

# **Strategies for Wildlife protection along Qinghai-Tibet expressway in China**



**Wang Yun, Gu Xiaofeng**

**China Academy of Transportation Sciences**

**2018.4**

**Creswick, Victoria, Australia**

# Acknowledgements

Environment Institute of Australia and New Zealand Inc.

China Academy of Transportation Sciences

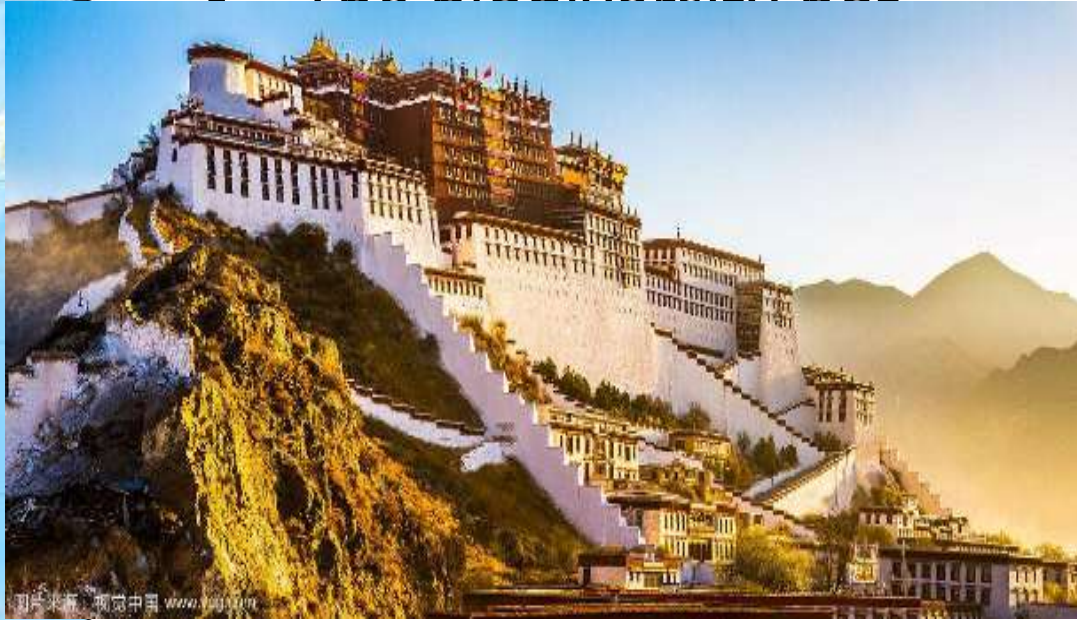
# • Outline

- **Wildlife and transportation infrastructures in Tibetan Plateau**
- **Impacts of transportation infrastructures on wildlife**
- **The strategies to protect wildlife along the expressway during and after the construction**

