

# Detecting the non-breeding migration of White ( *Numenius phaeopus rogachevae* ) in the East Asia–Australia Flyway



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*Numenius phaeopus* | *rogachevae* breeding range spent their non-breeding season in the northern Sumatra, Singapore, East Asia 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. We predicted that *rogachevae* subspecies migrate

along the East Asia–Australia Flyway and the non-breeding season in Southeast Asia. We found that at

least the *rogachevae* subspecies migrate along the EAAF and the non-breeding season in Southeast Asia

and the *phaeopus* subspecies migrate along the EAAF in the eastern region, including the

central region.

## 1. Introduction

Several subspecies of White ( *Numenius phaeopus* ) have been described in the world (de Haan & Cuthbert, 2014). According to the latest IOC World Bird List, the White species are divided into the Hudsonian White ( *Numenius hudsonicus* ) and the East Asian White ( *N. phaeopus* ) (Gill et al., 2021), which are distributed geographically in (Ta et al.,

2019). Subspecies *ruventris* of Hudsonian White breeds in the East Asia–Australia Flyway and the USA to South America (Gill et al., 2021). Subspecies *hudsonicus* of Hudsonian White breeds in the Hawaiian Islands, the North Pacific and the Indian Ocean. The East Asian White breeds in the East Asia–Australia Flyway (Gill et al., 2021), and a subspecies has been recorded from New Zealand (Gill et al., 2010). Five subspecies of East Asia

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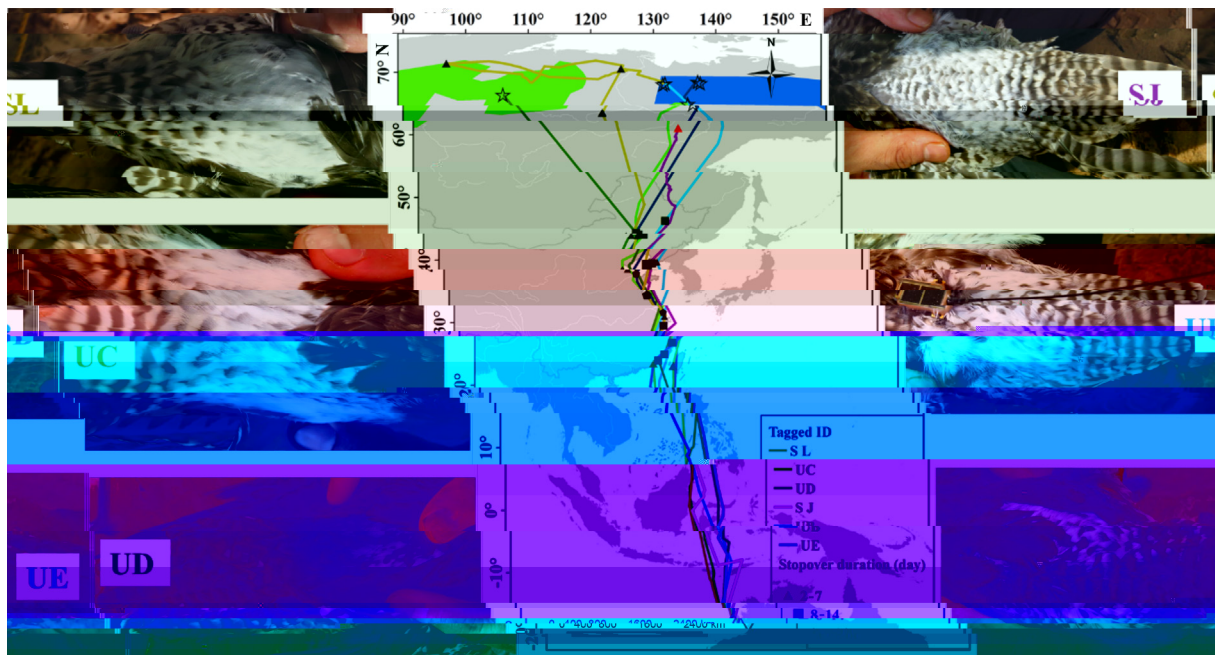
Whi b e (*N. phaeopus*) a e ec g i ed (Gi et a ., 2021). The b eedi g a d -b eedi g di t i b t i f f f the e b ecie a e l (B et a ., 2014; Bi d i f e I t e a t i a a d Nat e S e e, 2015; Ca - ei et a ., 2019; ee Fig. 1). *N. p. islandicus* b eed i Ice a d a d the B i t i h I e (a i G e e a d a d F a e I a d) a d e d -b eedi g ea i We t A f i c a; *N. p. phaeopus* b eed i the egi f N t h E e t We t e S i b e i a a d e d -b eedi g ea i A f i c a; *N. p. alboaxillaris* b eed i the egi f We t e K a a h t a t S t h e t e S i b e i a a d e d -b eedi g ea t h e i a d a d c a t f the We t I d i a O c e a ; *N. p. variegatus* b eed i the a g e f c e t a t E a t e S i b e i a a d e d -b eedi g ea t h e c a t f S t h A i a, S t h e a t A i a a d A t a i a. The t e c e t d e c i b e d b ecie , *N. p. rogachevae* (T l i c h, 2008), b eed i C e t a S i b e - i a. The -b eedi g i t e a e t i c e a (Fig. 1; T l i c h, 2008; L a et a ., 2012; B et a ., 2014). I t h a b e e c a t e d t h a t t h e *rogachevae* h i b e i g a t e a g t h e C e t a A i a F a (T l i c h, 2008) a d e d t h e -b eedi g ea i We t e I d i a a d E a t e A f i c a (S l e e a d M a , 2020; Gi et a ., 2021), b t t h e e i t i a a c k f e i d e c e.

