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## THE BIRDS OF SANGIHE AND TALAUD, NORTH SULAWESI

by  
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### SUMMARY

The islands ofSangihe, Siau and Talaud were visited between 24 August and 31 October 1995 and a total of 126 species recorded. This paper provides details of all species recorded, including those new to the islands, additional information is provided on the five endemic species: *Eos histrio*, *Loriculus catamene*, *Halcyon enigma*, *Eutrichomyias rowleyi* and *Aethopyga duyvenhodei*. Further details are provided of records made between 1986 and 1995 during visits to the islands by four individual birdwatchers. Four of the endemic species were shown to be more common than previously thought, whilst details of the third record of *Eutrichomyias rowleyi* are presented. The conservation status of the islands is discussed and recommendations made for future research.

### INTRODUCTION

Between 24 August and 31 October 1995 a joint research team from University of York, U.K. and Universitas Sam Ratulangi, Manado, Indonesia investigated the status and ecology of the avifauna 'of the Sangihe and Talaud islands, North Sulawesi, Indonesia. The project was sponsored by Universitas Sam Ratulangi in cooperation with the Indonesian Institute of Sciences (LIPI) and the PHPA/BirdLife International Indonesia Programme.

Table 1 : Dates of surveys on each island in 1995.

<u>Island</u>	<u>Dates of visit</u>
Sangihe	24 August 12 September & 12 25 October.
Talaud	6 September 11 October.
Siau	26 October 31 October.

The small island groups ofSangihe and Talaud form a chain which extends from near the tip of the Minahasa peninsula of northern eastern Sulawesi towards the southern tip of Mindanao in the Philippines. These islands form the northernmost limit of Wallacea, and as a result of their small size and geographical isolation support a relatively impoverished avifauna, lacking many species found on the main island of Sulawesi.

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## HABITAT DISTRIBUTION

The Sangihe islands have a steep topography as a result of their volcanic origins. Sangihe, the largest island, is dominated by mixed plantations, comprising tree crops such as coconut, nutmeg, clove, sago, banana and larger fruit trees. The plantations mimic forest in many respects. A wide diversity of species is found in the plantations and only in the east of the island, which is less mountainous, are monocrop coconut plantations found. A well developed mid canopy, comprising clove, nutmeg and other shrubs, is present and the established nature of these plantations, created approximately seventy years ago, means they support a surprising bird species diversity. On the steepest slopes and along some deep gullies and river valleys there are isolated patches of original vegetation; although these are small in area, they support a high diversity of bird species, and some species were only recorded in this habitat. However the majority of species were recorded utilising cultivated areas and seem to have adapted to this man made environment. The upper slopes of the active volcano Gunung Awu are dominated by secondary scrub and grasslands, supporting few bird species.

Brief visits were made to Poa island, north east of Sangihe; the island supports small areas of coconut plantation, forest and open grassland.

Siau is volcanic in origin and the north of the island is dominated by the active volcanic caldera of Gunung Api. The slopes of the volcano are very steep and appear to be covered in sparse scrub. Steep hills make up the rest of the island and the vegetation would seem to resemble closely that found on Sangihe, although detailed investigations on this island were not carried out. Little natural vegetation was observed and what forest does remain is rapidly being converted to agricultural use.

Small islands offshore of Siau were surveyed briefly and are steep, rocky and have sparse, scrubby vegetation; these are referred to as Mahoro island in the systematic list.

The Talaud islands are low lying, non volcanic and have more extensive areas of natural forest than remain on Sangihe. On Karakelong, the largest of the three main islands, a hunting reserve (*Taman Buru*) has been established; surveys were concentrated in this area, which supports important populations of many species. Cultivation is largely restricted to coastal and low lying areas and the central areas are remote and have poor soils. In the south of Karakelong, Gunung Piapi supports a unique vegetation association as a result of the under lying, nutrient deficient ultrabasic rock (Proctor *et al.* 1994) but few bird species are found and those that do inhabit the scrub are at low densities. Salebabu has more extensive areas of cultivated land and forest is restricted to the central hills where it is heavily disturbed and gradually being cleared. The third island, Kabaruang, was not visited in 1995.

The small Sara islands, located between Karakelong and Salebabu, are low lying and have coralline soils; forest cover is largely complete, but habitats are heavily disturbed by selective logging and local people collecting firewood.

## PREVIOUS RESEARCH

Little ornithological research has been undertaken on Sangihe and Talaud this century. A summary appears in the table below. Early collectors documented the avifauna, mainly between 1860 and 1890 (summarised in Meyer and Wigglesworth 1898), but it is thought that in the 1920s and 1930s widespread

conversion of natural vegetation took place on Sangihe, creating the mixed plantation ecosystem that dominates the island today (Whitten *et al* 1987b). The effects of this change have never been investigated. Similarly, little detailed research has been carried out on Talaud, making the present project the first to survey comprehensively the Sangihe and Talaud islands this century.

Table 2 : Summary of ornithological research on the Sangihe and Talaud islands 1926 1995.

<u>Year</u>	<u>Research conducted and key findings</u>
1926	Expedition from Museum of Zoology, Bogor to Sangihe and Talaud. No published information located, but specimens from the expedition in the museum.
1978	M.D. Bruce makes short visits to the islands. Key findings reported in White & Bruce (1986) and include the first sighting of <i>Eutrichomyias rawleyi</i> since the type was collected in the 1870s.
1985	F. D. Rozendaal conducts research on Sangihe and Talaud. No published information, but <i>Aethopyga duyvenhodei</i> is found to be present on Sangihe (Collar & Andrew 1988).
1986	K.D. Bishop visits Sangihe and Talaud. First published sightings of <i>A. duyvenhodei</i> and <i>Loriculus catamene</i> this century (Bishop 1992).
1991	J. Taylor visits Sangihe and Talaud for 2 weeks. <i>Eos histrio</i> found to be common on Karakelong (unpublished report, 1992).
1993	S. V. Nash visits Salebabu, Talaud but conducts no fieldwork (Nash, <i>pers. comm.</i> ).
1995	D. A. Holmes visits Sangihe and Talaud in March. <i>Eos histrio</i> moderately common on Talaud and the taxonomic position of <i>Halcyon enigma</i> is investigated but not resolved (unpublished report, 1995).

### CONSERVATION STATUS

Ten restricted range species (with a world range of <50,000 sq. km.) occur on Sangihe and Talaud, of which five are endemic to the islands. This has led to the islands being designated an Endemic Bird Area (EBA) by BirdLife International (ICBP 1992). Six of these species are listed as being globally threatened with extinction, including all five endemics (see Collar *et al.* 1994 for details).

The main threat to these species has been habitat destruction. Indeed on Sangihe, only isolated fragmentary patches of natural forest remain. Where species have been able to adapt to habitat loss or habitat degradation other hazards threaten their survival; for instance *Eos histrio* populations are coming under increasing pressure from trapping for the live bird trade, a trade likely to compromise the long term future of the species.

Table 3 : Species of conservation concern on the Sangihe and Talaud islands.  
Endemic Restricted Threat Status

	<u>Endemic</u>	<u>Restricted</u>	<u>Threat Status</u>
Blue-tailed Imperial Pigeon <i>Ducula concinna</i>	-	*	-
Grey Imperial Pigeon <i>Ducula pickeringii</i>	-	*	<b>vulnerable</b>
Red-and-blue Lory <i>Eos histrio</i>	*	*	endangered
Blue-naped Parrot <i>Tanygnathus lucionensis</i>	-	-	endangered
Sangihe Hanging-parrot <i>Loriculus catamene</i>	*	*	<b>endangered</b>
Lilac-cheeked Kingfisher <i>Cittura cyanotis</i>	-	*	-
Sulawesi Kingfisher <i>Ceyx fallax</i>	*	*	-
Talaud Kingfisher <i>Halcyon enigma</i>	*	*	near-threatened
Pied Cuckoo-shrike <i>Coracina bicolor</i>	-	*	near-threatened
Caerulean Paradise-flycatcher <i>Eutrichomyias rowleyi</i>	*	*	critical
Elegant Sunbird <i>Aethopyga duyvenbodei</i>	*	*	endangered

\* species either endemic or restricted-range.

## SYSTEMATIC LIST

Sequence and nomenclature follow Andrew (1992), sub specific nomenclature follows White & Bruce (1986); abbreviations used in the text are as follows (after Collar *et al.* 1994) :

**RR** = restricted range species

**C** = critical **E** = endangered **V** = vulnerable **NT** = near threatened.

All records refer to 1995 except where specified. \* = Indicates apparent first published record.

### **Great Frigatebird *Fregata minor*. "Talaud : A pair over Sara Besar on 9 September.**

#### **Lesser Frigatebird. *Fregata oriel***

\* Sangihe : Recorded offshore in groups of up to 20 individuals between 31 August and 19 October at Tamako, Tabukanlama and Poa island.

\*Siau : 2 birds offshore of Ulu on 26 October and up to 15 off Mahoro Island 30 October.

Talaud ; 4 birds recorded over Sara Kecil on 9 September and 4 birds south of Pulutan, Karakelong on 5 October.

#### **Little Pied Cormorant. *Phalacrocorax melanoleucos***

\* Sangihe : A single bird in mangroves south of Tabukanlama between 17-25 October.

**Brown Booby *Sula leucogaster***

\*Talaud : 2 birds offshore of Sara Besar on 9 September and a single off Lining, Salebabu on 13 September.

**Great Egret *Casmerodius albus***

Sangihe : Two birds seen flying into a roost at Tabukanlama on 24 October was the **only record**, c. 30 were observed at Tahuna on 18 October 1990 (J. Taylor).

Talaud : One bird at Beo, Karakelong on 24 October 1990 (J. Taylor).

**Intermediate Egret *Egretta intermedia***

Sangihe : 6 birds in the roost at Tabukanlama on 24 October was the **only record**.

