

AN OVERVIEW OF THE DISTRIBUTION, STATUS AND BEHAVIOURAL ECOLOGY OF WHITE SHOULDERED IBIS IN EAST KALIMANTAN, INDONESIA.

by
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Summary

An overview is presented of recent observations of the White shouldered Ibis *Pseudibis davisoni* in East Kalimantan, Indonesia. 45 encounters were made, while only 19 previous records were known from the island of Borneo. In total, 142 individual birds were sighted, of which 134 date from the three years 1994-1997. This high number of sightings is explained by multiple sightings of the same birds. The formerly known distribution of the species is expanded, and probable sub adult specimens and copulation have been observed. Considering the paucity of knowledge and the 'endangered' status, these sightings may be of great importance for the conservation of the species.

Introduction

The White shouldered Ibis, or Black Ibis, was first described by Hume, 1875, who named the

species *Geronticus davisoni*. Elliot (1877) recognized the similarities of this species with *Inocotis papillois* [*Ibis papillosa* Temminck 1824] and subsequently placed the two species in the same genus, *Pseudibis*. Holyoak (1970) considered *Pseudibis papillosa* and *P. davisoni* a single species, *Pseudibis p. papillosa* and *Pseudibis p. davisoni*. Some authors recognize the bird as a separate species.

Pseudibis davisoni was formerly found throughout SE Asia: Burma, Thailand, Malaysia, Cambodia, Lao PDR, Vietnam, southern China, and Borneo. At present it seems to be patchily distributed over this region (Hancock *et al.* 1992). *Pseudibis papillosa* occurs in South Asia.

The White shouldered Ibis is a large, dark brown to blackish ibis with a purple and blue green gloss on the wing feathers. It is easily identified in flight by its conspicuous white wing patch, which is visible only as a thin white line when the wings are closed. The large curved bill is horn coloured. Smythies (1981) describes a bare head, and coral red legs and feet. Hancock *et al.* (1992) states that in *papillosa*, the feet are horn coloured, and both legs and feet turn bright red during the breeding season, while the head is capped with a patch of warty red skin, which is absent in *davisoni*. The information on head colour in *davisoni* is contradictory: a red nape is also mentioned in MacKinnon & Phillipps (1993). Lekagul & Round (1991) and Sibuea *et al.* (1995) however mention a pale blue nape and neck collar on a slaty blackish naked skin head, and Wildash (1968) mentions a pale blue patch at the nape. A brighter blue nape and cap were seen by Sozer (1994). No sign of red on the head was seen by Petersen (1991), who instead described the upper part of the neck and the chin as being clear white.

Young birds of *papillosa* are described as dark brown all over, with a paler breast and lacking the iridescent tinge on the feathers (Hancock *et al.* 1992).

Only 19 previous records of White shouldered Ibis exist from Borneo (Table 1), but some of these sightings were not confirmed. According to Silvius & Verheugt (1989), the record at the Mahakam lakes in 1988 referred only to 'several dark ibises'. Holmes (1991) states that he never obtained sufficient views to claim absolutely positive identification for any of his ibis records in Kalimantan, but considers (*in litt.* June 1997) that the records from the Seruyan (L and M in Table 1) are reliable. Eight of the previous records originate from the Mahakam area between Long Iram and Long Bagun and two from the Mahakam Lakes (which of the three larger lakes is not specified). East Kalimantan; three are from the upper Barito River, and another three from scattered localities in the southern part of Central Kalimantan; two are from the area around Banjarmasin, South Kalimantan; and one from Kuching, Sarawak. Noteworthy is the fact that 18 out of 19 records originate from the southern half of Borneo.

