River and one to three were present during most counts on the intertidal sand-flats at that river mouth. Fourteen were present on Batu Burong Kecil on 8 September. All greater sand-plovers seen were in non-breeding plumage. I looked for Mongolian plovers but found none although some plovers seen on the sand flats could not be positively identified. Conversely no greater sand-plovers were seen at the mouth of the Bako River. This species tends to utilise firmer substrates than the Mongolian plover (Smythies 1999) which is in line with the observations reported here. These were two of the most numerous wading bird species recorded by Edwards & Polshek (1987).

Eurasian curlew (*Numenius arquata*). Six were seen at the mouth on the Bako River on 2 September. Curlews were seen on sand-flats to the south of the Samunsam River on two of the three days counts were made (Table 2) and eight were present on Batu Burong Kecil on 8 September. Curlews are described as erratic winter visitors to Borneo, the species was formerly regarded as common but since the 1950's sightings have fluctuated with some years none being recorded. Over 200 were recorded at Pulau Buit in 1986 the only time this location has been surveyed (Edwards & Polshek 1987).

Whimbrel (*Numenius phaeopus*). Two whimbrels were seen at the mouth on the Bako River on 2 September and two on mud-flats between Pulau Datu and the Samunsam mainland on 8 September.

Common redshank (*Tringa totanus*). Nine, some in breeding plumage others in non-breeding plumage were sighted at the mouth of the Bako River on 2 September.

Whimbrels and common redshanks are widespread common winter visitors to Borneo (Edwards & Polshek 1987).

Common sandpiper (*Tringa hypoleucos*). At Bako National Park up to five common sandpipers were present at the Telok Assam mangroves on all but one of 11 visits (Table 1) and judging from the numbers seen in other mangrove areas and on various sandy beaches small numbers are probably present on most such habitats in the Park. They were also present at the mouth on the Bako River. During this survey the common sandpiper was the only wading bird found within the National Park. This species was recorded during all wader counts on the tidal sand-flats near the Samunsam River (Table 2) and some roosted on Batu Burong Kecil (Table 3). This species is an abundant passage migrant and non-breeding visitor, occurring not only around the entire coast of Borneo but also far inland (Smythies 1999).

Ruddy turnstone (*Arenaria interpres*). Four were seen on sandflats between the two Pulau Krengga Islands, Samunsam on 7 September. Ruddy turnstones were present on Batu Burong Kecil both times this island was visited (Table 3).

Rufous-necked stint (*Calidris ruficollis*). One was seen on the north side of the Samunsam River on 7 September and next day three were seen on Batu Burong Kecil. Turnstones and rufous-necked stints are considered common winter visitors to Borneo (Edwards & Polshek 1987, Smythies 1999).

Black-naped tern (*Sterna sumatrana*). A few small, light coloured terns were seen from beaches and headlands around Bako National Park and nine black-naped terns were counted on a sand-bank south-west on Telok Delima on 2 September. Black-naped terns were much more common in the Samunsam area. They were often seen offshore and up to 30 were counted each day on a low tide roost at the mouth of the Samunsam River. On 5 September one black-naped tern was seen in Sematan Harbour and on our return on 9 September, 10 were present. None were seen more than a kilometer offshore and none were seen at the Talang-Talang Islands. All small terns positively identified were of this species. This species is resident and locally common in Sarawak. They have been recorded breeding on Pulau Datu (Samunsam) and Cape Sipang (Smythies 1999).

Great crested-tern (*Sterna bergii*). Large, light coloured terns, some (probably all) being great crested-terns were more common than the smaller black-naped terns at Bako National Park. Two large terns were seen from Telok Paku on 1 September, but only black-naped terns were seen from Telok Assam or between there and the Bako River. At Samunsam great crested-terns were outnumbered by their smaller congener (Table 4) but only great crested-terns were seen further offshore (Table 5). They have previously been reported as common in the Tanjung Datu area and they may breed on the other side of the Peninsula in Indonesian waters (Smythies 1999).

Rufous-backed kingfisher (*Ceyx rufidorsa*). One was seen from the mangrove boardwalk at Samunsam. These kingfishers occur in forests and in mangroves throughout the Sunda Region (Smythies 1999).

Stork-billed kingfisher (*Pelargopsis capensis*). A stork-billed kingfisher was seen twice from the Telok Assam boardwalk (Table 1). Two were seen as we traveled up

the Bako River to Kampong Bako on 2 September. None was seen at Samunsam. Stork-billed kingfishers are common in rivers, tidal creeks and mangroves in Borneo (Smythies 1999).

