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$$\begin{array}{ccccccc} \mathbb{A}^1 & \xrightarrow{\sim} & \mathbb{A}^1 & \xrightarrow{\downarrow \varphi} & \mathbb{H} & \xrightarrow{\sim} & \mathbb{Q} \\ & & \tilde{\mathbb{A}}^{2022} & & 4 & & 7 \\ & & \tilde{\mathbb{A}}^{2022} & & \beta & & \beta \end{array}$$

squared displacement (NSD)-time curve. The specific migration time, distance and route of migrating Common Kestrel were further analyzed. In addition, 95% and 50% home ranges of migrating and resident Common Kestrels were calculated respectively by using the kernel density estimation (KDE) in the software R 4.1.0. **[Results]** We found the migration pattern of Common Kestrels in Beijing was partial migration. Among the 7 ind tracked, 4 ind were resident, 1 ind was migratory, and 2 ind could not be determined. The migrating Common Kestrel (N01) migrated from winter habitats in Langfang, Hebei to summer habitats in Xilin Gol, Inner Mongolia, in spring (Fig. 2). Its spring migration distance was 551 km, which lasted for 25 d, with an average speed of 22 km/d, and its autumn migration speed was significantly faster than that in spring, with a total migration distance of 412 km, which lasted for 2 d, with an average migration speed of 203 km/d. Luanping County in Hebei was an important migration stopover during spring migration. The kernel density estimation revealed that there were obvious differences in 95% and 50% home ranges among individuals. In summer habitats, home ranges of the migrating Common Kestrel (N01) were 93.10 km² (95%) and 17.50 km² (50%), while in winter habitats, those were 7.03 km² (95%) and 0.99 km² (50%). The average home ranges of the resident Common Kestrels were 1 165.34 km² (95%, $n = 4$) and 178.71 km² (50%, $n = 4$). N02 had the largest home ranges, with an area of 4 320.26 km² (95%) and 648.22 km² (50%), while N03 had the smallest home ranges, with an area of 2.80 km² (95%) and 0.29 km² (50%, Table 2). **[Conclusion]** The research reveals migratory behaviors, routes, important migration stopover and home ranges of Common Kestrel in Beijing, which provides scientific basis for the targeted protection and management of the Common Kestrel.

Key words: Common Kestrel, *Falco tinnunculus*; Satellite tracking; Migration route; Home range

[illegible]

1

Table 1 Information of tracked *Falco tinnunculus*

No.	Age	Gender	Weight (g)	Tracking period (Year-month-date)		Tracking days (d)	Total number of points	Valid number of points
N01	Adult	♂	198	2022-04-12	2022-11-27	229	1 530	1 511
N02	Sub-adult	♀	205	2022-04-12	2022-12-13	245	1 897	1 780
N03	U	U	218	2022-04-14	2022-12-01	231	1 869	1 713
N04	U	U	197	2022-04-14	2022-08-21	129	901	845
N05	Adult	♀	230	2022-06-23	2022-07-01	8	62	62
N06	Adult	♂	170	2022-06-23	2023-03-29	279	759	751
N07	Adult	♀	240	2022-07-07	2022-07-22	15	137	133
Total						1 136	7 155	6 795

U L “U” means unrecorded.

2.2

76 km/h
22 km/d
0.74 Å
N01~
2022 9 17 N01
N02 à N03 à
121 d~
N04 N06~ 2 N05 N07~
15 d~
1~ Å
412 km 2 d 60.5 km/h
N01 2 203 km/d 0.95
Å N02 à N03 à N04 N06 N01
1 N02 2~ Å
N04 X N02 2.4
55 d N04 45 d~ 2022 6 6 N01 95% 50%
2022 5 29 93.10 km² 17.50 km²
95% 50% 7.03 km²
N03 N06 X 0.99 km² 95% 50%
N03 4 d N06 7 d~ 95% 50%
1 165.34 km² 178.71 km² n = 4 2~ Å

2.3

7 N01
N02 95% 4 320.26 km² 50%
N01 648.22 km² 95% à
2022 4 23 50%
N03 95% 2.80 km² 50%
18 d X 5 15 0.29 km² 95%
5 18
551 km 25 d Å