Table 1. Previously published records of White shouldered Ibis on Borneo

Location	Coordinates	Date	No	Reference	
A Dusun (Barito) R. (C)	not specified	1836	1	Smythies (1981)	
B Purukcahu (C)	114°40'E 0°39'S	1909	1	Smythies (1981)	
C = Central (E = East, S = South, Sar = Sarawak)	115°31'E 0°01'S	1912	1	Smythies (1981)	
Observed in a rubber recording daily for 18 years	115°31'E 0°01'S	1942	19, total	number of birds = ca. 55.	
The Ketrisin Gadawan I refer to	Figure 10	0°30'E 1°30'N	xi/1946	1	Smythies (1981)
F upstream of Long Iram (E)	not specified	1973	?	Smythies (1981)	
G Binuang (S)	115°04'E 3°10'S	9/xii/1974	1	Holmes & Burton (1987)	
H Masin airport (S)	114°37'E 3°20'S	15/xii/1974	3	Holmes & Burton (1987)	
I upper Barito river	115°15'E 2°12'S	7/ix/1989	1	Holmes & Burton (1989)	
December 1995 until June 1996, November 1996, and March 1997				the authors focused on seeking white-shouldered ibis. For each sighting, detailed notes were made on exact location, date, time of day, group size, behavior, habitat, and description. Local names and additional information were gathered through interviews with local inhabitants. Additional records were obtained from other biologists and bird watchers in the area. Most sightings were made from the upper deck of large riverboats, and occasionally from floating boats or motorized rafts. All sightings were made while transiting rivers, and no ibises were sighted from the land (some however were birds in over-the-head flight). In most cases the use of binoculars was not necessary because of the proximity of the birds. Ibis were found frequently approach to within 20 m before they would fly into nearby trees. Details of all these sightings are given in Appendix 1.	
O Long Wae - Tukang (E)	115°28'E 0°15'N	18/xi/1989	12	Petersen (1991)	
R Long Wae - Tukang (E)	115°28'E 0°15'N	18/xii/1989	1	Petersen (1991)	
S "Datah Bilang" Laham (E)	115°25'E 0°20'N	22/ix/1992	3	Szyer (1994)	

It is useful to also record those areas of apparently suitable habitat in Kalimantan where surveys have been made since 1980 and from which there are no records:

West Kalimantan

Danau Sentarum (S. van Balen, pers. Comm..)

Ketungau River (Holmes 1991)

Gunung Palung (Laman *et al.* 1996)

Pawan River (Holmes 1991)

Muara Kendawangan (Rusila & Enis 1995)

Central Kalimantan

Tanjung Puting (Nash & Nash 1988)

Sampit, Rungan and Kahayan rivers and Kuala Kapuas region (Holmes, *in litt.*)

South Kalimantan

Barito and Negara swamp region (Balen & Prentice 1997)

Upper Barito, where it was observed in 1979 (Smythies 1981) (Wilkinson *et al.* 1991)

East Kalimantan

Mahakam Delta (Eve & Guigue 1989)

Mahakam Lakes (C. Gönner, during nine years of observations)

Upriver between Mahakam Lakes and Muara Wahau (Holmes 1991) Kutai

National Park (S. van Balen, pers. comm.)

Kayan Mentarang (S. van Balen, pers. comm.).

In addition, the authors did not observe the species on the Mahakam either downstream from Long Iram or upstream from Long Pahangai, and the Penihing and Bukat peoples of these regions do not appear to be familiar with it.

Thus, with the exception of the probable records of Holmes along the Seruyan river (observations of a single bird on consecutive days which might have related to only one specimen), all records since 1980 have been confined to the Mahakam river and tributaries discussed in this paper. People of the Kenyan Umajalan tribe also know the species from the region of the Apokayan river (south of the Kayan Mentarang reserve in the western part of East Kalimantan).

Description and systematic status

In comparison with *papillosa* (studied at Walsrode Birdpark, Germany), it is clear that *davisoni* is larger, more robust, and has a longer neck and legs. The tail appears to be relatively shorter, and spreading downwards in contrast to straight, and somewhat downcurved. The conspicuous white spot on the upper wings was seen only in flying birds, never when perched or walking. Most individuals were dark greyish brown, appearing dull slate or blackish from a distance, with a purple or blue gloss on the wing feathers. In *papillosa*, the overall colour is browner and less dull.

The feet and legs of all birds studied in Kalimantan were red, and the bill horn to grey. The skin of the head is naked, and very dark grey or almost black. In *papillosa*, the red patch on the head is limited to the cap and the back of the head, and the entire neck is feathered to the head.

The larger size and different body shape of *davisoni* is quite evident in the field, and the differences in the colour and size of the bald patch on the head are striking. Intraspecific variations of the size and colour of the head patch are described below for *davisoni* which have never been recorded in *papillosa* although this taxon is much better known. Young *papillosa* are stated to be dark brown all

over (Hancock *et al.* 1992). It is concluded that the two taxa should be treated as separate species.

Intraspecific variations

These are illustrated in Figure 1.

Type 1. The first specimens observed (Sözer 1994) had a bright almost cobalt blue cap, nape and upper hind neck on a blackish bald head. The body colour was dull slate, and the neck was not feathered right up to the head.