\*Siau : A single bird at a fish farm off Ulu, Siau on 31 October.

Talaud : 2 birds in grassland near Beo, Karakelong on 13 14 September. Records **of one at Tald**, Karakelong on 22 October 1990 and two at Beo on 24 October 1990 (J. Taylor).

**Little Egret *Egretta garzetta***

Sangihe : Approximately 70 birds were seen at the roost at Tabukanlama on 25 October.

Talaud : **One** bird near Aloha, Karakelong on 28 October 1990. (J. Taylor).

**Reef Egret *Egretta sacra***

Sangihe : A single on Poa island, 19 October. Siau : 2 birds near Ulu, 26 October and 3 on Mahoro, 31 October. Talaud : Common in all coastal areas on Salebabu, Sara Besar and Karakelong, with a maximum of 6 at Lining on 8 September. Also recorded in March 1995, near Lining (D. A. Holmes).

**Cattle Egret *Bubulcus ibis***

Sangihe : Recorded on five occasions between 17 25 October at Tabukanlama, with a maximum of 10 birds roosting on 24 October. Also recorded in March 1995, at Naha (U. A. Holmes).

\*Siau : Up to 4 recorded near Ulu 26 31 October.

Talaud : Up to 7 birds near Pulutan, Karakelong on 10 October was the only record. Recorded by D. A. Holmes at Beo, a party of 4, and at Melanguane airport, March 1995.

**Striated Heron *Butorides striatus***

\*Sangihe : A single at Tahuna, 19 October 1990 (J. Taylor). There were up to 7 birds in mangroves/fish ponds behind Tamako on 31 August and 4 September. Also singles at Tahuna on 19 September and Tabukanlama on 18 October.

Talaud : A single by a river south of Pulutan, Karakelong on 5 October was the only record. In 1990 two records at Mangemitu, Karakelong, 22 October and south of Pulutan, 25 October (J. Taylor).

**Rufous Night heron *Nycticorax caledonicus***

Talau : A single seen in flight over agricultural land behind Lining, Salebabu, 7 September was the only record.

**Malayan Night heron *Gorsachius melanolophus***

Talau : An immature bird flushed from a forest track and watched for 10 minutes near Sere, Salebabu on 10 September was the only record. This bird was grey white in colour with black feather markings on both upper and undersides, black secondary coverts, a rufous brown nape and a black line down the centre of the chest and breast. Grey green legs and brown bill.

**Yellow Bittern *Ixobrychus sinensis***

\*Sangihe : One, Naha airport, 17 March 1995 (D. A. Holmes) and one feeding around fishponds at Tabukanlama on 24 October.

\*Talau : One near Aloha, Karakelong, 25 October 1990 (J. Taylor).

**Schrenck's Bittern *Ixobrychus eurhythmus* NT**

Talau : The only record was of a single female in dense riverside vegetation near Lining, Salebabu on 10 September. A single bird in similar habitat near Rainis, 29 30 October 1990 (J. Taylor).

**Black Bittern *Ixobrychus flavicollis***

Talau : A single in a coconut plantation near Beo, 13 September, up to 4 recorded along River Lobo, Karakelong between 16 and 21 September and singles near Pulutan on 5 and 9 October.

**Osprey *Pandion haliaetus***

Sangihe : A single over Petta, Sangihe on 25 October.

Siau : One north of Ulu on 26 October.

Talau : Two records, one near Tabang on 4 October and one south of Pulutan on 5 October. Also recorded over Sara Kecil, May 1986 (Bishop 1992) and Pulutan, 27 October 1990 (J. Taylor).

**Oriental Honey buzzard *Pernis ptilorhyncus***

\* Sangihe : A single bird flying low over Poa island on 19 October in association with other raptor species.

**Brahminy Kite *Haliastur indus***

Sangihe : Common in all habitats from sea level to c.850m. on Gunung Awu and Gunung Sahengbalira, where usually observed singly or in pairs.

Siau : 1 3 birds recorded daily at Ulu, Lake Kepetta and Mahoro island.

Talau : Common and widespread on Salebabu and Karakelong with a maximum of 12 at Melanguane, Karakelong on 8 September.

**White bellied Sea eagle *Haliaeetus leucogaster***

Sangihe : One immature at Tahuna, 1 November 1990 (J. Tayter). A pair on Liang island, 18 19 October.

\*Siau : An immature over Ulu, 26 October and a pair on Mahoro island, 30 October. Talaud : First reported Sara Kecil, May 1986 (Bishop 1992) and Rainis, 29 October 1990 (J Taylor). In 1995 an immature over Lining, 6 September, then an adult and immature at Sara Kecil, 9 September and an adult south of Pulutan, 5 October.

**Chinese Goshawk *Accipiter soloensis***

Sangihe : First recorded on 13 October at Talawid Atas, peak counts totalled approximately **550 birds** which passed south during two hours over Poa island on 18 October and 120 birds over Poa on 19 October. Birds were most often seen in groups of 8 15 individuals, but on 18 October two groups of 150 180 birds were observed. **On** 17 March 1995 at least 120 birds were seen flying north over Naha (D. A. Holmes).

Siau : The first record was a single over Ulu, 26 October. The highest count was approximately 45 birds grounded by low cloud at Beong on 27 October.

Talaud : A single bird flying north, Essang, 21 March 1995 (D. A. Holmes).

North Sulawesi is an important winter ground for this species and it is thought the Sangihe and Talaud island chain forms an important migration route. Local people on Sangihe and Siau confirmed that every year large numbers of sparrow hawks pass through the islands in October/November heading south and return north in March.

**Japanese Sparrow hawk *Accipiter gularis***

\*Sangihe : First recorded at Naha, 17 March 1995 (D. A. Holmes) and on 14 October at Talawid Atas, a single female, then a further 6 records with the maximum being a flock of 8 over Kedang on 21 October in association with *A. soloensis*.

\*Siau : 3 near Ulu on 26 October and approximately 15 near Beong on 27 October, grounded with *A. soloensis*

\*Talaud : A single male near Beo, Karakelong on 23 September. Not all Accipiters were positively identified, immature *A. soloensis* being similar to female *A. gularis*. A well watched female at Talawid Atas, Sangihe had uniform brown upperparts and wings with small cream white feather tips, a grey tail with four narrow brown bands, chest white cream streaked with grey, flanks and belly cream barred with dark grey and white vent. Crown and forehead dark grey, with small white patch on nape. Bill dark grey with yellow base to lower mandible and bright yellow legs. All birds positively identified in flight (just two occasions) had four bands on the tail. Male *A. gularis* appeared smaller than females.

**Grey faced Buzzard *Butastur indicus***

Sangihe : 4 over Poa island, 19 October and 7 over Kedang, 21 October were the only records from Sangihe. One over Naha, 17 March 1995 (D. A. Holmes).

Siau : 2 near Ulu on 27 October and 2 over Talawide on 30 October.

Talau : 2 near Aloh, 25 October 1990 (J. Taylor).

**Eurasian Kestrel *Faico tinnunculus***

\* Sangihe : A single female present on Poa island, 19 October. The bird arrived early in the morning and stayed on the island for approximately two hours, before departing south with *A. soloensis*. Identified from Spotted Kestrel by the less heavily streaked underparts, lighter brown in colour and brown upperparts lacking the rufous colouration of *Faico moluccensis*. Observed hovering over the island in characteristic fashion. This appears to be the first record for Wallacea (White & Bruce 1986).

**Spotted Kestrel *Faico moluccensis***

Sangihe : First reported in May 1986 (Bishop 1992) and subsequently seen in March 1995 (D. A. Holmes), both at Naha airport. Recorded from Tamako, Hegi, Talawid and Tabukanlama on Sangihe, all sites being in pure coconut plantations near sea level.

\*Siau : 3 in the fall of raptors on 27 October near Beong.

\*Talau : A single over Beo, Karakelong, 12 September.

**Peregrine Falcon *Faico peregrinus***

\* Sangihe : 2 birds near Talawid Atas on 10 September appeared to be of the dark resident race *emesti*. Two records of the paler, migratory race *calidus* were made on Sangihe; a single at Tabukanlama 17 October and a single at 800m on Gunung Awu 22 October.

\*Siau : A single of the *calidus* sub species over Ulu, 26 October.

**Philippine Scrubfowl *Megapodius cumingi* NT**

The sub species *sanghirensis* is endemic to Sangihe and Talau (White & Bruce 1986). Sangihe : Only two records, of birds calling from mixed plantation areas at an altitude of 300m near Talawid Atas on 10 September and 15 October. Calls are a plaintive, crying "whaoooo .....whaoooo.....whaooooooo". An active nest mound was located at 800m on Gunung Awu on a steep slope in tree fern scrub. Shallow excavations had been made in stony soil, approximately one metre across, with deeper burrowing concentrated at three points, to a total depth of c.30cm from the surface.

Talau : On Salebabu 2 birds seen in forest on Gunung Ayambana, 7 September. Regular in all habitats on Karakelong, being commonest in forest, the maximum day total recorded was 10 in forest around the River Lobo camp on 20 September. Also seen and heard in agricultural areas, with two in roadside vegetation south of Beo on 13 September. The Sara islands are an important site for this species, with two active nest mounds, of similar construction to that found on Sangihe, on Sara Besar and 3 on Sara Kecil located on 9 September, with a total of 9 birds being recorded on the islands.



**Common Bush hen *Amaurornis olivacea***

\*Talaud : 4 birds seen crossing a road through grassland behind Beo, Karakelong on 14 September and a single almost trapped at the River Lobo camp on 18 September.

**White breasted Waterhen *Amaurornis phoenicurus***

Talaud : A single bird in swampy vegetation south of Beo on 23 September was the only record, but D. A. Holmes had voice records at three locations on Karakelong in March 1995.