3

partial migration~

2002~ 1996~ 2002~ 1993 2005~ 1988 2017~ 2005~ 1988~

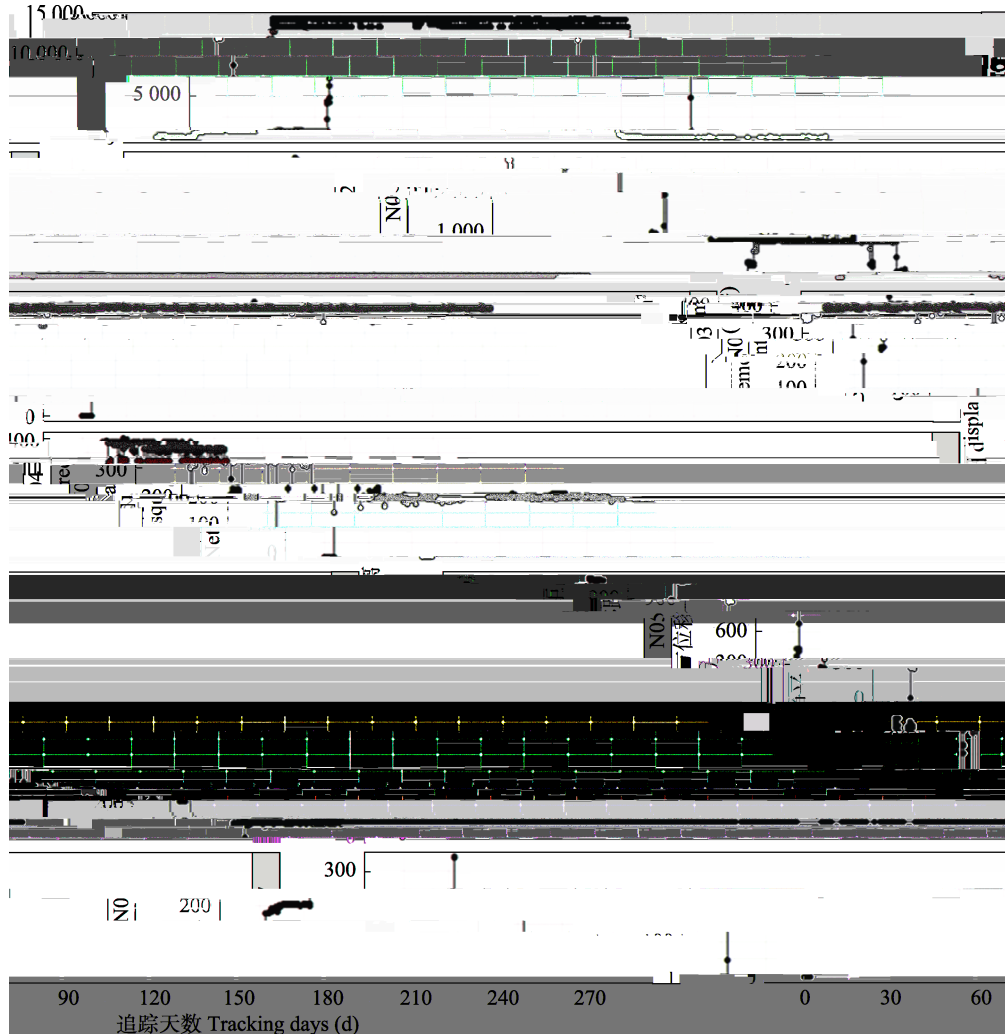
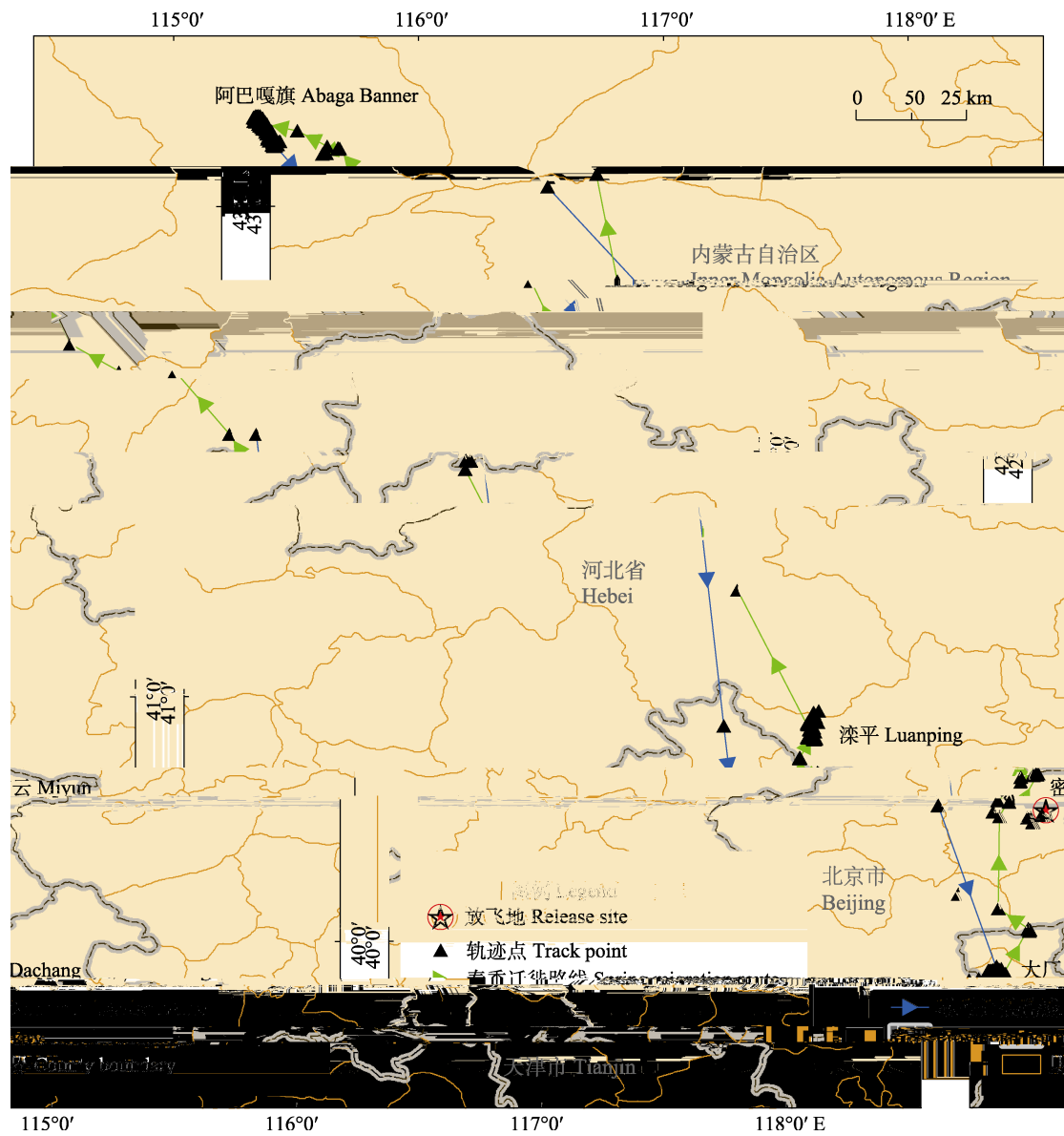