Type 2. More recently, many specimens were observed with the coloured patch on the bald head pale blue, covering almost the entire head and forming a collar around the neck just below the head. The area around the eye, as well as the throat, seemed darker. In other respects, this resembled type 1.

Type 3. We also observed some individuals, which were never seen within groups of the above types, which were lighter brown in colour, and had a clear white patch on the head instead of blue. The rounded white spot seemed to be limited to the upper hind neck and back of the head (the nape and cap). These features were observed on birds with a feathered head (type 3a) and on a bald head (type 3b). In the first case, the color of the head was the same dull dark brown as the rest of the body, in the second it was darker and more blackish with some gloss.

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Type 4. In two cases, birds resembling type 3 were observed with clear white extending down and to the front to form a white collar just below the head (EM, and Petersen 1991).

The birds of types 3 and 4 always appeared shyer and were never seen in groups together with the blue headed types, but usually in parties of two. Local inhabitants along the Ratah river claimed that they regularly saw this bird here, usually in ones or twos, but never along the Mahakam river where they only saw the blue headed types. They reported that the birds nest in tall emergent trees such as *Bangeris*.

Out of 64 records of the ibis on Borneo, only 37 include accurate descriptions. Of these, 27 describe the nape patch and/or collar and/or cap as blue (types 1 and 2). Sozer (1994) observed a bright cobalt blue upper hind neck and back of head, and the other records mention a pale blue patch on the head. 7 records describe a pure white nape and/or collar. On two occasions, a single white naped bird was seen along the Mahakam, the other ten ibis (5 records) were all along the Ratah river, a small quiet tributary of the Mahakam. Records of white naped birds were made in February, March, April, June and November. In contrast, blue naped forms were observed only along the Mahakam, with records from February, March, April, September and December.

From the above, it might be concluded that there is a relation between the blue naped forms and the Mahakam (a large, open river, with human habitations and river traffic) and between the white naped forms and the Ratah river (small, well forested, quiet). Possibly the latter birds are sub adults. If correct, this would imply that breeding occurs throughout the year. Copulation was observed in

February 1996 and the sighting of three immature birds in November 1996, in the same area, affirms this assumption.

Habitat

Little is known of the habitat preferences of the ibis on Bomo. It is known that *papillosa* feeds in shallow waters along the edges of marshes and other wetlands, in estuaries and rivers, ricefields, grasslands etc. (Hancock *et al.* 1992). They roost communally in large trees, or if these are not available, on small islands or in the middle of fields. Large emergent trees are used for nesting.

Most of the recent records of *davisoni* were of birds foraging on large gravel and shingle banks that emerge when the river is low. There were fewer observations when the river was high, and then generally from mud banks, or of birds roosting in large trees along the river. Most were recorded upstream of Long Iram. Below this point, the river runs more slowly and is deeper, there is less forest in the vicinity, and no gravel or shingle banks. Eight birds were seen roosting in a large tree along the Nyahing (or Nyawatan) river, between the villages of Damai and Intu Lingau (CG). The Nyahing has its mouth downstream from Long Iram, but its headwaters lie close to the Mahakam upstream from Long Iram, and the area consists of lowland and hill forests; there are many gravel and shingle banks in the river. There was only one record, of two birds, between the series of large rapids some 17 km upstream of Long Bagun, and all other Mahakam sightings were in the 120 km stretch of the river between Long Bagun and Long Iram.