**Purple Swamphen *Porphyrio porphyrio***

Talaud : A single bird in cultivated habitat at the base of Gunung Piapi, Karakelong on 26 October 1990 (J. Taylor).

**Grey Plover *Pluvialis squalarola***

\*Sangihe : A single in mangrove at Tamako on 31 August.

Talaud : 2 birds on Sara Besar and a single near Lining on 9 September.

**Pacific Golden Plover *Pluvialis fulva***

Sangihe : On Sangihe 3 birds at Tabukanlama on 18 and 24 October and a group of 5 birds at 700m near Kedang feeding on recently cleared land.

\*Siau : A single on the beach at Ulu, 30 October.

Talaud : Recorded on Salebabu, Karakelong and Sara Besar on exposed reefs, beaches and grassland, vrth a maximum of 35 at Melanguane airport on 8 September.

**Malay sian Plover *Charadrius peronii***

\*Talaud A party of two adults and two immatures, probably one family, on the beach at Beo, 18 March 1995, with a single near Essang, Karakelong on 21 March (D. A. Holmes).

**Lesser Sand plover *Charadrius mongolus***

\*Talaud : One record of 3 birds with *C. leschenaultii* at Toabatu, Karakelong on 29 September.

**Greater Sand plover *Charadrius leschenaultii***

Talaud : Recorded on beaches at Lining, Salebabu, Sara Besar, Toabatu and Pmutan, Karakelong, with a maximum of 6 at Toabatu, 29 September.

**Whimbrel *Numenius phaeopus***

Sangihe : Common in coastal habitats on Sangihe; *N. p. variegatus* commoner than the nominate race.

Talaud : Common on coasts and rivers on Karakelong, Salebabu and Sara Besar, 12 at Melanguane, 8 September being the largest flock.

**Far Eastern Curlew *Numenius madagascariensis* NT**

\*Talaud : Singles on Sara Kecil, 9 September and south of Lobo, Karakelong, 14 September.

**Black tailed Godwit *Limosa limosa***

\*Talaud : A single bird in a flock of *N. phaeopus* flying west past Salebabu on 8 September.

**Common Redshank *Tringa totanus***

\*Sangihe : A record of 2 birds in mangroves at Tamako on 31 August.

**Spotted Redshank *Tringa erythropus***

\*Sangihe : A single bird at Tamako on 31 August. This appears to be the first published record for Sulawesi (White & Bruce 1986).

**Marsh Sandpiper *Tringa stagnatilis***

\*Sangihe : 3 birds on 18 October and 2 on 24 October at fish ponds near Tabukanlama.

\*Talaud ; 2 birds at Melanguane airport, Karakelong on 8 September.

**Common Greenshank *Tringa nebularia***

\*Talaud : 2 birds observed in flight and calling over River Lobo, Karakelong on 14 September.

**Wood Sandpiper *Tringa glareola***

\*Sangihe : A single bird at Tahuna, 19 October 1990 (J. Taylor). A single bird in mangrove at Tamako on 4 September was the only record in 1995.

**Terek Sandpiper *Xenus cinereus***

\*Talaud : A single on coastal mudflats at Beo, Karakelong on 27 September.

**Common Sandpiper/*Irtf'ris hypoleucos***

Sangihe : Common in all coastal areas.

Siau : Common in all coastal areas.

Talaud : Common in coastal areas and inland along rivers on Karakelong and Salebabu.

**Grey tailed Tattler *Heteroscelus brevipes***

Sangihe : Recorded in mangroves at Tamako, Tabukanlama and Benketang on Sangihe, with a maximum of 7 at Tamako on 4 September.

\*Siau : A single at Ulu on 30 October.

Talaud : Up to 4 recorded in coastal habitats on Salebabu and Karakelong and inland along River Lobo.

**[Swinhoe's Snipe *Gallinago megala*]**

Sangihe : A single bird, tentatively identified as this species from flight characteristics, at Naha airport, 17 March 1995 (D.A.Holmes).

Talaud : A single bird, likewise probably this species, at Melanguane airport, 18 March 1995 (D. A Holmes).

**[Pintail Snipe *Gallinago stenur*]**

Talaud : A single small snipe seen on River Lobo, Karakelong on 18 September was thought to be this species, which has not been recorded on Talaud.

**Rufous necked Stint *Calidris mficollis***

Sangihe : A single bird at Tabukanlama on 24 October.

**Oriental Pratincole *Glareola maldivarum***

\*Talaud : Two birds flying along the main road at Beo, Karakelong on 25 September are the second record for the island, the first being two flying north near Beo on 22 March 1995 (D. A.Holmes).

**Common Black headed Gull *LOTUS ridibundus***

\* Sangihe : A solitary bird at Tahuna harbour on 16 March 1995 (D.A.Holmes)..

**Whiskered Tern *Chlidonias hybridus***

\* Talaud : 7 birds in a mixed feeding flock of terns, offshore south of Lobo, Karakelong on 14 September.

**White winged Tern *Chlidonius leucopterus***

Talaud : Four records; 12 flying east of Lining, Salebabu, 9 September, 15 between Melanguane and Beo, Karakelong, 12 September, c.30 off Toabatu, Karakelong, 1 October and a single near Tabang, 4 October. A flock of 20 "marsh terns" offshore of Lirung on 21 May 1986 included one bird positively identified as this species (Bishop 1992).

**Common Tern *Sterna hirundo***

\*Talaud : Thirteen records between 8 September and 11 October; 5 off Lining, Salebabu, 8 September, the first record for the islands. Flocks included 30 off Lining, 10 September, 25 between Melanguane and Beo, 12 September, approximately 180 offshore south of Lobo, 14 September and C.I 50 offshore of Toabatu, 1 October.

**Black naped Tern *Sterna sumatrana***

\*Talaud : Five records between 12 September and 5 October, first were 10 off Lining, Salebabu, 12 September, with a maximum of c.15 offshore of Toabatu, Karakelong, 1 October.

**Bridled Tern *Sterna anaethetus***

\*Talaud : 2 off Lining, Salebabu, 22 March 1995 (D. A. Holmes).

**Little Tern *Sterna albifrons***

\*Talaud : 9 off Lining, Salebabu, 10 September and c.10 offshore south of Lobo, Karakelong.

**Great Crested Tern *Sterna bergii***

Sangihe : 3 on Poa, 18 October and 3 offshore of Tabukanlama, 24 October.

Talaud : Present in small numbers around Karakelong, with a maximum of c.15 offshore of Toabatu on 1 October.

**Lesser Crested Tern *Sterna bengalensis***

\*Talaud : One record of a single bird resting on floating driftwood off Tabang, Karakelong, 4 October.

**Brown Noddy *Anous stolidus***

\*Talaud : One bird in a mixed feeding flock of terns offshore of Toabatu on 1 October.

**Grey checked Green Pigeon *Treron griseicauda***

Sangihe : The endemic sub species *sangirensis* is uncommon and observed in small groups of 1-5 birds in forest and mixed plantations at mid altitudes, between 100 and 600m.

**Pink necked Green Pigeon *Treron vernans***

Sangihe : Uncommon and observed primarily in coastal plantations in small groups of 1-4 birds. Maximum recorded were c.20 flying to roost at Tabukanlama, 25 October. 2 on Poa island, 18 October.

\*Sjau : A single flying over Ulu, 30 October.

Talaud : First reported at Lining, May 1986 (Bishop 1992) and subsequently on Karakelong, March 1995 (D. A. Holmes). Common in cultivated low lying and coastal areas on Salebabu and Karakelong, with flocks of up to 60 birds around Lining, 8 September, 30 near Beo, 14 September and 73 at Beo, 24 September.

Black naped Fruit dove *Ptilinopus melanospila* Sangihe : One of the commonest birds on the island, found in all habitats from sea level to c.900m; roosts communally in coconut and other tall trees.

\*Sjau : 2 birds observed near Lake Kepetta, 28 October in a remnant forest patch.

Talaud : Very common in all habitats, the maximum being 84 in forest habitat around the River Lobo camp, 20 September.

**Green Imperial Pigeon *Ducula aenea***

Talaud: The endemic sub species *D. a. intermedia* was recorded on Salebabu and Karakelong. Just one observation on Salebabu, in forest near Sere, but the species is frequently observed on Karakelong in forest areas. Usually in small groups flying to roost, often in association with *D. concinna*, with a maximum count of 19 in forest at River Lobo camp, 17 September.

**Blue tailed Imperial Pigeon *Ducula mcinnna* RR**

Sangihe: Regular in forest and mixed plantation habitat between c.200m and c.500m around Gunung Sahengbalira and Talawid Atas. The majority of records of this species were made in remnant forest patches, suggesting it is reliant on this habitat. The most notable concentration was 9 above Talawid Atas, 18 October.

Talaud: Common in forest on Karakelong up to an altitude of c.300m, often in flocks of up to 15 birds, with a maximum daily total of 32 around the River Lobo camp, 16 September. Not recorded on Salebabu and local villagers on this island reported a decline in numbers associated with habitat loss and hunting. One was heard calling on Sara Kecil on 9 September. The call of this species is a distinctive deep pitched, rolling "ur ooow".

**Grey Imperial Pigeon *Ducula pickeringii* V/RR**

Talaud: Only recorded twice by the project and according to villagers on Karakelong this is the least common of *Ducula* species, being restricted to the forested central hills. A single bird was seen flying to roost with 3 *D. aenea* on the evening of 19 September at the River Lobo camp, Karakelong and a 'single captive bird in Bengel, Karakelong, 24 September. Previously only known from Kabaruang and Salebabu on Talaud, confirmed by Bishop (1992) in 1986.

**Pied Imperial Pigeon *Ducula hicolor***

Sangihe: Observed in mixed plantation areas around Talawid Atas, with a flock of 24 on 8 September. The only other records on Sangihe were a single at Tabukanlama, 25 October, roosting with *Treron vemans* and *Streptopelia chinensis* and 5 birds on Poa island, 18 October; this last site is a traditional roost according to local people.

