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, 200438, 756400; 2., 100871; 3.
:
(*Canis familiaris*), (*Ailuropoda melanoleuca*)
GPS
, MaxEnt
885.8 km²,
48.2%; 861.2 km², 47.6%
28.2%,
: ; ; ; ; MaxEnt

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The spatio-temporal impact of domestic dogs (*Canis familiaris*) on giant panda (*Ailuropoda melanoleuca*) in Baishuijiang National Nature Reserve

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ABSTRACT

Aims: Anthropogenic interferences have various forms such as domestic animals, in which many have significant negative impacts but are consistently ig

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Methods: To understand the extent of the impact free-range domestic dogs have on giant pandas, we used infrared cameras and GPS collars to study the repercussions of domestic dogs entering nature reserve and affecting the wildlife. We also constructed a MaxEnt model to estimate the spatial overlap of domestic dogs and giant pandas in Baishuijiang National Nature Reserve.

Results: The suitable habitat for giant pandas in nature reserve is 885.8 km², around 48.2% of the overall area, while the area of domestic dog distribution is 861.2 km², or 47.6% of the nature reserve. The overlap between domestic dogs and giant panda habitat is 28.2% of the entire nature reserve. There are significant differences in activity rhythms of giant pandas between sites with and without dog detection.

Conclusion: These results indicate the extent to which the trespassing of domestic dogs has affected giant pandas. The negative impact of residential areas could result in a combination of human activities (e.g., poaching, farming, livestock grazing, automobile traffic), requiring distinctive solutions to eliminate. We suggest any major residents close to nature reserves should restrain dogs at residences. Taking account for the effects of dog’s movements and habitat use in the nature reserve is essential for a comprehensive conservation framework.

Key words: giant panda; domestic dog; habitat; camera trap; MaxEnt model

2013) (Hughes & MacDonald,
 (*Canis familiaris*)
 (Rong et al, 2019),
 (Doherty et al, 2016)
 (Vanak & Gompper,
 2009)
 (Young et al, 2011)
 (Meek,
 1999), (*Chrysocyon*
brachyurus) (Lacerda et al,
 2009); (*Lycalopex*
griseus) (Silva-Rodríguez et al,
 2010)

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:

: (1)

, ; (2)

; (3)

0.5%,
3%–5% (D'Eon & Delparte,
2005) 2020 1 2021 1

18 GPS :

2 4 4 4

4 1 h 1 ,

(Frair et al, 2004)

1

(104°16'–105°25' E, 32°36'–

33°00' N)

, GPS
Tracker Client ,

GPS ,

(Wang et al, 2021) 1,837.99 km²,

901.58 km², 261.32 km²,

675.09 km² 15.6 ,

932.5 mm, 276 (Rong et al, 2019)

2.2

2.2.1

MaxEnt (MaxEnt 3.3.3, <https://www.cs.princeton.edu>)

2

GPS

, 2 h ,

(Anderson & Gonzalez,

2011)

2.1

2.1.1

2017–2020

170 ,

64 ,

ArcGIS 10.8

'near'

2 km × 2 km

“ ” “V”

ASCII , MaxEnt

: 1

1 ;

(receiver operating
characteristic curve, ROC)

(area
under curve, AUC) (Elith et al,

2010) (equal

training sensitivity and specificity threshold)

MaxEnt

3 1 30 s , “ ”,

1 16 G 32 G

, ArcGIS 'overlap'

8

5 ,

2.1.2 GPS

GPS

2.2.2

HQAN40S

, GPS (,
) , 220 g,

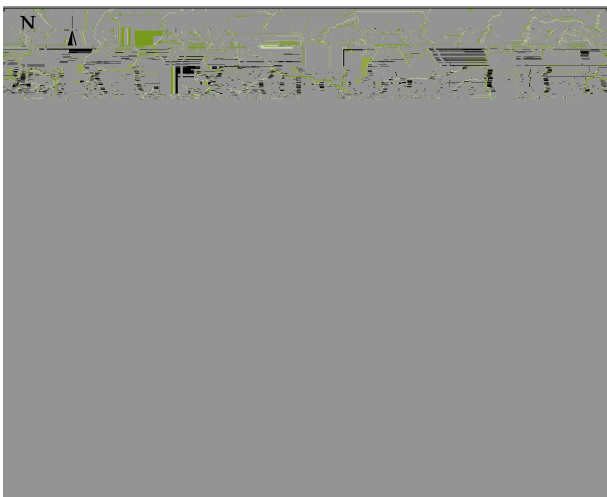
(non-parametric circular kernel-density method)

1 (), (Linkie & Ridout, 2011) 1,000 R 3.5.3 “overlap” (Fiske & Chandler, 2011)