Figure 1. Profiles of heads

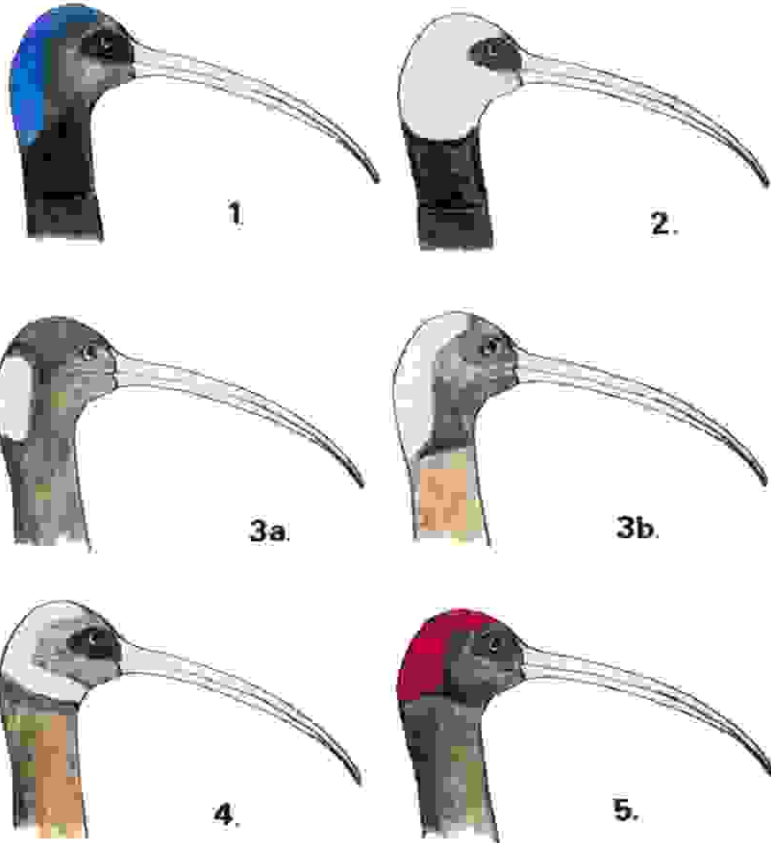


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banks with their necks drawn in like a swan, placing their heads along their backs. Generally they were not shy, and birds on gravel banks mid river could be approached to within 20 m. Those seen on mudbanks, however, or beneath overhanging branches, would fly off immediately on approach. In contrast, the white naped birds were always shy, and could not be approached to within 50 m. When feeding birds on the gravel banks were approached, they would at first start to walk away, constantly looking back at the approaching disturbance, and then fly off to perch in a nearby tree top. The birds do

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not seem to be afraid of passing large riverboats, and foraging was observed close to villages.

In *papillosa*, population movements occur in response to monsoons (Hancock *et al.* 1992). It is suggested that Kalimantan birds may do likewise. Not recorded in Appendix 1 are some seven to ten records of groups of ibises (assumed White shouldered) flying fast, at moderately high altitude above the canopy, perhaps travelling longer distances to new feeding grounds, or perhaps to roosting sites.

Local inhabitants state that the birds roost communally at dusk, from 1700 1730 hrs, in large *Bangeris* trees. One such roost was observed near Telok Belang, 1 km upstream from Laham on the Mahakam.

On one occasion, in February 1996, CG observed four birds on a river bank near Muara Ratah, two of which commenced copulation. The calls were a harsh, loud 'klioh klioh' recalling those of the European Black Woodpecker *Dryocopus martins*, and these became more excited as copulation continued, resembling the calls of the Black headed Gull *Larus ridibundus*. Local inhabitants describe the call as 'wuw wuw', and claim the birds always nest in very large *Bangeris* trees along the river.

In November 1996 three immature birds were observed (RS), flying together with six adults close over Ratah. Although head colouration was not clearly seen, the birds were a little smaller than the adults and short straight bills.

Diet

Petersen (1991) states that a local inhabitant saw an ibis near Ujoh Bilang feeding on fruits. We regularly observed them pecking between the shingle and swallowing small items of prey. On mudbanks, they would probe the mud with their bills. Local inhabitants state that they often feed on worms along the river banks. Hancock *et al.* (1992) states that *papillosa* is omnivorous, with a diet of insects, earthworms, millipedes, centipedes, larvae and pupae, tadpoles, small crustaceans, lizards, small slow moving mammals and birds. Occasionally leaves of cultivated and wild plants are taken, also groundnuts and carrion.

Local names

The name in the Indonesian language has been given as *Pelatok Besi Baku Putih* (Sibuea *et al.* 1995), this being a literal translation of its English name. It is unlikely that this name would be known among the inhabitants of the species' range.

Interviews were conducted with local people. Many of the Dayak tribes along the Mahakam have moved to the region from further inland, and appear to have no specific name for the bird, merely using the collective name of a number of large waterbirds such as *bangau* (Indonesian for heron or egret), *kusog* (Bahau Saaq for heron or egret), *karau* (Punan and Bakumpai for stork) or *ku yuh* (Kenyah Umajalan for stork or heron). On the other hand, some villages of Bahau Saaq and Bahau Busang tribes have lived in the region for centuries, and they do distinguish different waterbirds. Thus they gave the name of *hapawai* for Black headed Ibis *Threskiornis melanocephalus* in several villages.