\*Siau: Flocks of 7 and 18 in remnant forest around Lake Kepetta on 29 October.

Talaud: One record of a single bird on Sara Besar, 9 September. A single record near Lining in May 1986 (Bishop 1992) and a group of 15 near Rainis, 28 October 1990 (J. Taylor).

**Feral Pigeon *Columba livia***

\*Sangihe: Feral birds seen daily in Tahuna, October 1990 (J. Taylor)

**Metallic Pigeon *Columba vitiensis***

\*Talaud: One record of a single bird in a remnant coastal forest patch south of Pulutan, Karakelong, 8 October.

**Slender billed Cuckoo dove *Macropygia amboinensis***

The sub species *sanghirensis* is endemic to Sangihe and Talaud (White & Bruce 1986).

Sangihe : Found on Sangihe in all habitats to an altitude of c. 1000m, but commonest in plantations at lower altitudes. Also observed in scrub within the crater of Gunung Awu.

Siau : A common bird of coconut plantations and mixed agricultural areas.

Talaud : Irregularly observed in secondary coastal scrub and plantations on Salebabu, Karakelong and Sara Kecil, usually singly or in pairs.

**Spotted Dove *Streptopelia chinensis***

\*Sangshe : The first record is a single bird at Tahuna on 18 October 1990 (J. Taylor) with subsequent records near Naha in March 1995 ( D. A. Holmes). Irregular in all habitats on Sangihe up to an altitude of c.300m, the largest count being a group of 15 flying to roost with *Treron wnvms* and *Ducula bicolor* at Tabukanlama, 25 October. Siau : Very common in all low altitude areas to c.500m.

\*Talaud : First recorded at Essang, 20 March 1995, vocalisation only (D. A. Holmes). Uncommon on Karakelong and Salebabu in plantations and secondary scrub, and recorded on two occasions in forest, not typical habitat for the species.

**Emerald Dove *Chalcophaps iulica***

Sangihe : Found in low densities in mixed plantation and forest around Tahuna, Tamako, Talawid and Kedang up to an altitude of c.700m on Sangihe.

\*Siau : A single in coastal plantations north of Ulu, 26 October.

Talaud : Recorded on Salebabu and Karakelong in forest and cultivated habitats, up to an altitude of c.350m.

**Red and blue Lory *Eos histrio* E/RR**

Sangihe : The endemic sub species *E. h. histrio* has not been observed on the island since 1978 (M D. Bruce in White & Bruce, 1986) and was feared extinct (Whitten *et al.* 1987b) as a result of habitat loss. Small flocks of Red and blue Lories were seen on nine dates between 8 September and 15 October, in mixed plantation areas adjacent to remnant forest patches near the village of Talawid Atas. A maximum of 5 birds was seen, but local villagers reported that approximately 30 are present in the area. 2 birds in a party of 4 observed on 13 October were tentatively identified as nominate *histrio* by direct comparison with the other two which were considered to be escaped *talautensis*, the Talaud sub species. The latter were smaller and less robust in build particularly the head, with narrower blue breast band, and less black on the wing coverts; finally, they carried wooden leg rings The putative *histrio* were larger, with a broader blue breast band and more black on the wing coverts. The species was also reported to be present around the village of Kedang, with villagers seeing small numbers irregularly.

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Talaud : In 1986 birds were recorded in ones and twos near Tule, Karakelong (Bishop 1992) and small parties were observed north of Rainis 28–30 October 1990, with at least 8 birds present in one flock (J. Taylor).

On Karakelong the endemic sub species *E. h. talautensis* is still common in forest in the north of the island, being observed daily, usually in groups of 1–8 birds, with a maximum of 253 birds at a roost site near Toabatu on 1 October. The species also visits cultivated areas to feed on nectar produced by coconut flowers and is most commonly observed in flight as groups move between feeding, roosting and resting sites. In the south of Karakelong, *E. histrio* is less common with a total of 9 birds seen in one week around the village of Pulutan. Although reported by local PHPA officers to be extinct on Salebabu and Kabaruang, a single bird was seen in forest edge habitat on Gunung Ayambana, Salebabu, 8 September and birds were heard calling the following day. Informants in Lining, Salebabu suggested that a flock of c. 100 birds visits the Ayambana area each year between November and March. Lories were observed to feed in trees identified as: *Ficus* sp., *Canarium* sp., *Lansium domesticum*, *Syzygium* sp. and Coconut (*Cocos nucifera*).

Captive juvenile birds in Beo, Karakelong in late September and information from local people suggests the species breeds in June/July, but trappers also suggested breeding takes place in November and December to coincide with the main fruiting season on the islands. A single nest site was visited, following information from local trappers. Located at 30 metres height in a *Canarium* sp. tree, the nest site was in a hole in the main trunk caused by a main side branch having broken off from the tree; in mid September this site was unoccupied.

Red and blue Lories are commonly trapped on Karakelong and enquiries amongst trappers at two villages, Bengel and Toabatu, suggested approximately 300 birds were caught in a year at each village. The birds are either sold to traders in Beo and subsequently transported to Manado, Sulawesi, the main market for the species, or directly to Filipino traders who travel to Karakelong each year specifically to purchase lories. This trade is illegal as Red and blue Lory is a CITES Appendix I listed species (Nash 1993).

#### **[Ornate Lorikeet *Trichoglossus ornatus*]**

Sangihe : The first record for Sangihe was of a single bird on 8 September in mixed plantation habitat above Talawid Atas. *T. ornatus* was observed on a further 5 dates, with a maximum of 3 birds on 9 September and a pair was seen displaying on 13 October. The origin of these birds is not known, but the presence of escaped *E. histrio*, *Lorius garrulus* (Chattering Lory) and *Tanygnathus lucionensis* in the same area suggests these could be introduced birds.

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**Golden mantled Racquet tail *Prioniturus platurus***

Siau : 2 birds heard calling near Lake Kepetta, 28 October were assumed to have been of the nominate, Sulawesi race *P. p. platurus* previously recorded on Siau (White & Bruce 1986). Talaud : The endemic sub species *P. p. talautensis* was observed only on Karakelong, where it is widespread in low densities. Usually seen in small flocks of up to 8 birds, the species occurs in forest and cultivated areas and was the commonest parrot observed in the ultrabasic forest on the island.

**Blue naped Parrot *Tanygnathus lucionensis* E**

Sangihe : A single bird was observed roosting with *T. megalorynchos* near Talawid Atas on four dates. The individual appeared to be of the *talautensis* sub species and presumably an escapee. Talaud : The endemic sub species *T. l. talautensis* is present on Salebabu and Karakelong, in forest and forest edge habitats up to c.300m. There was a single record on Salebabu, of 2 birds in forest edge habitat near Lirung, 11 September. On Karakelong *T. lucionensis* is widespread at low densities, with individual birds and small parties of up to 5 birds being seen in plantations; it is commoner in forest, with a maximum of 8 near the River Lobo camp, 18 September, and commonly associates with *P. platurus* in feeding trees.

**Blue backed Parrot *Tanygnathus sumatranus***

Sangihe : Widespread in low numbers in forest and mixed plantation up to c.800m. Recorded at Tahuna, Sahengbalira and Talawid Atas, the largest count being a flock of 11 birds seen feeding in remnant forest in a steep valley above Talawid Atas.

Talaud : Recorded only on Karakelong, with highest numbers in forest, but also occurs in plantations and other secondary habitats. The largest party was a flock of 9 seen in forest near Toabatu, 3 October. A female and 2 males (identified by beak colouration) were watched investigating a cavity in a dead tree in cultivated land near Bengel, 24 September. Bishop (1992) observed a flock of 15 near Lirung in May 1986.

**Great billed Parrot *Tanygnathus megalorynchos***

Sangihe : Uncommon and seemingly reliant on areas of forest; 2 birds heard calling on Gunung Sahengbalira, 2 September and a roost of up to 10 birds near Talawid Atas in September and October. Siau : 3 birds were heard calling at Lake Kepetta, 28 October and a single bird was seen there, 29 October and 2 birds were seen on Mahoro island, 31 October. Talaud : Recorded on Salebabu and Karakelong, usually in pairs and commonest in forest or forest edge, but also visits plantations to feed. The highest count was a group of 16 seen and heard at a roost site near Toabatu, Karakelong, 2 October



**Sangihe Hanging parrot *Loriculus catamene* E/RR**

Sangihe : This species is a single island endemic and the only recent record was of two birds seen on Gunung Awu in 1986 (Bishop 1992). A total of 54 birds was seen in seventeen sightings, the majority being of small groups of 1-4 birds in mixed plantation habitats. The species was recorded at Tahuna, Gunung Sahengbalira, Tabukanlama, Kentuhang, Ulung Peling, Talawid Atas, Kedang and Gunung Awu, at altitudes between near sea level and c.900m., in coconut monoculture/mixed plantations and forest. The species has clearly adapted to changes in its habitat brought about by forest clearance and an important food source appears to be nectar from coconut flowers. *L. catamene* was most commonly observed in areas of mixed plantation and remnant forest patches and a group of 17 birds was observed apparently leaving a roost on the morning of 3 September in such habitat near Kentuhang.

**Oriental Cuckoo *Cuculus saturatus***

\* Sangihe : Single birds observed at Talawid Atas, 14 October and Petta, 25 October.

Talaud : Small numbers noted in secondary habitats on Karakelong and Salebabu, the first seen on 11 September near Lining. One near Aloha in cultivation, 25 October 1990 (J. Taylor).

**Asian Koel *Eudynamys scolopacea***

Sangihe : Uncommon in forest and mixed plantations up to c.800m on Gunung Sahengbalira. More frequently heard than seen, up to 5 were heard calling around Kentuhang on 3 September. A single bird was seen and heard calling on Poa island, 19 October. Talaud : A common species in forest on Karakelong and occasionally seen feeding at fruiting trees, but very wary. More often heard, an excited, tremulous "whooh... whooooo... whooooo" rising in pitch, sometimes in the middle of the night. Can also be found in secondary habitats, particularly where large forest trees remain.