3

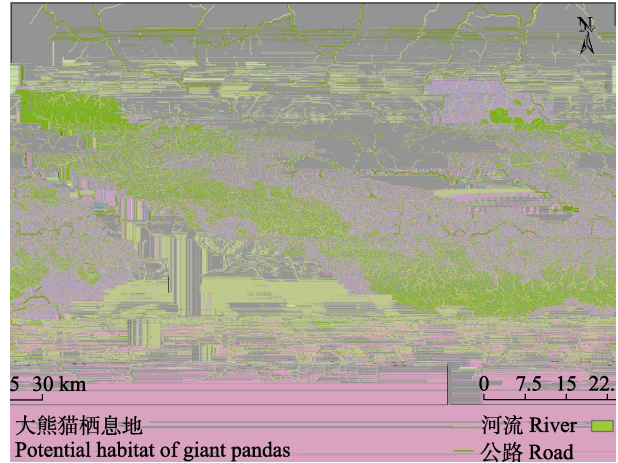
3.1

MaxEnt (AUC = 0.939), MaxEnt 885.8 km², 48.2% (2) (= 36.1%), (= 26.8%), (= 12.1%), (= 0.8%)



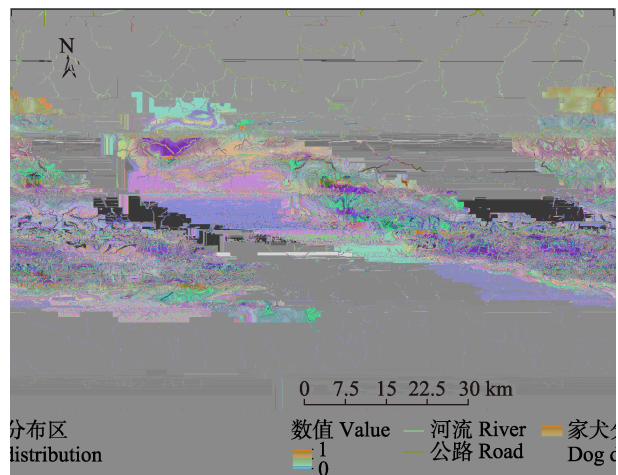
1

Fig. 1 Distribution of giant panda detection sites in Baishuijiang National Nature Reserve



2

Fig. 2 The estimated habitat range of giant panda across Baishuijiang National Nature Reserve based on the camera stations

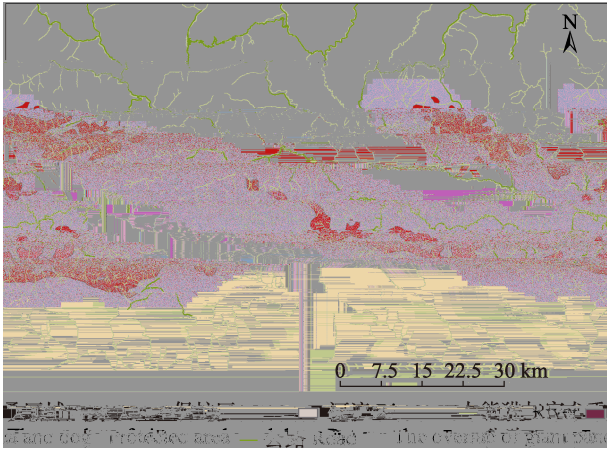


3 18 GPS

Fig. 3 The estimated distribution of dogs across Baishuijiang National Nature Reserve based on the tracking movements of 18 dogs

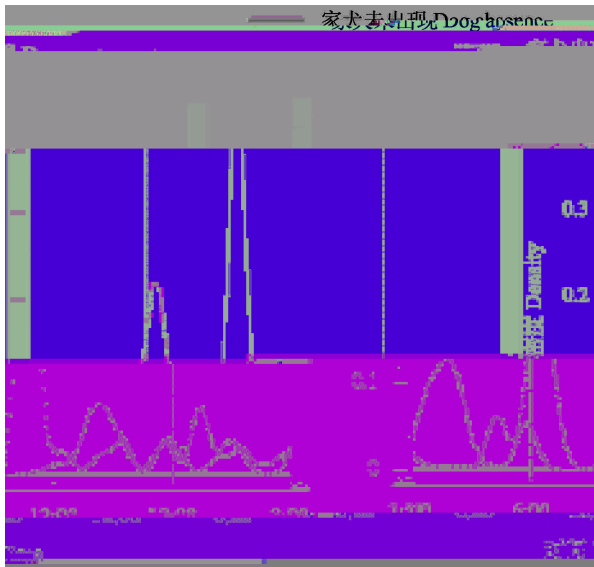
3.2

MaxEnt AUC = 0.874, 861.2 km², 47.6% (3) (= 56%), (= 20.3%), (= 0.6%)



4

Fig. 4 The overlap between dogs' home range and giant pandas' distributions in Baishuijiang National Nature Reserve



5

$P < 0.05$

Fig. 5 Species' daily activity between sites which dog absence (black continuous curves) and dog appearance (blue curves). Significant relationships ($P < 0.05$) are indicated by asterisks.

3.3

ArcGIS 'overlap' (4), 12.1%, 517.8 km², 58.4%, 28.2%

3.4

58.4%

10:00–12:00 (5), 6:00–8:00, $P = 0.033$, $\Delta = 0.312$

4

AUC 0.87, 28.2%

(He et al, 2019), (Zhao et al, 2019), (Zhang et al, 2018), (Zhao et al, 2019)

48.2%

83.3%

(, 2015)

110

:

, , (Elith et al, 2010)

(, 2016)

(Silva-Rodríguez et al, 2010)

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