[*Ed: this observation must be questioned because to date there is no formal record of this species from Kalimantan*]. EM encountered the name of *diyung bala* from one Bahau Busang villager on sighting the bird, whereas the authors heard the name *tiung balah* at Laham, a Bahau Saaq village (the pronunciation of the last two names was the same).

Threats

The population of this ibis is seriously threatened on the SE Asian mainland by the rapidly increasing human population, more intensive cultivation, wetland drainage, pesticides, and in some areas warfare. The larger trees used as secure nesting sites are becoming scarce, while in some areas it is hunted (Hancock *et al.* 1992).

The species does not appear to be hunted or disturbed along the Mahakam. The large riverboats and motorized canoes may disturb foraging birds but this does not appear to be a serious threat. More significant is likely to be forest clearance, forest degradation by logging, and the loss of large roosting or nesting trees. The *Bangeris* trees have little economic value and the wood is used only for small carving and knife handles etc. The logs do not float. Some tribes even protect large trees of this species to encourage honey bees.

Pesticides are used in some areas but local people can rarely afford these; their use is likely to increase in the future. In some areas, the traditional *tuba* fishing is practiced (natural poisoning of fish, very local and short lived) but is being replaced by poisoning with chemicals, which threatens both human and bird populations. Eventually, increasing human settlement along the river, through transmigration and the resettlement of inland populations, with the resultant loss of forest, is likely to be the biggest threat.

It seems possible that the only remaining viable population of this ibis in Kalimantan is along the middle and upper reaches of the Mahakam. We estimate the total population, based on recent observations, to be between 30 and 100 individuals. On 22 December 1995 we observed 15 blue naped forms and two occasions we have seen a group of 3 white naped birds. This minimum of 18 birds can be extrapolated to 30, if we assume the white naped forms are sub adult and that each adult pair raises two young.

Clearly the species is vulnerable and should be considered endangered. Each individual sub population in SE Asia is likely to be critically endangered. We recommend proposals to place the species on the CITES list, as information in this article alone might stimulate interest from foreign collectors. The species is protected by Indonesian law, but there is a risk of illegal trade. It therefore seems appropriate to take conservation measures in the short term.

Acknowledgements

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version.

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Appendix 1, Details of new sightings of White shouldered Ibis, East Kalimantan, 1992-1996.

Initials refer to observers as follows: GL Godwin Limberg, EM Erik Meijaard, CG Christian Gönner, KK Kjell Kühne. Unless otherwise stated, the villages named are situated along the Mahakam river (see Figure 2).

May 1988 (CG). 8, perched in tree along Nyahing (Nyawatan) river (a secondary tributary of Mahakam), between Darnai and Intu Lingau, ca. 35 km south of Long Iram. Distinct white shoulder patch, reddish legs, light coloured bill.

August 1994 (GL). 9, Mahakam river near Muara Ratah, 2 on gravel bank near Ujoh Halang, 2 near Laham. The white shoulders and shiny blackish plumage were clearly visible.

30 June 1995, noon (EM). 1 near Tukan Merang (between Long Iram and Memahak Teboq), on a muddy riverbank beneath overhanging trees. Plumage black with a shiny gloss, legs pinkish, bill brown, distinct light collar and nape.

4 August 1995 (GL). 9, on large gravel banks near Laham, and 4 at undefined location between Long Iram and Ujoh Bilang. White shoulders and shiny blackish plumage clearly visible.

15 December 1995, 08.05 AM (authors). 1 in flight over tree tops on south side of Mahakam near Muara

Ratah. 1 at 11.40 AM flying east above the trees on the south bank of the river near Memahak Besar. Identified as large dark ibises, with white patches on the upper side of the wings.

22 December 1995, 10.00 AM (authors). 1 on gravel bank on south side of river between Long Uray and Long Merah; photographs taken. At 10.30 AM, 14 foraging on large gravel banks just downstream of Laham, on north side of river, 300 m upstream from Banto Pacific logging camp; we passed at 100 m distance, but approached to within 20 m on the following day. Large pale blue patch on blackish naked skin of head, white wing spots quite conspicuous, body dark greyish brown, legs and feet red.