**Channel billed Cuckoo *Scythropus novaehollandiae***

\*Siau : 4 at Lake Kepetta, 28 October and 3 there, 29 October. Talaud : One near Beo, 24 October 1990 (J. Taylor). This is the northern limit of its known range.

**Lesser Coucal *Centropus bengalensis***

Sangihe : Common on Sangihe in secondary scrub and grassland up to c.700m on Gunung Sahendaruman.

Siau : Common in secondary scrub and grassland areas.

Talaud : Common on Salebabu and Karakelong in most habitats, including ultrabasic scrub on Gunung Piapi, but is absent from forest.

**Sulawesi Owl *Tyto rosenbergii***

Sangihe : A single bird calling, a harsh, flat hissing screech, at Kentuhang, 2 September, and one seen hunting in a coconut plantation at Talawid Atas, 12 October.

**[Moluccan Scopsowl *Otus magicus*]**

Sangihe : A Scops Owl heard calling on 8 and 9 September at Talawid Atas was assumed to have been this species.

**Brown Boobook *Ninox scutulata***

Talaud : One seen in forest by the River Lobo camp, Karakelong, 18 September was the only record. The bird was perched in the lower branches of a large tree and was watched for several seconds before it flew. This is an early date (known period in Sulawesi is October to March, White & Bruce 1986). A single bird seen near Beo, 19 March 1995, was thought to have been this species (D. A. Holmes).

**[Edible nest/Uniform Swiftlet *Aerodramus fuciphagus/vanikornensis*]**

Small, narrow winged, all dark swiftlets seen at Kendahe and Talawid, Sangihe and near Bengel, Karakelong could not be specifically identified, despite good views, but are thought to have been one of the two named species, neither of which has previously been recorded on Sangihe or Talaud. *Collocalia esculenta* has paler underparts, always clearly discernible with prolonged observation and *Aerodramus infuscatus* is paler brown and has a distinctive flight action, caused by the broader secondaries.

**Moluccan Swiftlet *Aerodramus infuscatus***

\* Sangihe : Present from sea level to 1200m in smaller numbers at lower altitudes, but particularly common on the upper slopes of Gunung Awu. Noted to be common in March 1995 (D. A. Holmes).

\*Siau : Large groups hawking for insects over Ulu, 26 October. Identified as *A. infuscatus* by their slightly larger size, in comparison with the common *Collocalia esculenta*, broader wings, with slightly bulging secondaries, less contrasting upper and underparts (on *C. esculenta* the grey underparts contrast strongly with the blue black wings and upperparts) which are a dirty brown colour and a slightly paler rump, grey brown but only visible with good views. This species has a stronger flight action than *C. esculenta* and a more robust jizz. Following Chantler and Driessens (1995) it is thought these birds are of the nominate race *C. infuscatus* found on Halmahera, Morotai and Temate in the North Moluccas.

**Glossy Swiftlet *Collocalia esculenta***

Sangihe : One of the commonest birds on Sangihe, recorded from sea level to 1200m in all habitats. Apparent ecological separation of *C. esculenta* and *A. Infuscatus* was noted in forested areas, with the smaller *esculenta* often hawking below the canopy level flying between trees, whilst *infuscatus* was only seen feeding above the canopy.

\*Siau : Very common, where previously unrecorded, and a nesting cave was located on Mahoro Island. Talaud : In contrast to Sangihe, uncommon, observed in small numbers in forest habitat on Karakelong and Salebabu

**White throated Needletail *Hirundapus caudacutus***

\* Sangihe : A single bird feeding over a ridge above Kedang, c.800m on 21 October.

**Fork tailed Swift *Apuspadficus***

\*Talaud : A party of 6 over Toabatu, Karakelong, 3 October, c.15 at c.500m. over Gunung Piapi, 7 9 October and 10 south of Alo, Karakelong.

**Asian Palm swift *Cypsiurus balasiensis***

\* Talaud : A group of 3 flying south with 11 *Collocalia esculenta* over Toabatu, Karakelong, 29 September. Identified as this species by the long narrow wings, relatively long tail and distinctive, frantic, flight action.

**Common Kingfisher *Alcedo atthis***

Sangihe : Two records of a single bird (subspecies not recorded) in mangrove at Tamako, 30 August and 2 there on 4 September.

Talaud : One in mangrove near Lining, Salebabu, 7 September. Common along River Lobo, Karakelong with pairs holding territory. Subspecies not recorded.

**Lilac cheeked Kingfisher *Cittura cyanotis* RR**

Sangihe : The endemic sub species *sanghirensis* is widespread in low densities throughout the island from 100m to 850m in remnant forest patches and mixed plantation agriculture. Recorded at Tahuna, Gunung Sahengbalira and Talawid Atas, the species is adapted to mature plantations and was most commonly observed on feeding perches adjacent to recently cleared, open areas.

**Ruddy Kingfisher *Halcyon coromanda***

Siau : The only record was a single bird in scrub at c.300m near Beong, on 27 October. Talaud : A single bird near Rainis on 30 October 1990, of the migrant sub species *major* (J. Taylor).

**Sacred Kingfisher *Halcyon sancta***

Sangihe : Three records; c.10 at Tamako, 31 August and 6 there 4 September and 2 at Benketang, 3 September, all sightings in mangrove areas.

Talaud : Common in coastal scrub and mangrove on Salebabu, Karakelong and Sara Besar and Kecil.

**Collared Kingfisher *Halcyon chloris***

Sangihe : Common in secondary scrub, mangrove and other coastal habitat around Tahuna, Tamako, Petta, Tabukanlama and Benketang. A juvenile bird that was mist netted on Poa island, 19 October appeared to have recently fledged, suggesting that breeding may take place on the islands.

Siau : Birds seen at Ulu, Lake Kepetta, Beong and Mahoro island. Talaud : Recorded on Salebabu, Karakelong and Sara Besar in coastal habitats and secondary scrub up to an altitude of c. 200m. but most commonly observed in mangrove. The first evidence of breeding on Talaud was provided by a bird close to fledging found in Bengel, Karakelong, that had been collected by villagers from a hole in a tree in a plantation on 23 September. This was identified by the relatively large size of bill for a bird of that age. The subspecies occurring on Talaud has not been identified, but it is noted that Philippine *collaris* has similar measurements to nominate *chloris* (see duPont 1971, and c/"White & Bruce 1986 under *H. enigma*).

#### **Talaud Kingfisher *Halcyon enigma* T/KR**

Talaud : Not positively identified by D. A. Holmes in March 1995, but birds thought to be this species were observed in enclosed habitats north of Beo.

Endemic to Talaud and regularly observed in forested areas on Karakelong and Salebabu. The taxonomic position of the two forms of '*H. chloris*' on Talaud was unclear, with the smaller form being treated as either a true species, *H. enigma*, or a sub species *H. chloris enigma* (Eck 1978). The specific status of *enigma* is supported by both ecological and morphological differences from *chloris* (Riley in prep.). Ecological separation of the species occurs, with *enigma* being restricted to forest, whilst *chloris* is found in secondary and coastal habitat; both species appear to have resident, breeding populations on the islands and such sympatric distribution provides the strongest evidence for speciation (White and Bruce 1986). The species can be identified in the field by its smaller size (cf comment on *H. chloris collaris* above) and less heavy bill compared to *chloris*, and differences in call are suspected.

The species is not uncommon in forested habitat, particularly along the River Lobo, and was usually observed on feeding perches. Prey items appeared to include small grasshoppers and river snails.

#### **Rainbow Bee eater *Merops ornatus***

Sangihe : One record, a group of 4 in grassland on Gunung Sahendaruman, 29 August.

Talaud : 3 south of Beo, Karakelong, 13 September and a group of c. 120 in open, grassy terrain surrounding the River Lobo flood plain, 14-15 September.

#### **Common Dollarbird *Eurystomus orientalis***

Talaud : On Karakelong present at Beo, River Lobo and Toabatu in secondary habitats at low densities and usually observed singly or in pairs.

#### **Red bellied Pitta *Pitta erythrogastris***

Talaud : Not seen, but birds heard regularly at low densities in forested habitat on Salebabu and Karakelong; presumably the endemic sub species *P. e. inspeculata*. The call is a thin, mournful "wooo....oo..ooooo" which rises slightly in pitch on the first note, falls at the start of the second and then

rises again. On Karakelong recorded at Beo, Toabatu and at the River Lobo camp, with up to 4 birds calling at dawn on 20 September at the latter site being the maximum recorded. Bishop (1992) has a voice record from Lining, May 1986, while D. A Holmes encountered three separate birds (one sighting) near Beo on 19 March 1995.

#### **Hooded Pitta *Pitta sordida***

Sangihe : The endemic sub species *P. s. sanghirana* was recorded at low densities in mixed plantation habitat from c. 150m to c.450m at Tahuna and Talawid Atas. Most records were of calling birds, but a pair calling from dense undergrowth in a sago plantation behind Tahuna were observed, 27 August. The call is a repetitive, double note "hoo...ooo".

Talaud : Birds heard giving a similar double note call to that heard on Sangihe were thought to be this species. Noted from forest at Sere, Salebabu, 10 September and at the River Lobo camp, Karakelong, 23 September, Previously *Pitta sordida* has not been recorded on Talaud.

#### **Barn Swallow *Hirundo rustics***

Sangihe : Common in all habitats from sea level to c. 1200m on Gunung Awu, after the first recorded at Gunung Palenti, Tamako on 30 August.

\*Siau : Approximately 30 seen over Ulu, 26 October.