- **Wildlife and transportation infrastructures in Tibetan Plateau**



The biodiversity bet

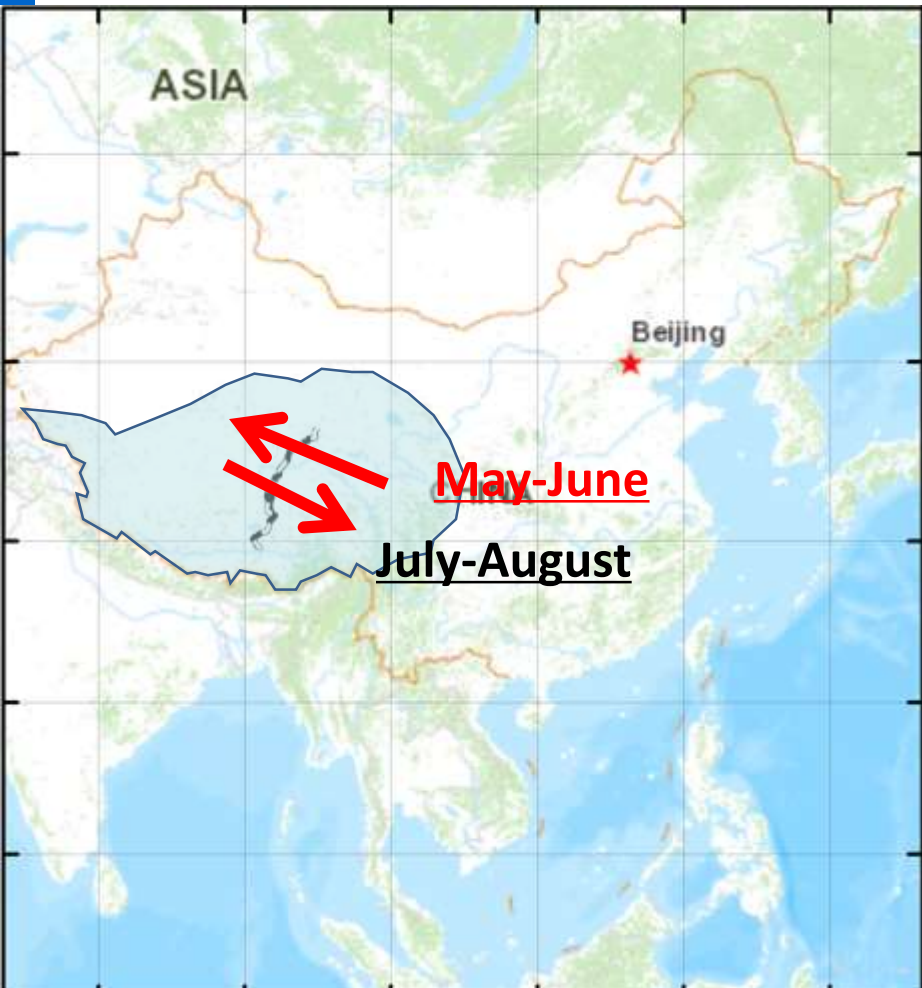


图片来源：视觉中国 www.50000.com



- **Wildlife and transportation infrastructures in Tibetan Plateau**

- **Main wildlife species**



- Tibetan antelope(IUCN:NT)



# • Wildlife and transportation infrastructures in Tibetan Plateau

## ○ Main wildlife species

- Tibetan gazelle(IUCN:NT)



- Wild yak(IUCN:VU)



- Kiang (IUCN:LC)




# • Wildlife and transportation infrastructures in Tibetan Plateau

## ○ Transportation infrastructures



- Qinghai-Tibet highway: 1950-1954
- Qinghai-Tibet railway: 2001-2006
- Qinghai-Tibet expressway: near future

Three parallel roads + Wildlife ?



What are the  
impacts?