I t h e E a t A i a - A t a a i a F a (E A A F), b t h . *phaeopus* a d *variegatus* h a e b e e i d e e t e d a d t h a t t h e i a i - b eedi g g d a e c a t e d i t h e e t e a d e a t e egi e e c t i e . *N. p. phaeopus* a i d i t i b t e d f t h e c a t f B a g a d e h (Ri e , 1982) a d S i L a l a (P h i i , 1975). The -b eedi g *variegatus* W h i b e i d e d i t i b t e d a g t h e c a t f B a g a d e h (Ri e , 1982) ( e b i d c c a i a i t e d t S i L a l a ; P h i i , 1975) t M a i a a I a d (S t i et a ., 1997) a d M i c e i a (B a l e , 1951) i t h e C e t a P a c i f i c . A f e *variegatus* h i - b e e d -b eedi g ea i t h e M a a P e i a, W a c e a e g i

a d S d a I a d , h i e t *variegatus* h i b e e d -b eedi g e a i e a t e I d e i a, t h e G a d a c a a I a d a d t h e F i d a I - a d f t h e S a c h i e a g i t h e S t h P a c i f i c, N e G i e a, a d A t a i a (B i h , 2006; C a d e t a ., 2016).

S e t d i e h a e c i d e e d t h a t *N. p. variegatus* i t h e b - e c i e f t h e E a i a W h i b e i S t h e a t A i a a d A t a i a (B et a ., 2014; d e H a d C a , 2014;

de c i t i f the h g i c a f e a e c i t e t i t h t h e .  
*rogachevae*: the b a c k t t i g t h e e b a c k a d f . *roga-*  
*chevae* a e e i t e e d a t h a t h a t f . *variegatus*, a d t h e d a b a  
 t h e a i a f e a t h e f . *rogachevae* a e i d e t h a t h e f t h e .  
*phaeopus* (T i c h , 2008). S e i d i d a e h i b i t e d t h e i t e e -  
 d i a t e a g e c h a a c t e i t i c b e t e e . *variegatus* a d *phaeopus* e e  
 a a c c e d i I d e i a (C a , 1983), M a a P e i a (R b i  
 a d C h a e , 1936), T h a i a d (J g e e , 1949) a d B e (M a c K i  
 a d P h i i , 1993). I a d d i t i , f i e d e f d t h a t - b e e d i g  
 h i b e i N t h e t A t a i a h e d a a i a t i i t h e t  
 c f e b a c k a d f e i t e e d a t t g i t e e  
 d a , a d t h e a e d t h g h J a a d i g i g a t i (K a g e t a . ,  
 2000). T h e e t f G a t h a (2000) a t h g g e t t h a t t h e  
 E a i a W h i b e a i g t h g h J a a a d e h i b i t i g t h e i t e e -  
 d i a t e a g e c h a a c t e i t i c e e t i l e f N t h e t A t a i a .  
 B t h b e e d i g a g e a d - b e e d i g a g e f *variegatus* W h i b e