\*Talaud : Common on Salebabu, Karakelong, particularly in secondary habitats and around human habitation. Seen over Sara Besar in association with movements of *H. tahitica*.

#### **Pacific Swallow *Hirundo tahitica***

Sangihe : Common in all habitats from sea level to c. 1200m.

\*Siau : Regular at lower altitudes on Siau, where there are no previous records. Talaud : Common on Salebabu, Karakelong, Sara Besar, particularly at lower altitudes in secondary habitats. Large numbers, c.6000, of both *Hirundo* species roost on electricity wires in the centre of Lining, Salebabu each night. It would appear birds travel from Karakelong to the roost, large scale movements of birds moving south being noted daily from as far north as Alo.

#### **Yellow Wagtail *Motacillaflava***

\*Sangihe : First records are of birds seen in October 1990 (J. Taylor). Widely distributed from sea level to c.400m, with a flock of c.80 flying south west over Talawid Atas, 15 October and also noted on Poa island.

\*Siau : Birds at Ulu and Lake Kepetta, 26-28 October.

\*Talaud : First record is of 11 flying towards Karakelong from the sea on 24 October 1990 (J. Taylor). Regular in coastal and secondary habitats and inland along rivers on Karakelong and Salebabu, with c.30 on sand banks along River Lobo, Karakelong, on 15 September being the largest concentration.

**Grey Wagtail *Motacilla cinerea***

\*Sangihe : On Sangihe 1 in mangroves at Tabukanlama, 18 October and 1 on Poa island on the same date.

\*Siau : 2 on Mahoro island, 31 October.

\*Talaud : Less common than *M. flava* and recorded only along River Lobo, Karakelong, with up to 6 on 15 September. The first records for Talaud are singles near Aloha on 25 and 28 October 1990 (J. Taylor).

**Pechora Pipit *Anthus gustavi***

\*Sangihe : A single bird seen at c.800m in scrubby grassland on the slopes of Gunung Awu, 22 October. Attention was drawn to the bird by a single, harsh "pswit" call note. A small pipit with striking white lines on mantle and strong white wing bars, it was seen first in flight, alighting briefly in the grass until flushed.

**Red throated Pipit *Anthus cervinus***

\*Talaud : A flock of 11 flying south, together with Yellow Wagtails, near Alo, Karakelong; identified as *A. cervinus* by their distinctive high pitched, thin call "seep.....seepp".

**Pied Cuckoo shrike *Coracina bicolor* NT/RR**

Sangihe : A single male bird was seen in secondary scrub at c.700m on Gunung Sahengbalira, 2 September and is the second record for the island, the first being collected in 1864 (White & Bruce 1986). Uniform black grey upperparts, black nape, crown and forehead, white underparts and a striking white rump.

**Sulawesi Cicadabird *Coracina mono***

Sangihe : The endemic sub species *C. m. salvadorii* was seen once, with a party of 4 in forest edge habitat on Gunung Sahengbalira, 2 September. A single was observed at Kendahe, 19 October 1990 (J. Taylor).

Talaud : The endemic sub species *C. m. talautensis* was regularly observed in forest and secondary scrub habitat on Salebabu and Karakelong. Inconspicuous and usually observed singly or in pairs searching for insects in the sub canopy. A female carrying nesting material was seen at the River Lobo camp, 19 September.

**Golden Bulbul *Hypsipetes affinis***

Sangihe : Bishop (1992) noted that this species was common in secondary woodland and mixed tree crop plantations on Sangihe in May 1986, the first records of the endemic sub species *platenae*. It has not been recorded since.

**Brown Shrike *Lanius cristatus***

\*Siau : The first records are a single at Beong, 27 October and 2 on Mahoro island, 31 October. Talaud : Single birds regularly seen in secondary scrub on Karakelong, after the first was seen near Beo on 24 September. One record in March 1995 (D. A. Holmes).

**Blue Rock thrush *Monticola solitarius***

Siau : 4 birds on Mahoro island, 31 October was the only record.

Talaud : Small numbers recorded on rocky beaches and around villages on Salebabu and Karakelong, with the first in Lining, 6 September.

**Gray's Warbler *Locustellafasciolata***

Sangihe : One calling, a harsh "chit", in mangrove vegetation, 17 October at Tabukanlama.

Talaud : One seen 23/24 September in scrub near Beo, Karakelong. A large rufous brown warbler, with pale greyish underparts and slight supercilium. One near Beo in March 1995 (D. A. Holmes).

**Arctic Leaf warbler *Phylloscopus borealis***

Sangihe : One record of 2 birds in a mixed flock, 13 October at Talawid Atltt, feeding in a coconut tree.

Talaud : Small numbers regularly recorded on Karakelong in forest and secondary scrub. The first was on Sara Besar, 9 September.

**Grey streaked Flycatcher *Muscicapia griseisticta***

\* Sangihe : A single bird reported by J. Taylor on Gunung Awu, 20 October 1990 is the first record for Sangihe. In 1995 a single bird near Talawid Atas on 17 October.

\*Siau : Very common, with a maximum of 12 (8 birds in a migrating flock), on 27 October near Beong. Also recorded near Ulu and Lake Kepetta.

Talaud : Only recorded on Karakelong, where the species is regular in secondary habitats, with the first record on 23 September.

**Caerulean Paradise flycatcher *Eutrichomyias rowleyi* C/RR**

Sangihe : Endemic to Sangihe and previously only known from the type specimen collected in the 18.70s and a single sighting on Gunung Awu in 1978 (White & Bruce 1986), this species was thought to be extinct (Whitten *et al.* 1987). While obviously inconclusive, on 11 September a single bird, almost certainly this species, was seen for 10 seconds in scrub on a ridge close to a steep, forested gully at c.250m near Talawid Atas. The bird was judged to be slightly larger than Philippine Paradise flycatcher (which was seen by the same observer later in September), with a typical flycatcher posture, perching upright, low down in a bush. Dark sky blue above, with black on the lores, primary tips and outer tail feathers, cream white underparts and dark bill and legs. The site was revisited in October, but the bird

was not re located, possibly because the site was heavily disturbed by farmers clearing vegetation. Interviews with local people at Talawid Atas identified up to five sites where the species was said to occur, although no further sightings were made. This is clearly a very rare species with a localised distribution, all three records having come from the slopes of Gunung Awu.

**Philippine Paradise flycatcher *Terpsiphone cinnamomea***

Talau : The endemic sub species *T. c. talautensis* is common in all wooded habitats on Salebabu and Karakelong, including the ultrabasic forest association on Gunung Piapi. It is particularly common in forest and a total of c.35 was recorded in one day in such habitat around the River Lobo camp, 20 September.

**Island Monarch *Monarcha cinerascens***

Sangihe : One record of 4 birds in forest edge on Gunung Sahengbalira, 2 September.

Talau : Regularly observed in forest and secondary habitats on Salebabu and Karakelong. Often seen in mixed species flocks in particular associating with Black Sunbird, Everett's White eye, Grey sided Flowerpecker and Philippine Paradise flycatcher. The Island Monarch was most often observed in the under canopy of secondary forest in pairs or small parties of up to 4 birds.

**Yellow sided Flowerpecker *Dicaeum aureolimbatum***

Sangihe : The endemic sub species *D. a. laterale* is common in mixed plantation and forest patches from sea level to c.850m and is often seen in mixed species flocks (together with, in particular, Grey sided Flowerpecker, Brown throated Sunbird, Black Sunbird and Elegant Sunbird). Immature birds, identified by their pinky brown bare parts were regularly seen in late August/early September.

**Grey sided Flowerpecker *Dicaeum celebicum***

Sangihe : The endemic sub species *D. c. sanghirense* is common around habitations, in mixed plantation areas and was also recorded in forest patches, from sea level to c.500m.

\*Siau : Common around towns and in agricultural areas on Siau, where not previously recorded. The first birds were recorded on 26 October 1995.

Talau : *D. c. talautensis* is a well marked sub species and is very common on Karakelong and Salebabu, particularly in secondary scrub, agricultural areas and around habitations.

**Brown throated Sunbird *Anthreptes malaceisis***

Sangihe : The endemic *A. m. heliocolw* was common in plantations and mangroves to an altitude of c.400m. Throughout late August and early September males were in moult. Siau : A single female near Lake Kepetta on 29 October.



**Black Sunbird *Nectarinia aspasia***

Sangihe : *N. a. sangirensis*, an endemic sub species, is very common in all habitats up to 1200m and is often observed in small family parties or in mixed feeding flocks. In late August/early September many juveniles were present and males were undergoing moult, suggesting breeding takes place in June/July.

Siau : Less common than on Sangihe and at lower altitudes replaced by *N. jugularis*.

Talaud : The presumed sub species *N. a. talautensis* is probably the commonest bird on Salebabu, Karakelong and the Sara islands. Recorded from sea level to c.480m on Gunung Piapi in secondary habitats and forest, the Black Sunbird is usually seen in mixed feeding flocks although the largest concentration noted was a single species group of c.35 birds feeding on a flowering shrub at the River Lobo camp, 19 September. A female was mist netted at Gunung Piapi, 19 October.

**Olive backed Sunbird *Nectwinia jugularis***

\*Sangihe : A male having the features of *N. j. plateni* was recorded on Poa island, a male 19 October.

\*Siau : Common in plantations and around habitations, the first records for Siau were made on 26 October 1995.

