



Detecting the non-breeding region and migration route of Whimbrels (*Numenius phaeopus rogachevae*) in the East Asian–Australasian Flyway



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Numenius phaeopus rogachevae breeding range spent their non-breeding season in the northern Sumatra, Singapore, East Java and Northwest Australia and mainly stopped over along China's coasts during migration. None of our birds bred in the exclusive breeding range of the *phaeopus* subspecies. Previous studies have predicted that *rogachevae* whimbrels migrate along the Central Asian Flyway and spend the non-breeding season in West India and East Africa. We found that at least some *rogachevae* whimbrels migrate along the EAAF and spend the non-breeding season in Southeast Asia and Australia. The ssp. *phaeopus* is at best sparsely distributed in the EAAF in the west region, or possibly does not occur at all.

1. Introduction

Seven subspecies of Whimbrel (*Numenius phaeopus*) have been described in the world (del Hoyo and Collar, 2014). According to the latest IOC World Bird list, the Whimbrels are divided into Hudsonian Whimbrel (*Numenius hudsonicus*) and Eurasian Whimbrel (*N. phaeopus*) (Gill et al., 2021), which is supported by genomic analysis (Tan et al.,

2019). Subspecies *ruventris* of Hudsonian Whimbrel breed in Alaska and Northwest Canada and spends non-breeding season from western USA to South America (Gill et al., 2021). Subspecies *hudsonicus* of Hudsonian Whimbrel breed in Hudson Bay area to Northeast Canada and the bulk of the population spends the non-breeding season in the Caribbean and South America (Gill et al., 2021), and small numbers have been reported from Whimu91 Zealand (Gill et al., 2010). Five subspecies of Eurasian

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In the East Asian – Australasian Flyway (EAAF), both *ssp. phaeopus* and *variegatus* have been widely reported and that their main non-breeding grounds are located in the western and eastern regions respectively. *N. p. phaeopus* mainly distributed from the coast of Bangladesh (Ripley, 1982) and Sri Lanka (Phillips, 1975). The non-breeding *variegatus* Whimbrel widely distributed along the coast from Bangladesh (Ripley, 1982) (some birds occasionally visited to Sri Lanka; Phillips, 1975) to Mariana Islands (Stinson et al., 1997) and Micronesia (Baker, 1951) in the Central Pacific. A few *variegatus* whimbrels spend non-breeding season in the Malay Peninsula, Wallacea region

Some studies have considered that *N. p. variegatus* is the only subspecies of the Eurasian Whimbrel in Southeast Asia and Australia (Brown et al., 2014; del Hoyo and Collar, 2014; Lnkaj ly Asia4tlySout456.2((coast6

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descriptions of the morphological features are consistent with the ssp. *rogachevae*: the black spotting on the lower back and rump of ssp. *rogachevae* are less intense dark than that of ssp. *variegatus*, and the dark bars on the axillary feathers of ssp. *rogachevae* are wider than those of the ssp. *phaeopus* (Tomkovich, 2008). Some individuals exhibited the intermediate plumage characteristics between ssp. *variegatus* and *phaeopus* were also accounted in Indonesia (Cramp, 1983), Malay Peninsula (Robinson and Chasen, 1936), Thailand (Jorgensen, 1949) and Borneo (MacKinnon and Phillipps, 1993). In addition, field survey found that non-breeding whimbrels in Northwest Australia showed a variation in the spots colour of lower back and rump from less intense dark to strong intense dark, and they passed through Java during migration (Kuang et al., 2000). The results from Grantham (2000) may thus suggest that the Eurasian Whimbrels passing through Java and exhibiting the intermediate plumage characteristics were most likely from Northwest Australia.

Both breeding range and non-breeding range of *variegatus* Whimbrel

[Fig. 2](#), 130.71° E, 61.09° N, close to the breeding range of the ssp. *variegatus*) during its northward migration. The other three birds exhibited less intense dark spotting (a typical feature of ssp. *rogachevae*), one of them stayed in the breeding range of ssp. *rogachevae*, and two of them stayed in the western part of the breeding range of the ssp. *variegatus* ([Fig. 2](#)).

4. Discussion

This study provided new information on the breeding sites of Eurasian Whimbrels in the EAAF according to migration tracking of birds from two stopover sites and three non-breeding sites. Our results suggest that both *rogachevae* and *variegatus* occur in the EAAF. We found that two tagged birds bred in the region between the known breeding ranges of ssp. *rogachevae* and *variegatus* (114° E to 132° E; [Fig. 1](#); Appendix [Table S2](#)). This region (between the valleys of the Anabar and Yana Rivers) has been suggested as the gap of breeding whimbrels due to a lack of breeding records in this poorly surveyed area ([Lappo et al., 2012](#)).The

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