Collared kingfisher (*Todirhamphus chloris*). One or two collared kingfishers were seen on several occasions at the Telok Assam boardwalk (Table 1) and this species was seen or heard at several other locations within Bako National Park. It is probably widespread in the Park. Although recorded only once during systematic bird counts at Samunsam (Table 2) they were often seen or heard in coastal vegetation around the headquarters or along the beaches both north and south of the river. They were present on both Talang-Talang Islands. This is a common bird around Borneo and also occurs in other parts of Asia, Australia and some Pacific Islands (Smythies 1999).

Discussion

The seabird fauna of Sarawak is small and the few species present are all widely distributed through the tropical oceans. Most of the wading birds found in Sarawak are migratory, breeding in the Arctic and passing through Sarawak on route to and from their Southern Hemisphere wintering locations. A notable exception is the Malaysian plover that is resident year round. All these birds are vulnerable to human disturbance or exploitation and sea birds (Wells 1991, de Korte 1991, de Korte & Salves 1994) and probably also wading birds have declined in abundance throughout South East Asia. The declines are especially marked for Pelecaniformes which apparently no longer breed in Sarawak. Most South East Asian breeding Pelecaniformes still breed on Spratley Island, Amboyne Cay and Swallow Reef 500 km north of the Borneo mainland (Wells 1991). Some species are still present but declining rapidly in Indonesia, (including Kalimantan, and islands west of Borneo) (de Korte 1991, de Korte & Silvus 1994). Protection of suitable small, predator-free islands may allow bird to colonise Sarawak islands.

Neither marine birds nor wading birds have been adequately surveyed in Sarawak and there are very few previous counts with which to compare the data presented here. Thus it is impossible to assess recent changes in the bird's abundance.

Both black-naped and bridled terns are known to breed in Sarawak, black-naped on various islets in western Sarawak and both species on Pulau Tukong Ara (MacKenzie & Salter 1986). In 1958 black-naped terns apparently nested on at least 50 rocks between Tanjung Datu and Bako National Park (Smythies 1999). By 1980 most of these rocks had been abandoned and the few remaining colonies were greatly reduced in size, probably due to human disturbance and egg collecting (MacKenzie & Salter 1986). In 1980 and 1981 black-naped terns breed on six of the islets near the mouth of the Samunsam River. There were up to 46 adult birds associated with the colony, breeding success was low with most nest failures caused by fishermen (MacKenzie & Salter 1986).

The colony at Pulau Tukong Ara is better known with counts having been made on various occasions since 1950 (Smaby-Stone 1991, Sim Lee Kheng & Japar 2000). The numbers of terns nesting on the island has fluctuated over this period. About 25 pairs of bridled terns nested on Pulau Tukong Ara in 1954, about 250 in 1964, declining to fewer than 50 in 1981, then rising to 220 in 1989 ((Smaby-Stone 1991).

Black-naped terns declined from about 100 pairs in 1950 to fewer than 20 pairs by 1965 but then began to increase again in the late 1980's (Smaby-Stone 1991). During the 2000 breeding season 222 bridled tern nests and 27 black-naped tern nests were counted (Sim Lee Kheng & Japar 2000).

As egg-laying occurs in April and May (Smaby-Stone 1991) the breeding season had long finished before this survey thus, I was unable to census any breeding colonies. All tern colonies between Tanjung Datu and Bako National Park should be censused during the breeding season.

While traveling between Samunsam and Sematan or the Talang-Talang Islands I recorded one frigate bird, two black-naped terns and three great crested-terns, an encounter rate of 1.9 terns per hour or 0.75 terns per kilometer (Table 5). This is about one tenth of the encounter rate recorded by MacKenzie & Salter (1986) during a more extensive survey in western Sarawak in 1980 and 1981. However, their transects were mostly done during the breeding season (May to July) and over half of the terns recorded by them were bridled terns. I saw no bridled terns during this survey. During the breeding season MacKenzie & Salter (1986) only recorded bridled terns within 35 km of the breeding colony at Pulau Tukong Ara, with most being seen close to Pulau Lakei, Bako National Park. I searched for this species from vantage points at Bako National Park and during boat based transects. Presumably their absence during this survey reflects a seasonal change in their distribution as they are assumed to move well offshore outside the breeding season (MacKenzie & Salter 1986).

The only systematic wide-ranging survey of wading birds in western Sarawak covered the coastline between Santubong and Kuala Igan and was carried out between 28 September and 1 November 1985 (Edwards & Polshak 1987). It is impossible to directly compare the results from my survey with theirs as there was very little geographical overlap and their survey was over a month later in the year than mine. That timing could be significant as in Sarawak most of the species involved are passage migrants. They identified the coast between Sungai Buntal and Sungai Bako as a moderately important site with 4% of the 28,694 wading birds counted (Edwards & Polshak 1987). As I counted only part of this area neither the species recorded nor numbers are comparable. Curiously they did not record common sandpipers in Bako National Park, while I did not see the large numbers of whimbrels seen by them. Sixty five percent of the waders recorded in their survey were seen on Pulau Bruit (Edwards & Polshak 1987) and it is important that this location be revisited.