2 February 1996, 3.30 and 4.30 PM (authors). Ratah river between Danumparoy and Ma'au, 2 large dark ibises with a white patch on the upper wings flew up from the muddy north bank of the river and perched in a large tree on the other side. We first thought these to be a hitherto undescribed species: while perched, the white patches were clearly visible as pure white, smaller spots on the folded wings. Of the same size and bill length as the blue headed ibises, the overall colour was a lighter dull brown, without visible gloss, rounded pure white patch on the back of the head. The head did not appear bald, but of exactly the same colour as the rest of the body. Our impression was that these were either subadults or in non breeding plumage (both of which have not yet been described).

18 February 1996, 5.50 PM (CG). 2 perched in tree beside river near Tukang Merang. At 6.30 PM 7 seen perched in tree near Lutan Distinctive white shoulder patch, reddish legs, light blue neck skin and light coloured bill clearly visible.

19 February 1996 (CG). 6 encounters with 10 birds in total: 1 perched in tree and 1 in flight around tree tops, near mouth of Ratah river, 4 on gravel bank, of which 2 copulating, near Muara Ratah, 1 between Laham and Long Uray, 2 between Long Uray and Long Merah, and 1 near Long Melahan.

24 February 1996 (CG). 3 perched in tree near Tukang Merang.

3 March 1996 (KK). 4 encounters with 8 birds in total: 3 between Long barn and Long Kalian (2 sightings) and 5 near Long Kalian (2 sightings).

5 March 1996 (KK). 4 encounters with 7 birds in total: 1 between Long Melahan and Long Bagun, 1 between Long Uray and Long Merah, 3 near Muara Ratah, and 2 near Lutan.

20 March 1996 (authors). 3 between Ma'au and the Muring rapids along the Ratah river, flying from east towards south bank of river. One kept flying towards the Muring tributary, the others landed in tree tops above a large gravel bank on south side of river. The latter birds were approached to within 50 m when they also flew off towards the Muring. All had white necks (see description of 2 February 1996).

21 March 1996, 2.00 PM (authors). 2 flying upriver above Ratah river just below mouth of Muring. Both birds were very shy. Colour dull dark brown, throat shining slightly as if naked skin, nape white. White shoulder patch was seen. At 5.15 PM, 1 flying upriver above the Ratah near Danumparoy, quite fast and at high altitude, but colouration could not be seen owing to poor light.

7 April 1996, 4.00 PM (authors). 2 groups, of 4 and 5 birds, standing some 20 m apart on muddy bank on north side of river between RTC logging camp and mouth of the Pan tributary. The birds were resting, with necks folded, and heads resting on their backs. Dark greyish brown with pale blue heads and red legs.

16 April 1996 (authors). 2 sighted foraging on muddy riverbank while we travelled down the rapids between Long Bagun and Long Pahangai, observed at 20 m on a tranquil stretch on south bank of Mahakam. Pale blue nape patches.

17 April 1996, afternoon (authors). 1 flying across Mahakam from south to north near Memahak Teboq. It perched in a large leafless tree. Described as large brown ibis with conspicuous white wing spots, and clear white small nape patch.

27 April 1996, 1.30 PM (authors). 5 between RTC logging camp and mouth of Pari tributary, flying from south to north of river and settling on the muddy bank. The birds were approached to within 50m and filmed on videocamera, when they flew off over the forest to the west.

16 June 1996, 1.30 PM (authors). 2 flying south across Ratah river between the Batu and Muring rivers. When we approached the flying birds in a canoe, they settled in a large tree. White nape patches. At 3.30 PM, 4 near Danumparoy, flying overland from the Ratah river towards the Barito Pacific logging camp on the Mahakam. No plumage details observed (other than white wing patches) owing to back lighting.

In summary, 5 observers on 23 recording days had a total of 45 observations with a total of 142 birds. Out of 34 records of 89 birds, there were 7 records (12 birds) of white naped ibises, as follows:

- Long Wae Tukung, 1, November (Petersen 1991).
- Danumparoy Ma'au, 2, February (authors).
- Muring river, Ma'au, 3 and 2, March (authors).
- Danumparoy, 1, March (authors).
- Memahak Teboq, 1, April (authors).
- Batu river, Ma'au, 2, June (authors).

Appendix 2. Coordinates of locations in the region of survey

Figure 1. Map of Borneo with localities of previous sighting of White shouldered Ibis. The letters correspond with those in Table 1.