\*Talaud : A single male feeding in a coconut tree south of Lining, Salebabu, 10 October

**Elegant Sunbird *Aethopyga duyvenbodei* E/RR**

Sangihe : Endemic to Sangihe (and possibly Siau, one record from 1865, see White and Bruce 1986) the only published sighting of this species was a small group observed on Gunung Awu in 1986 (Bishop 1992). Rozendaal collected seven specimens south of Mangnitu, May 1985 (RMNH Leiden per Nigel Collar). *A. duyvenbodei* was found to be regular at low densities in areas of mixed plantation with remnant patches of forest in close proximity, with a total of 28 birds seen in 16 observations. Recorded from 75m at Ulung Peling to c.900m on Gunung Awu, the species has a broad altitudinal range and is one of the few species found on the upper slopes of Awu. Other sites where *A. duyvenbodei* was observed are Gunung Sahengbalira, Gunung Palenti, Kentuhang, Talawid Atas and Kedang. Usually observed singly or in pairs within mixed feeding flocks, associating in particular with other sunbird species and flowerpeckers (see *Dicaeum aureolimbatum* for details), birds were seen gleaning insects from vegetation and spiders' webs. A juvenile was seen near Kentuhang on 1 September, being identified as such by a pale pinky brown bill and legs.

**Everett's White eye *Zosterops everetti***

Talaud : The endemic *Z. e. babelo* was commonly seen in secondary scrub, forest and ultrabasic forest on Gunung Piapi, from sea level to 500m. Usually seen in single species flocks of 5-20 birds feeding in the under canopy. A recently fledged juvenile was seen begging for food on Gunung Piapi, 8 October.

**Black fronted White eye *Zosterops atnfrons***

Sangihe : The endemic sub species *Z. a. nehrkomi* was known only from the type specimen, now lost (White & Bruce 1986). 2 birds seen in remnant forest on Gunung Sahengbalira on 2 September in a mixed feeding flock (with Elegant Sunbird, Island Monarch, Yellow sided Flowerpecker and Grey sided Flowerpecker) were identified as this species, and are presumed to have been the *nehrkomi* subspecies. The type specimen was reported to have been "brighter and yellower above than the nominate [*Z. a. atnfrons* of North Sulawesi and Banggai], especially on the rump, with a brighter golden yellow throat" (White & Bruce 1986).

**Black faced Munia *Lonchura nwlucua***

Sangihe : One recorded in mixed plantation at Kentuhang and a flock of 7 at Tabukanlama, 18 October.

Siau : A flock of 12 at Ulu, 26 October was the only record.

Talau : One record of 2 birds in secondary scrub near Bengel, 13 September.

**Tree Sparrow *Passer montanus***

\*Sangihe : Common around all towns and villages on Sangihe, first reported by J. Taylor in October 1990.

\*Siau : Common in all towns, the first records from Siau.

\*Talau : Common on Salebabu and Karakelong around towns and villages. First recorded on Talau at Beo in October 1990 (J. Taylor).

**Asian Glossy Starling *Aplonis panayensis***

Represented by the endemic sub species *sanghirensis* (White & Bruce 1986)

Sangihe : Very common on Sangihe in mixed plantations and around habitations. Large roosts located near all villages, usually in coconut trees, the largest being an estimated 400 birds at Tabukanlama, 17 October.

Siau : Commonly observed in mixed plantations and around habitation. 4 adults and an immature were mist netted at Lake Kepetta, 30 October.

Talau : Common in scrub on Karakelong and Salebabu, with large roosts at Lining, Beo and Toabatu, the latter in the same tree as a large roost of Red and blue Lories. Observed nesting in coconut palms near Lining, May 1986 (Bishop 1992) and in dead forest trees near Beo, September 1995.

**Black naped Oriole *Oriolus chinensis***

Sangihe : The endemic sub species *O. c. sanghirensis* was found to be common in mixed plantations and forest from sea level to c. 850m. A male and female were mist netted near Talawid Atas, 14 October. *O. chinensis* was often seen associating with Hair crested Drongos, with pairs of orioles accompanied by a single drongo in small feeding groups.

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Siau : The sub species *O. c. formosus* was common in all habitats surveyed.

Talaud : The endemic sub species *O. c. melanisticvs* was recorded on Salebabu and Karakelong in forest and secondary habitat, but the species seems less well adapted to scrub and plantation areas, with considerably fewer records in comparison to forest.

#### **Hair crested Drongo *Dicmrus hottentotus***

Sangihe : Common and conspicuous in all habitats; the majority of birds seen were of the white eyed *leucops* sub species, but birds at Talawid and Kedang differed in having red eyes, noticeably more slender bills and lacked the lyre shaped tail of *D. h. leucops*, being only slightly forked; a bird mist netted at Talawid Atas, 14 October exhibited these features and was also in moult.

Siau : Common in all habitats.

#### **Slender billed Crow *Corvus enca***

\*Siau : Common around habitation and in secondary scrub to at least 700m., with groups of 10-15 near Beong, 27 October.

\*Talaud : The only record was a single in a forest clearing by River Lobo, Karakelong, 20 September. It needs to be determined which taxon has spread to these islands, for example *celebensis* or *violaceus*.

### **DISCUSSION**

#### **MIGRATION**

The islands are an important migration route for species wintering in Wallacea. As noted by White (1975, 1976 and 1977) many eastern Palaearctic migrants winter in South east Asia but only a few species reach Wallacea, although some species have their main wintering grounds in the region. White highlighted five non passerine species (White 1976): Yellow Bittern, Chinese Goshawk, Grey faced Buzzard, Oriental Cuckoo and Brown Boobook, and ten passerine species (White 1977): Barn Swallow, Pechora Pipit, Yellow Wagtail, Grey Wagtail, Grey streaked Flycatcher, Gray's Warbler, Eastern Reed warbler *Acrocephalus (arundinaceus) orientalis* and Arctic Leaf warbler, and 11 species of wader (White 1975) that winter to some extent in Wallacea. Only two of these species have not been recorded (to date) on the islands: Red necked Phalarope *Phalaropus lobatus* and Oriental Reed warbler.

Some species are largely transient migrants, passing south through the islands to the main wintering grounds in North Sulawesi in September and October and returning north in March and April, with only a few individuals wintering on Sangihe and Talaud, for example Chinese Goshawk. Other species, for example Barn Swallow, would seem to winter in sizeable numbers on the islands.

It is suggested that some species recorded on the islands for the first time in 1995 will prove to be regular, rapid transitory species, that have been overlooked in the past; for example Fork tailed Swift was only observed in the first two weeks of October, but during this time it was common at certain localities.

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### ENDEMIC AND RESTRICTED RANGE SPECIES

Four of the five species endemic to the Sangihe and Talaud islands were recorded, while the fifth may still be present. On Sangihe, Elegant Sunbird and Sangihe Hanging parrot are widespread and appear to have adapted to changes in habitat brought about by forest clearance. No immediate threats were identified, but it is not known to what extent these and other species rely on remnant forest patches. It is thought that these areas are important sites for many species, providing, for example, nest sites and food supplies.

Caerulean Paradise flycatcher remains a little known and obviously very rare species; all records have come from the north of the island and photographs and pictures of the species, used by the project to try to obtain information on the flycatcher, were recognised by local people in just one village. The species had been feared extinct and, whilst it may still survive, the population size, distribution and ecological requirements of the flycatcher are virtually unknown. However, since the two reported sightings have come from the slopes of Gunung Awu, still largely covered in scrubby secondary forest, it is possible that the species is restricted to this habitat.

Red and blue Lory still occurs on both Talaud and Sangihe. On the latter island only a remnant population might survive, which would be vulnerable to further habitat degradation and the loss of genetic integrity resulting from inter breeding between the endemic *histrio* sub species and the introduced *talautensis*. On Talaud the species is still common on Karakelong, but is becoming increasingly restricted to the north of the island. Populations in the south of Karakelong and on Salebabu are small, whilst the Lory is reported to be extinct on Kabaruang. At the present time, habitat loss on Karakelong is not a major threat and the main pressure on the population is trapping of wild birds for trade.

Talaud Kingfisher appears to be sufficiently differentiated morphologically and ecologically to warrant full species status, but without more substantial evidence, such as sonograms and measurements, this must remain tentative. It was found to be common in the forested areas of Karakelong and Salebabu. With large areas of this forest having protected status, no immediate threats to the species' survival were identified.

Of the other restricted range and threatened species previously recorded on the islands, all except Sulawesi Kingfisher *Ceyx fallax* were recorded by the project during fieldwork. The islands harbour important populations of many of these species, but in particular Blue naped Parrot, which is becoming increasingly rare in the Philippines as a result of habitat loss and trapping (Collar *et al.* 1994) and the little known Grey Imperial Pigeon, restricted to islands around the Sulawesi Sea (White & Bruce 1986).

In more general terms the ornithology of the islands is better documented as a result of these investigations. A total of 145 species have now been recorded within the Sangihe and Talaud Endemic Bird Area. Since the last major review of bird distributions within these islands (White & Bruce 1986) several new species have been recorded. Many are passage visitors or vagrants, but others, for example, Pink necked Green Pigeon, Spotted Dove, Tree Sparrow and Slender billed Crow are probably recent colonists and have established resident populations.

Other species recorded as occurring on the islands prior to 1986 have not been observed since and these are listed in Appendix n. The majority of the 16 species are seabirds, waders or waterbirds and the lack of records reflects the greater emphasis most recent workers on the islands have given to the resident land birds. Four species that were not observed can be described as resident land birds:

Sulawesi Serpent eagle *Spilomis rufipectus*, Nicobar Pigeon *Caloenas nicobarica*. Great eared Nightjar *Eurostopodus macrotis* and Sulawesi Kingfisher *Ceyx fallax*. These species have been recorded previously on Siau (first two species) or Sangihe (latter three species) prior to 1986 but there are no recent published records. It is suggested that these species have been unable to adapt to the loss of forest habitat on these islands and population levels are now much reduced, although there is a possibility that further research will re-locate all these species.

Table 4: Numbers of species recorded on the islands and summaries of pre and post 1986 data.

Island	No. species to	No. species	New species	Total for island
	1986	1986 1995	1986 1995	
Sangihe	79	81	25	104
Siau	46	46	6	72
Talaud	75	104	37	112

Note obviously feral species omitted.