The only bird seen during this survey that was listed by Davison (1999) as threatened or endangered was the Malaysian plover, at least three of which were present at the mouth of the Samunsam River. This species occurs in Indochina, the Malay Peninsula, the Philippines, Sulawesi and the Sunda Islands (MacKinnon & Phillipps 1993). It is uncommon throughout its range and is absent from large areas of the Sarawak coast (Smythies 1999). Only four Malaysian plovers were recorded during a 1985 survey of wader roosts in western Sarawak (Edwards & Polshak 1987).

Recommendations for further research on coastal birds in Sarawak.

This survey has identified the following priorities for research on coastal birds in Sarawak

- A census of the terns breeding on offshore rocks and islets between Tanjung Datu and Bako National Park.
- Determine breeding success at selected tern colonies and assess the current impact of human disturbance and egg collecting on these colonies.
- Resurvey the important wading bird sites in Western Sarawak identified during the 1985 survey by Edwards & Polshak (1987).
- Map the distribution and abundance of Malaysian plovers between Sematan and Tanjung Datu and survey other areas where this near-threatened species may still occur.
- Conduct a survey of the birds, mammals and reptiles on the Talang-Talang and Satang Islands. These reserves may provide sanctuary for species that are threatened or locally extinct on the mainland.

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Appendix 1. A working draft for an interpretive booklet on the birds of the Telok Assam mangroves.

The boardwalk through the mangroves at Telok Assam in Bako National Park offers a unique opportunity to explore a mangrove forest without the need to get wet and dirty. Mangroves may not be the most attractive, nor the most spectacular of ecosystems, but they are one of the most productive. There is no where better to start learning about these fascinating ecosystems than the boardwalk at Telok Assam.

Mangroves are one of the most threatened ecosystems yet one of the most important to people. Countless species of fish and other marine animals including many that are eaten by people spawn in mangroves or use mangroves for some equally crucial stage of their life cycle. This includes fish that are caught many kilometers out to sea. If we lose the mangroves those will no longer be there for us to eat.

Mangroves are the only trees or shrubs that can grow in salt water and they have special adaptations to allow this. At low tide look down between the trees and note the numerous tree roots that poke vertically out of the mud. These roots allow the roots to take in oxygen and little if any is available in the mangrove muds. Mangroves are most common and the species diversity is greatest in the tropics but a few species do occur in warm temperate parts of the world. There are ??? species of mangrove trees in Sarawak and ?? of these occur at Telok Assam.

Threats to mangroves

In the past mangroves have been seen as wasteland, places to be cleared to make way for productive land. A high proportion of the World's mangroves has already been lost, and the rate of loss of mangrove forests exceeds the rate at which the better-appreciated tropical rainforests are being cleared. Throughout the tropics vast areas of mangrove forest have been 'reclaimed' to be used for farming yet the resulting farms are inevitably far less productive than the mangroves that were destroyed. Mangroves have been logged for timber and firewood or destroyed to provide land for the construction of ports, industrial estates, villages or tourist resorts. Even today few people appreciate the importance of mangroves.

Mangrove birds

Mangrove ecosystems look deceptively simple yet a bird survey of Sarawak mangrove forests recorded 66 species. Not all these species would occur at Telok Assam and few of these species spend all their time in mangrove forests. Some birds use mangroves only at certain times during a tidal cycle. For most species the mangroves are just one of the habitats they explore during the course of a day. Mangrove forests offer many feeding opportunities for birds. Wading and herons feed on mud-dwelling crabs and shellfish. Kingfishers catch fish, and other animals, bulbuls, ioras and other insectivores search for insects amongst the leaves while the velvet-backed nuthatch runs up and down the mangrove trunks in search for its insect prey. Watch the birds you see and try to figure out what food they eat.

Wading birds. As its name suggests the **common sandpiper** is the most numerous of the wading birds at Telok Assam. The same sandpipers that feed in the mangroves

also visit the nearby beach. Do they use the mangroves at low tide and the beach when the tide is high? Common sandpipers are widespread in Sarawak and you may well have seen them in other coastal habitats or even in fields far from the coast. The common sandpiper walks with a bobbing gait that helps identify it from other small wading birds that could be present.

Kingfishers

Kingfishers don't just catch fish and not all kingfishers are found along the seashore. Sarawak has 10 species of kingfishers and they can be found in coastal habitats, along streams and rivers and some species occur in forest far from water. The **stork-billed kingfisher** is the largest Bornean kingfisher and with its massive red bill it is a spectacular looking animal. They hunt fish by sitting on dead branches overlooking the seashore then when they spy potential prey they dive from the perch into the water. Another kingfisher that occurs at Telok Assam is the **collared kingfisher**. This species is common around the coast of Borneo and can even be found in villages or in plantations. You will probably hear its harsh repetitive chek-chek call before you see the bird.