MAP of MAHAKAM

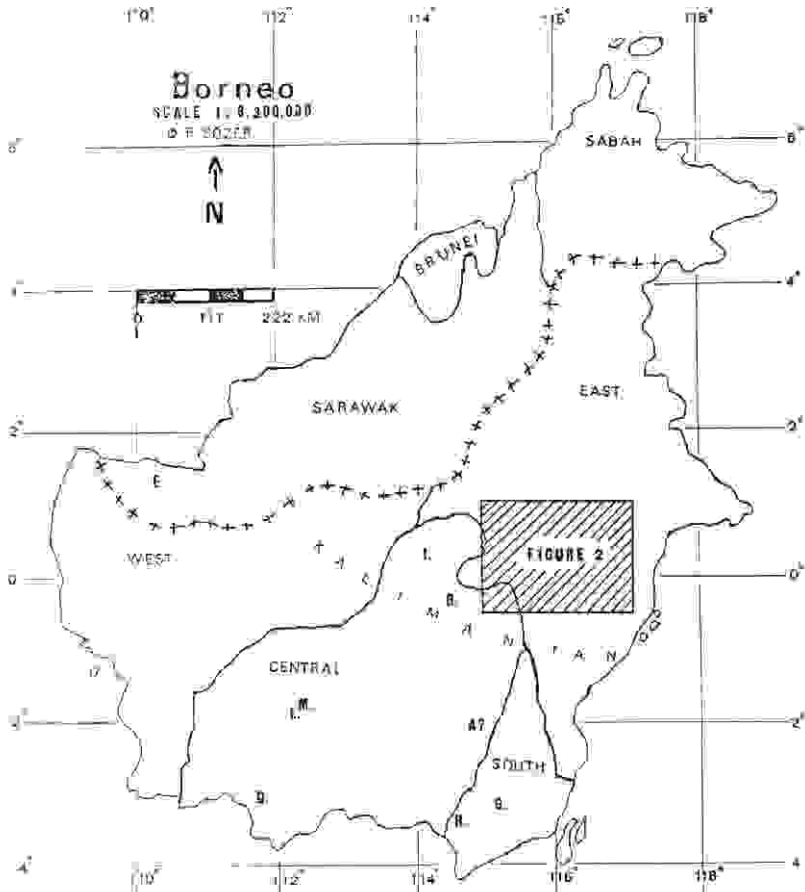
KALIMANTAN BIRD REPORT 2

compiled by D.A. Holmes

Batu River, Ma'au	115°20'E 0°12'N
Cemp. Barito Pacific	115°25'E 0°30'N
Damparoy	115°23'E 0°18'N
Damparoy - Ma'au	115°23'E 0°17'N
Lahan	115°24'E 0°21'N
Lahan - Long Uray	115°26'E 0°21'N
Long Isan - Long Kahan	115°33'E 0°03'N
Long Isan - Ujoh Eulang	not specified
Long Kahan	115°32'E 0°02'N
Long Malahan	115°12'E 0°27'N
Long Malahan - Long Bagun	115°18'E 0°28'N
Long Uray - Long Merah	115°26'E 0°23'N
Lutar	115°30'E 0°20'N
Memahak Besar	115°24'E 0°26'N
Memahak Teboq	115°30'E 0°10'N
Muara Ratab	115°24'E 0°12'N
Muring River, Ma'au	115°22'E 0°13'N
Nyalang E. - Damai-Lingan	not specified
PI RTC - Pari River	115°30'E 0°12'N
Putau Ujoh Halang	115°32'E 0°03'N
rapid upstream of Long Bagun	115°10'E 0°28'N
Tubang Merang	115°31'E 0°08'N

rom Kalimantan was prepared for *Kukila* by Holmes first 'Kalimantan Bird Report', and referred to here as ent data, up to the middle of 1997. For completeness, or the Mahakam Delta, as this Asian Wetland Bureau referred to as E&G. Remarkable is that most of the t previously been documented for Kalimantan. New

Kalimantan records in E&G have already been incorporated into the Indonesian Checklist (Andrew 1992). Frequent reference is also made to van Balen & Prentice (this issue), which discusses the Barito basin of South Kalimantan, and which is referred to here as B&P, to Laman *et al.* (1996) for records from Gunung Palling National Park in the west, here referred to as L.G&L, and also to Yus Rusila Noor & Enis Widianarti Hanafia (Rusila & Enis 1995) with reference to Muara Kendawanoan here referred to as



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Mountains and Pulau Laut in the SE of Kalimantan, van Balen (in press) for records from Danau Sentarum in the west and Soesilawati and Ulu-Jidat (1997) for dipterocarpaceae on the White-shoal and

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