Many questions remain and further research is needed to assess the extent to which species on Sangihe have adapted to mixed plantation areas and whether these populations are still dependent on remnant forest patches, for example for nest sites. The ecology of all the endemic species remains little understood, in particular the critically endangered Caerulean Paradise flycatcher, and if effective conservation strategies are to be implemented to protect this and other species, there is an urgent need for this work to be undertaken. The conservation problems facing the majority of species on the Talaud islands are less immediate and an important protected area has already been established, although there is currently no management of this and logging activities are threatened. However parrot populations, in particular the Red and blue Lory, are coming under increasing pressure from bird trappers. It is likely that trapping has been a factor in reducing populations on the Sangihe islands, Salebabu and possibly Kabaruang and at the present time, the status of Red and Blue Lory on Appendix I of CITES, is not being enforced, further compromising the species' long term prospects of survival.

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**APPENDIX 1**

**Place names mentioned in the text:**

Site names on Sangihe and Siau follow Peta Rupabumi Indonesia, Sheets 2419 61/63 (Tahuna), 2419 33/24 (Tamako) and 2419 52 (Kendahe), scale 1:50 000; edition 1, 1991.

Site names on Talaud follow Sheet NB 52 13, scale 1:250 000, produced by the Directorate of Geology, 1976.

Altitudes are mean heights above sea level, in metres, either spot heights from maps or a range in which surveys were conducted, assessed by altimeters calibrated at known heights daily. Vegetation is summarised into broad categories, the first for each site being dominant, as follows :

A: agricultural plantations

C : coastal habitats, include mangroves, beaches and fish ponds

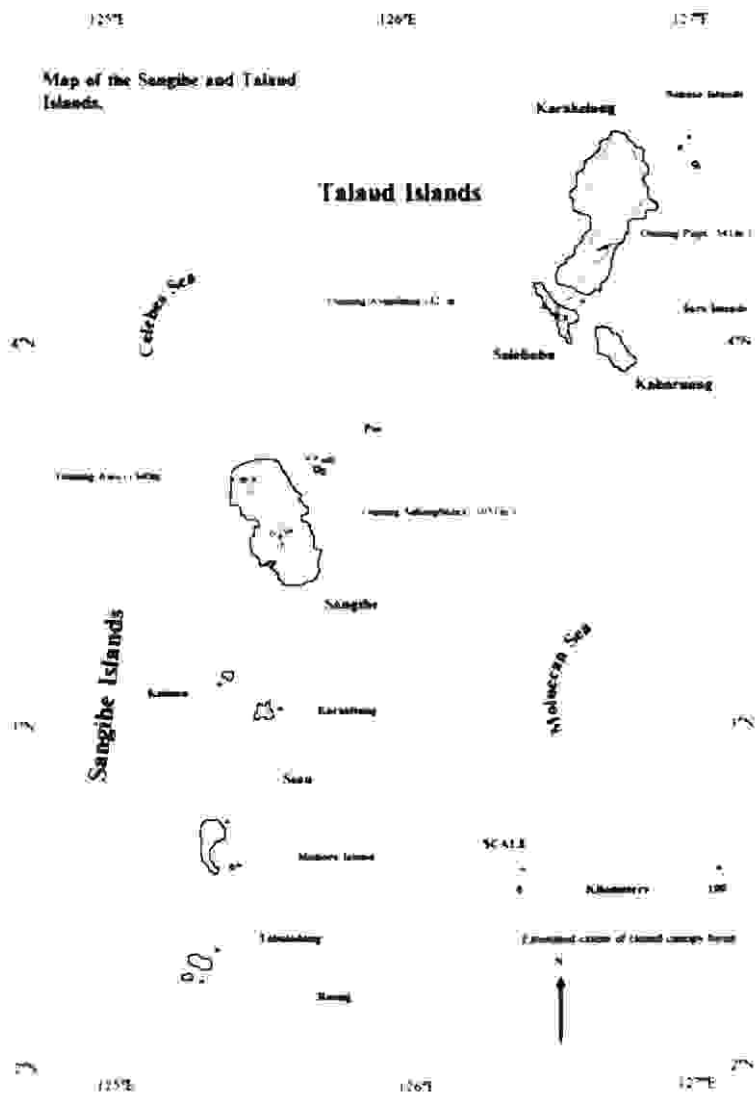
F : closed canopy forest.

H: human habitation.

S : secondary scrub. Appendix I

			Altitude	Vegetation
SAMBIHE	Benkatang	03°39'50N 125°33'56E	0-50	A, C
	Gurung Awu	03°41'40N 125°28'75E	800-1200	S
	Gurung Palem	03°28'30N 125°33'45E	827	#, S, F
	Gurung Sahendanman	03°29'90N 125°30'80E	806	A, F, S
	Gurung Sahengbala	03°31'50N 125°33'56E	1031	F, S
	Haji	03°40'60N 125°30'95E	150	A
	Kedang	03°40'11N 125°28'23E	350-800	#, S
	Kentulang	03°30'99N 125°31'25E	200-850	A, F, S
	Liang Island	03°48'10N 125°34'05E	0-50	
	Patta	03°39'00N 125°33'50E	15	H
	Poa Island	03°47'30N 125°33'30E	0-30	
	Tabukanlana	03°40'27N 125°32'45E	0-50	A, C, H
	Talma	03°36'45N 125°30'60E	0-400	A, C, F
	Talwid Atas	03°42'66N 125°24'55E	0-500	A, S, F
	Tamako	03°27'40N 125°30'25E	30	#, H
STALI	Ujung Pelung	03°29'35N 125°31'96E	25	A, H
	Beong	03°42'N 125°24'E	250-350	A, S
	Lake Kepetta	03°39'21N 125°24'07E	150-250	A, S
	Manoro Island	02°39'17N 125°28'57E	0-50	
TALAUD	Talwid	03°39'N 125°24'E	80	A
	Uta	03°04'2N 125°25'E	50	A, H
	Alc, Karakelong	04°08'N 126°52'E	25	H
	Bengel, Karakelong	04°14'12N 126°49'02E	100-300	#, S
	Beu, Karakelong	04°14'N 126°47'E	0-125	A, S, S, H
	Pesang, Karakelong	04°29'N 126°44'E	0	A
	Gurung Ayambara, Salebabu	03°56'N 126°41'E	50-400	A, S, F
	Gurung Piapi, Karakelong	04°07'N 126°47'E	50-321	F, S
	Luning, Salebabu	03°55'N 126°42'E	0-200	A, S, S
	Melangiana, Karakelong	04°01'N 126°41'E	25	A, H
	Buhutan, Karakelong	04°06'N 126°47'E	0-50	A, H, C
	Kamus, Karakelong	04°14'N 126°49'E	0-50	H, C
	Lobo, Karakelong	04°18'N 126°43'E	15	
Pisar Lobo, Karakelong	04°17'97N 126°45'02E	0-250	F	
Sara Besar/Sara Kecil	03°56'N 126°43'E	0-10	C, F	
Sera, Salebabu	03°38'N 126°38'E	125-350	#, S	
Tobata, Karakelong	04°19'25N 126°33'06E	0-250	A, S, F, S	
Tahang, Karakelong	04°16'N 126°53'E	0		
Tula, Karakelong	04°01'N 126°48'E	0	A	





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**APPENDIX II**

**List of species previously recorded on the islands but not since 1986.**

<b>Species</b>	<b>Island</b>	<b>Reference</b>
Wedge tailed Shearwater <i>Puffinus pacificus</i> (E. of Talaud, Sept 1970)	Talaud	Anon 1972
Wilson's Storm petrel <i>Oceanites oceanicus</i> (N. of Talaud, 13 Sept 1945)	Talaud	Christian 1950
Black throated Little Grebe <i>Tachybaptus novaehollandiae</i> (Collected Kabaruang, 1893 and Sangihe, 1893).	Talaud, Sangihe	M&W
Great billed Heron <i>Ardea sumatrana</i>	Siau	W&B
Sulawesi Serpent eagle <i>Spilornis rufipectus</i> (See Hickson, 1889).	Siau	W&B
Spotted Tree duck <i>Dendrocygna guttata</i> (Kabaruang, 1893. Sangihe, 2 female specimens 21 Nov 1865, RMNH, White & Bruce 1986).	Talaud, Sangihe	M&W
Wandering Tree duck <i>Dendrocygna arcuata</i> (Karakelong, no date.)	Talaud	M&W
White browed Crake <i>Poliolimnas cinerea</i>	Talaud	W&B
Common Moorhen <i>Gallinula chloropus</i> (Juv. male, 24 Oct 1866, RMNH).	Siau	W&B
Bar tailed Godwit <i>Limosa lapponica</i> (Kabaruang, 1893)	Talaud	M&W
Little Ringed Plover <i>Charadrius dubius</i> RMNH (Specimen, no details given)	Siau	W&B
Oriental Plover <i>Charadrius veredus</i> (Karakelong, no details given.)	Talaud	W&B
Ruddy Turnstone <i>Arenaria interpres</i> (Karakelong is listed by PHPA as a locality for this species, no other details are given.)	Talaud	PHPA (Beo) (unpubl.)
Nicobar Pigeon <i>Caloenas nicobarica</i> (Blasius quotes Meyer (1879) as describing this species as common on Sangihe and Siau.)	Sangihe, Siau	Blasius 1888
Great Eared Nightjar <i>Eurostopodus macrotis</i> (Sangihe, 2 female, 20 Oct 1865, RMNH, and male 15 Oct 1895 (Hose 1.903). Meyer & Wigglesworth (1898) list the species for Talaud, with no details).	Talaud (?) Sangihe	Hose 1903
Sulawesi Kingfisher <i>Ceyx fallax</i> (Meyer (1879) reported the species to be quite common. Blasius (1888) states other collectors did not find it.)	Sangihe	M&W

M&W " = Meyer & Wigglesworth 1898, W&B = White & Bruce 1986