**Fig. 2.** Migration routes and geographic features of the five tagged birds in the North Atlantic. The three individuals on the left (SL, UC and UD) have wintered in the North Pacific; the birds on the right (SJ, UE and UD) have wintered in the North Atlantic. The three individuals on the left (SL, UC and UD) have wintered in the North Pacific; the birds on the right (SJ, UE and UD) have wintered in the North Atlantic. The three individuals on the left (SL, UC and UD) have wintered in the North Pacific; the birds on the right (SJ, UE and UD) have wintered in the North Atlantic. The three individuals on the left (SL, UC and UD) have wintered in the North Pacific; the birds on the right (SJ, UE and UD) have wintered in the North Atlantic. The three individuals on the left (SL, UC and UD) have wintered in the North Pacific; the birds on the right (SJ, UE and UD) have wintered in the North Atlantic.

**Fig. 2.** 130.71° E, 61.09° N, center of the breeding area of the *variegatus* dig it th a d ig ati . The the the e b i d e h i b i t e d e i t e e d a l t t i g ( a t i c a f e a t e f . r o g a c h e v a e ) , e f t h e t a e d i t h e b e e d i g a g e f . r o g a c h e v a e , a d t f t h e t a e d i t h e e t e a t f t h e b e e d i g a g e f t h e . v a r i e g a t u s ( F i g . 2 ) .

**4. Discussion**

This study identified five of the breeding sites of the EAAF White-throated Sparrow in the North Pacific and North Atlantic. Our results show that both *rogachevae* and *variegatus* occur in the EAAF. We found that the tagged birds bred in the region between the 114° E and 132° E (Fig. 1; A e d i T a b l e S 2 ) . This region (between the area of the Alaska-Yanar-Riye) has been suggested as the breeding habitat for the *rogachevae* (La et al., 2012). The birds bred in the region from 63° to 65° latitude, suggesting that birds breed in the area that is the area of the Alaska-Yanar-Riye. The area of the Alaska-Yanar-Riye is the area of the Alaska-Yanar-Riye. The area of the Alaska-Yanar-Riye is the area of the Alaska-Yanar-Riye.

The five tagged birds that bred in the breeding area of the *rogachevae* were SL, UC, SJ, UE, and UD, which were tagged in the North Pacific. The birds that bred in the North Atlantic were SJ, UE, and UD. The birds that bred in the North Pacific were SL, UC, and UD. The birds that bred in the North Atlantic were SJ, UE, and UD. The birds that bred in the North Pacific were SL, UC, and UD. The birds that bred in the North Atlantic were SJ, UE, and UD.

As mentioned above, the EAAF White-throated Sparrow has been suggested to be a subspecies of the *rogachevae* (Lee et al., 2019). The EAAF White-throated Sparrow has been suggested to be a subspecies of the *rogachevae* (Lee et al., 2019). The EAAF White-throated Sparrow has been suggested to be a subspecies of the *rogachevae* (Lee et al., 2019).

Although the collected data of *rogachevae* are limited, genetic data show that the White-throated Sparrow is a subspecies of the *rogachevae*. Our results show that the White-throated Sparrow is a subspecies of the *rogachevae*. Our results show that the White-throated Sparrow is a subspecies of the *rogachevae*. Our results show that the White-throated Sparrow is a subspecies of the *rogachevae*. Our results show that the White-throated Sparrow is a subspecies of the *rogachevae*. Our results show that the White-throated Sparrow is a subspecies of the *rogachevae*.

Overall, the differences in the geographic features between the *rogachevae* and *variegatus* indicate that the two species have different wintering habitats (Lee et al., 2019). Overall, the differences in the geographic features between the *rogachevae* and *variegatus* indicate that the two species have different wintering habitats (Lee et al., 2019).



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