- **Impact of transportation infrastructures on wildlife**

- **Road kill**

- 2004-2012, May-August, migration season
- Hot spots: K2994-K2999
- Number: 13



- **Impact of transportation infrastructures on wildlife**

- **Road kill**

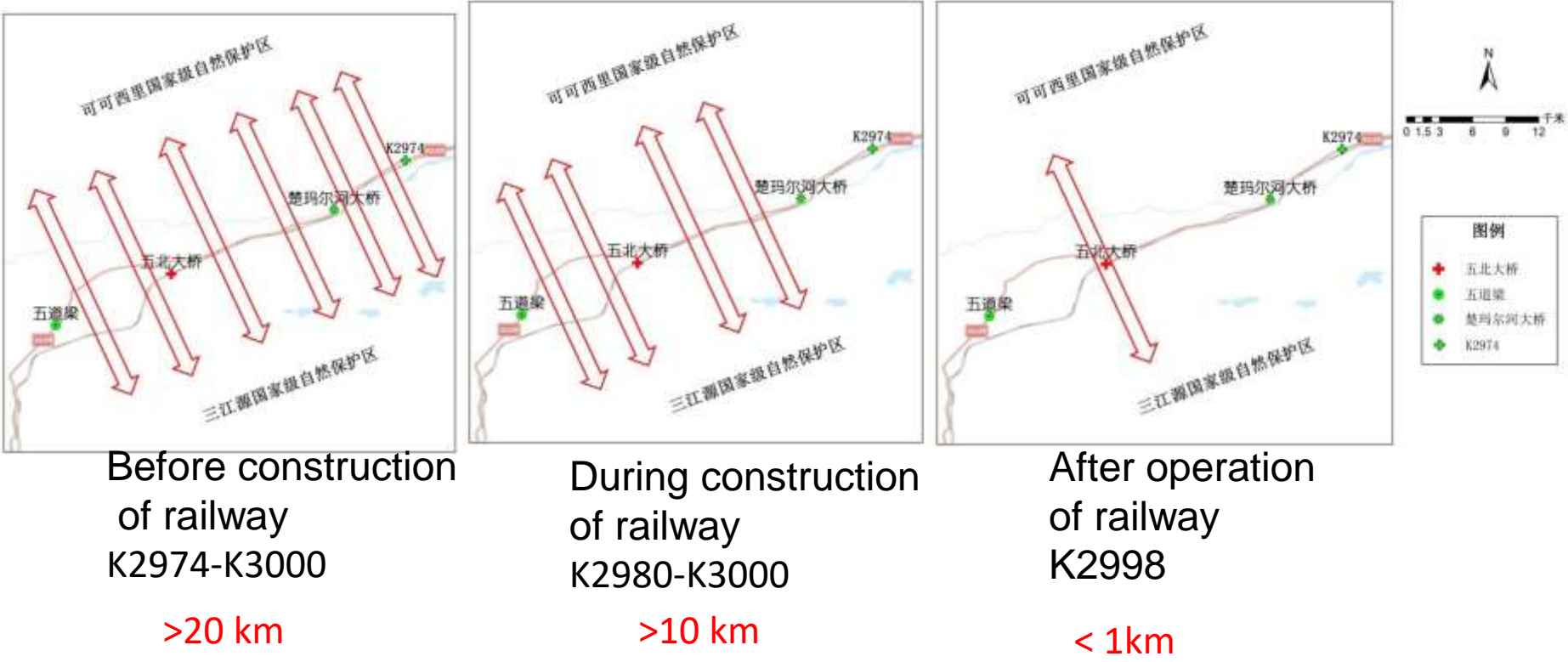






# Impact of transportation infrastructures on wildlife

○ Width of passages of Tibetan antelope migration was shorten by the overlapping effect of highway and railway

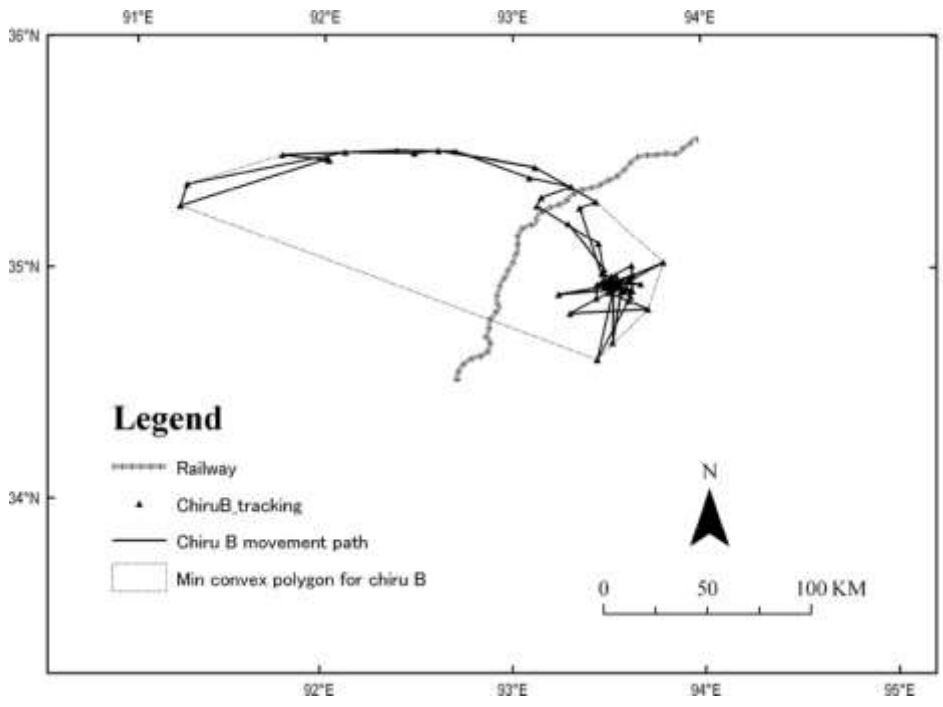
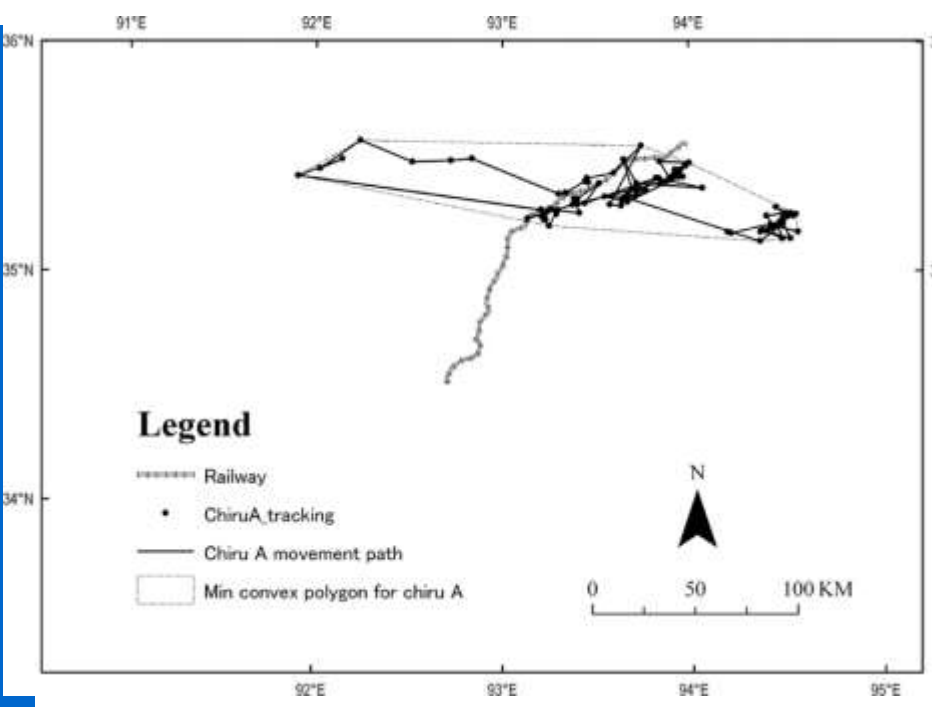