Eaters of Insects

Insects are important in the diet of many mangrove birds. The coexistence of so many species of insect eating bird is possible as each has its own particular range of insect prey or finds its prey in different parts of the mangrove forest. A few of the more common and easily observed insect-eating birds are described below.

The pretty **velvet-fronted nuthatch** is one of the small, colourful birds you should definitely look out for. They have a blue back and bright red feet and bill but they can also be identified from their behaviour. They are the only species you are likely to see running up and down or even side to side on the trunks and large branches of the mangroves. Their robust chisel-shaped bill is used to extract their insect prey from crevices in the bark. Their sharp repetitive calls may alert you to their presence.

The **Ashy tailorbird** is another small bird that frequently visits the mangroves. This cocky little bird with its russet head and ash-grey body is an active hunter of small insects. They search for prey amongst the leaves of the mangrove trees.

The **Common iora** is a yellow bird with conspicuous white wing bars. They are usually solitary or in pairs and while their calls tell you a bird is present they often seem to be obscured by the leaves amongst which they feed. They too feed on leaf-dwelling insects but the rather different hunting methods of the iora and tailorbird no doubt expose different prey species to each predator.

The **Magpie robin** is a bird you may already know. It is a common bird in many habitats including towns and cities. The male is the more attractive sex. Males have a glossy black head and back with a white breast and belly and with a single broad, white wing bar. The female has the same pattern but she is grey and white. Most of their food is obtained from the ground and at Telok Assam they are usually seen on the exposed tidal mud flats or perched in the lower tiers of the mangroves. They eat insects and other invertebrate animals.

Overhead you will see yet more insectivores, the swifts, swallows and tree swifts. Identifying these fast flying birds presents a real challenge to the bird watcher. Firstly you need to separate swifts from swallows and treeswifts. This itself is not easy. Swifts and swiftlets have long, pointed, evenly curved swept-back wings with short square tails or long, pointed tails. They are black (or brownish) and white. They rarely perch in trees, instead clinging to cliffs using their sharp claws. About 10 species occur in Borneo and at least six of these could be seen at Bako. One of the most common is the **little swift** with its white chin and white rump. Look out for the glossy black **silver-rumped swift**, the only swift whose entire upper body rear of the wings is white. The **edible-nest swiftlet** may also be seen at Bako. As its name suggests this is the species whose nests go to make that Asian delicacy bird nest soup.

Swallows are unrelated to, but resemble swifts in their body shape and hunting methods.

They are not so swift in flight and unlike swifts; swallows frequently perch in trees, on powerlines or even on buildings. Their flight is more erratic than that of a swift and they more often fly close to the ground or water than do swifts. Two species of swallows are likely to be seen at Bako. The **barn swallow** is migratory and during the northern summer they breed in northern Asia and Europe. They are abundant in Sarawak during the northern winter whereas very few are present during summer. The **Pacific swallow** is common all year. The two species are difficult to tell apart. Look closely if you can. The barn swallow has a blue band under its head while the breast of the Pacific swallow is grey instead of white.

The **grey-rumped treeswift** belongs to a completely different group of birds that are only found in South East Asia. This green and white bird with its distinctive head-crest has a very different method of catching insects. They perch in tall trees then make broad, circular flights frequently returning to the tree from which they launched their flight. At Telok Assam look for them in the tall Casuarina trees at the start of the boardwalk.

Other animals

The Telok Assam mangroves are visited by **bearded pigs, plantain squirrels, proboscis monkeys, long-tailed macaques** (although the canteen is an easier place to observe these badly behaved animals) and sometimes even the **silvered leaf monkey**. Crabs, mudskippers and other fish are usually visible.

Some tips for bird watching.

The best time to see birds at the boardwalk, or for that matter anywhere else in Bako is early morning or just before dusk when the birds are most active. Walk quietly along the boardwalk, stopping frequently to listen and look for movement in the trees. The shelters are good places to sit quietly and wait for birds to show themselves. A pair of binoculars and a fieldguide to Bornean birds are necessary if you wish to identify the birds you see. Bird watching requires lots of patience, but the sight of some interesting or beautiful animals usually rewards patient people.

Some useful books

The serious birdwatcher will want a copy of the Fieldguide to the birds of Borneo, Sumatra, Java and Bali by John MacKinnon and Karen Phillipps. The little book by C.M. Francis, A Pocket Guide to the Birds of Borneo is less detailed but is a cheaper alternative that is more easily found in Sarawak shops. The Birds of Sarawak, a Pocket Checklist by Richard Gregory-Smith provides an easy way for birdwatchers to keep track of the species they have seen.

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