

may increase provided there are appropriate 'safe sites' in which the seedlings can establish themselves. Such niches occur with a reduction in competitive pressure from the original saltbush following overgrazing providing that competition from annual species (e.g. medics) is not excessive.

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### MIGRATION OF PALAEARCTIC WADERS IN WALLACEA

Wallacea is used in this paper as a convenient term to designate a geographical area, the Indonesian islands lying between the Sunda and the Sahul continental shelves (Darlington 1957; White 1973). Because it is situated directly north of western and north-western Australia, Palaeartic migrant waders that winter in Australia must be expected to occur there as passage migrants. How far they also winter there is undocumented; for there have been no field studies of migrant waders in these islands.

Thomas (1970) considered that only a small part of the waders breeding in the eastern Palaeartic winters as far south as Australia. He also questioned the likelihood that they winter in large numbers in the Malayan Archipelago, stating 'Marchant (*in litt.*) has pointed out that in New Guinea and Indonesia extensive wader grounds for wintering birds are probably few or lacking' because estuaries and swamps are environmentally unsuitable, and beaches narrow and rocky or sandy.

Some light can be thrown on these questions by analysing the much scattered literature on birds in Wallacea, which largely consists of papers listing collections of birds from various localities, usually with details of the number of specimens of each species and the dates of collecting. An extensive but by no means exhaustive examination of this literature

has yielded data for nearly 800 specimens. Because most collectors of birds in Wallacea were primarily concerned with obtaining specimens of the indigenous species, though no doubt many of them tried to make their collections as comprehensive as possible, there is little reason to suppose that any of them were biased towards collecting migrant waders. In the following list the numbers of specimens obtained and months of collecting are given. If the number of specimens was not stated it has been scored as one only, so that the totals are the minimum of actual specimens. Islands are not named unless they call for comment.

Because my data seem to substantiate the notion that Wallacea is not a major wintering ground for the waders of the eastern Palaeartic the problem of their destination remains. A long south-western migration as far as Africa appears unlikely because most of the species peculiar to the eastern Palaeartic are unknown in Africa; a few have been only rarely recorded. Thomas's suggestion of a major wintering area in north-western Australia has still to be investigated. Perhaps the bulk of the eastern Palaeartic waders are accommodated in southern Asia north of the equator. A fourth possibility has not been mentioned by Thomas. Are there in fact vast breeding populations of waders in Siberia east

of longitude 100°E? A glance at some of the Russian literature and Vaurie (1965) is not altogether reassuring on this point. For species and some subspecies peculiar to the eastern Palaearctic one finds that the breeding range is very imperfectly known or that few breeding localities have been reported.