Fig. 1 Net squared displacement time curve of the *Falco tinnunculus*



2 N01

Fig. 2 The migration route of N01 *Falco tinnunculus*

Smith et al. 2005 Rotics et al. 2018~
 N01
 Chapman et al. 2011~
 time minimization strategy~
 18 d
 Anser albifrons Deng et al. 2019~
 Ciconia ciconia Shamoun-Baranes et al. 2003~
 1 1 3 7

2 4

Table 2 Seasonal home ranges of four resident *Falco tinnunculus*

Season	Kernel density estimation	Home range (km ²)				Average value
		N02	N03	N04	N06	
All time	95%	4 320.26	2.80	333.35	4.95	1 165.34
	50%	648.22	0.29	65.81	0.52	178.71
Spring	95%	1 873.37	2.55	279.07		718.33
	50%	179.55	0.60	38.83		72.99
Summer	95%	873.53	2.34	10.25	2.72	222.21
	50%	94.00	0.26	1.48	0.66	24.10
Autumn	95%	6.61	1.81		0.03	2.81
	50%	0.83	0.40		0.003	0.41
Winter	95%				0.01	0.01
	50%				0.001	0.001

^ X
ä
^ 2021~
ä
Ä
b
^ Smith et al. 2005~ Ä
Q b Q
Kang ^ 2015~
14
^ KDE~ 95% 0.04 ~ 1 km² 50% 0.005 ~ 0.15 km²
^ dynamic Brownian bridge movement model dBBMM~ 7
95% 0.92 ~ 1 446.21 km² 50%
0.13 ~ 9.11 km²
Zurell et al.
2018~ ä
2020~ ä
Stier et al. 2017~
0
ä ä ä 2013~ Ä
Kang et al. 2015~
X

U β
β
^ 46 ~
Holte et al.
β
^ 971 ~
Ä
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