#### LIST OF SPECIES

- VANELLUS CINEREUS** Grey-headed Lapwing  
Once, northern Celebes. Vagrant.
- CHARADRIUS DUBIUS** Little Ringed Plover  
Six; August–September, February–March. These are referable to the Palaearctic *curonicus*. Localities are Celebes, Buton, Sumba and Ternate. Perhaps only casual in Wallacea.
- CHARADRIUS MONGOLUS** Mongolian Sand-dotterel  
Twenty-five; August–November, February, April–June. Mainly transient.
- CHARADRIUS LESCHENAUITHI** Large Sand-dotterel  
Ninety-eight; August–December, February, April–June. Some evidently winter, for a dozen records were in December and February. Many records in August–September indicate transients.
- CHARADRIUS VEREDUS** Oriental Dotterel  
Twelve; September–November. Transient; none indicative of return northwards. The number listed is lower than the total, for Kuehn is stated to have collected it 'repeatedly' at Toaal, Kai Islands (Hartert 1901).
- PLUVIALIS SQUATAROLA** Grey Plover  
Eleven; August, November–December, June. Mainly transient.
- PLUVIALIS DOMINICA** Eastern Golden Plover  
Eighty; July–April. Because one quarter of these were obtained from December to February, some probably winter.
- ARENARIA INTERPRES** Turnstone  
Thirty-five; September–November, March, June. Mainly transient.
- GALLINAGO STENURA** Pin-tailed Snipe  
Seven; November–December, March. Winters, only in western localities: Siao, Binongka, Buru, Lombok, Flores.
- GALLINAGO MEGALA** Marsh Snipe  
Thirty-six; November–January, March. Winters.
- NUMENIUS MINUTUS** Little Whimbrel  
Seven; some undated; dates only for October. Transient.
- NUMENIUS PHAEOPUS** Whimbrel  
Seventy-four; August–April. Perhaps mainly transient, for many records are August and September, but nine specimens in December and January indicate some wintering.
- NUMENIUS MADAGASCARIENSIS** Eastern Curlew  
Eleven; November, April–May, July. Transient.
- NUMENIUS ARQUATA** Western Curlew  
One, Halmahera. Vagrant.
- TRINGA NEBULARIA** Greenshank  
Twenty-eight; August–March, June. Some winter.
- TRINGA TOTANUS** Redshank  
Four, Celebes and Salayar only; October–November.
- TRINGA STAGNATILIS** Marsh Sandpiper  
Eight; November only. Specimens from Wallacea are surprisingly few, for five of these were collected on Letti, South West Islands.
- TRINGA GLAREOLA** Wood Sandpiper  
Thirty-five; August–April, July. Some evidently winter.
- TRINGA HYPOLEUCOS** Common Sandpiper  
One hundred and seventeen; August–May, July. About one-fifth are wintering birds in December–February.
- TRINGA BREVIPES** Grey-tailed Tattler  
Forty-five; August–April. Some evidently winter because there are many specimens in December–February.
- TRINGA TEREK** Terek Sandpiper  
Fifteen; August–November, February. Probably mainly transient.
- CALIDRIS TENUIROSTRIS** Greater Knot  
Seven; August, November–December. Evidently winters because four of the specimens are in December.
- CALIDRIS ACUMINATA** Sharp-tailed Sandpiper  
Eighteen; August–November. Mainly transient.
- CALIDRIS RUFICOLLIS** Red-necked Stint  
Sixty-four; August–November, April–June. Mainly transient.
- CALIDRIS SUBMINUTA** Long-toed Stint  
Five; September–October. Records are only from northern Celebes.
- CALIDRIS FERRUGINEA** Curlew Sandpiper  
Three; August, October, June. Records are from Obi, Banda and Sermatta. Because the species is common in Western Australia, it may be only a rapid transient in Wallacea.
- CROCETHIA ALBA** Sanderling  
Three; November, June. Records are only from Ambon and Sumba. Presumably a rapid transient.
- LIMICOLA FALCINELLUS** Broad-billed Sandpiper  
Two; October. Records from Celebes and Toaal, Kai Islands.
- LIMOSA LIMOSA** Black-tailed Godwit  
Eight; September–November. Probably mainly transient. The eastern subspecies, *melanuroides*, wintering on beaches, inlets and saltwater marshes (Condon and McGill 1970) differs sharply from the western nominate subspecies, which in Africa winters mainly on fresh water north of the equator.
- LIMOSA LAPONICA** Bar-tailed Godwit  
Seventeen; October–January, May. Some winter.
- PHALAROPUS LOBATUS** Red-necked Phalarope  
Eight; October–December. Localities are Celebes, Buru and Seram. Numerous at sea between Ambon and Seram (Stresemann 1914).
- GLAREOLA MALDIVARUM** Oriental Pratincole  
One, Timor. Hartert (1903) pointed out that Finsch had stated that it had been recorded from Batjan, Ternate, Halmahera and Ambon, but he queries the accuracy of this because he knew of no collector who had obtained it there. Van Bemmel (1948) also had no further confirmation. It is evidently a rapid transient in Wallacea.

#### DISCUSSION

Thirty-two species of Palaearctic waders have been recorded from Wallacea. Three, *Vanellus cinereus*, *Charadrius dubius* and *Gallinago stenura*, have not been recorded from Australia. Two, *Numenius arquata* and *Tringa totanus*, have been recorded from Australia on sight-records. Of these the first is only known as a vagrant in Wallacea and the second only from specimens from western Wallacea. The inventory for Wallacea is likely to be increased by at least seven species. Records from Borneo indicate that *Charadrius alexandrinus*, *Tringa ochropus*,

*Gallinago gallinago* and *Calidris temminckii* are likely to occur occasionally in western Wallacea. From the evidence from western and north-western Australia *Calidris canutus*, *Philomachus pugnax* and *Limnodromus semipalmatus* must reach Wallacea, though the last two are probably infrequent.

Dates of collected specimens indicate that *Pluvialis dominica*, *Charadrius leschenaultii*, *Numenius phaeopus*, *Tringa glareola*, *T. brevipes*, *T. nebularia*, *T. hypoleucos*, *Limosa lapponica*, *Calidris tenuirostris*, *Gallinago megala* and *Phalaropus lobatus* winter to some extent in Wallacea apart from transients of most of these species that pass through to Australia. Dates of specimens also suggest that many other species are predominantly or wholly passage migrants in Wallacea to or from Australia. As a whole, the material well supports Marchant's views quoted by Thomas that Wallacea is not an important wintering ground for Palaearctic waders.

The many specimens collected between August and October contrasts with the few obtained from March to May. For some species there are no specimens in the latter period. Possibly waders on the northward migration from Australia pass through Wallacea more rapidly than they do on the southward. Also some species may take a different migration route in the spring or local conditions may be more favourable for collection on autumn passage. These are questions that invite the attention of anyone who does field work in this area.

Some species present points of special interest. The numerous specimens of *Numenius phaeopus* seem remarkable but Smythies (1960) recorded that in Borneo it is a great lover of mangrove swamps. This may account for the frequent specimens from Wallacea. The great disparity in numbers of specimens of *Calidris ruficollis* and *C. subminuta* may also reflect Smythies's observation that *C. ruficollis* in Borneo is a bird of the sea-shore but that *C. subminuta* avoids the shore and frequents paddy fields and marshes.

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### THE AUSTRALIAN SUBSPECIES OF LEWIN'S RAIL

Lewin's Rail *Rallus pectoralis*, Temminck, 1831, was also described as *Rallus brachipus* by Swainson from a Tasmanian specimen in 1837, and was known by the latter specific name until Mathews (1910) showed that the earlier name was valid. Mathews treated *R. brachipus* as a synonym of *R. pectoralis pectoralis* and in the same work described another subspecies from Western Aus-

Some species wintering commonly in Western Australia present contrasting pictures in Wallacea; *Calidris acuminata* and *C. ruficollis* have been collected there often, but *Pluvialis squatarola* and *Calidris ferruginea* are represented by few specimens. Perhaps these latter are rapid transients. Species that Smythies associates with mudflats in Borneo, *Tringa stagnatilis*, *T. terek*, *Calidris ferruginea*, *Limicola falcinellus*, have been collected seldom in Wallacea.

A puzzling feature is that *Charadrius leschenaultii* has been obtained four times as often as *C. mongolus*. Smythies thought *C. leschenaultii* was 'probably the commoner of the two' in Borneo, which hardly implies such a disparity. Dates of specimens suggest that *C. mongolus* is mainly a passage migrant to Australia, but that *C. leschenaultii* winters in Wallacea, thus exposing it to more frequent collecting. Because both species occur in the same habitats on beaches and are very similar in winter plumage, any deliberate bias to obtaining *C. leschenaultii* seems unlikely.

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tralia, *R. p. clelandi*. In his Systema Avium Australasianarum, Mathews (1927) listed three subspecies, treating *R. p. brachipus* as a separate Tasmanian subspecies, and this arrangement was followed by Peters (1934).

Because no description appears to have been published to show how *pectoralis* and *brachipus* differ, the characters of the three subspecies, as shown by