Factors: ①distance; ②landform: hide area; ③habitat quality



- **Impact of transportation infrastructures on wildlife**

- **Delay in the migration period of Tibetan antelope**

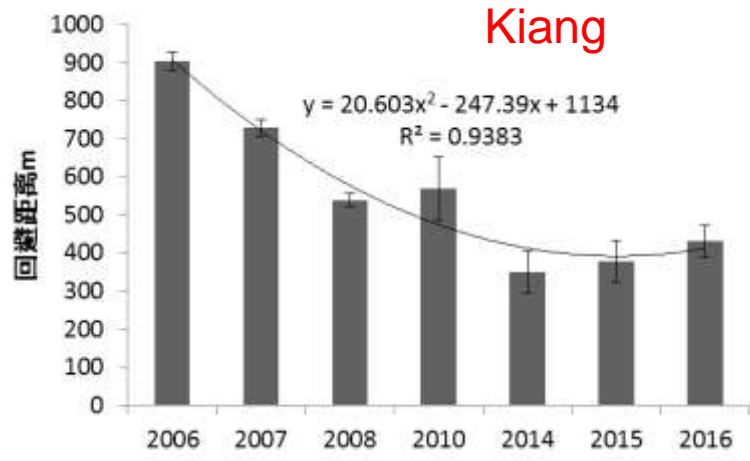
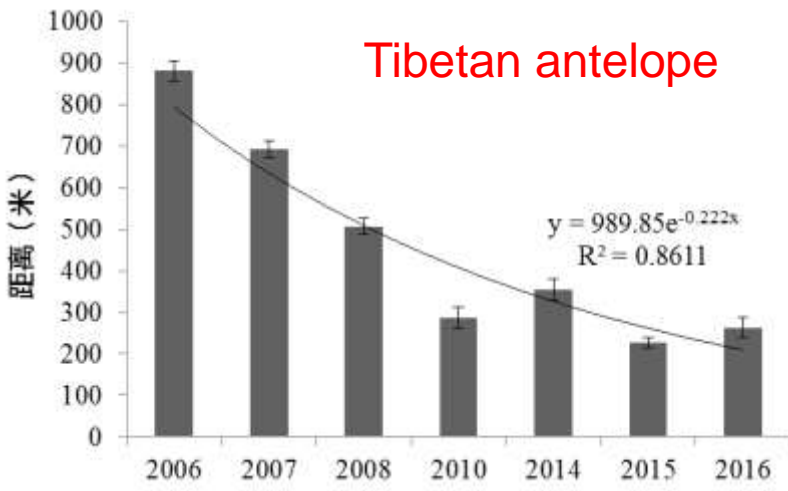


Migration pattern of the Chiru A, B based on satellite tracking

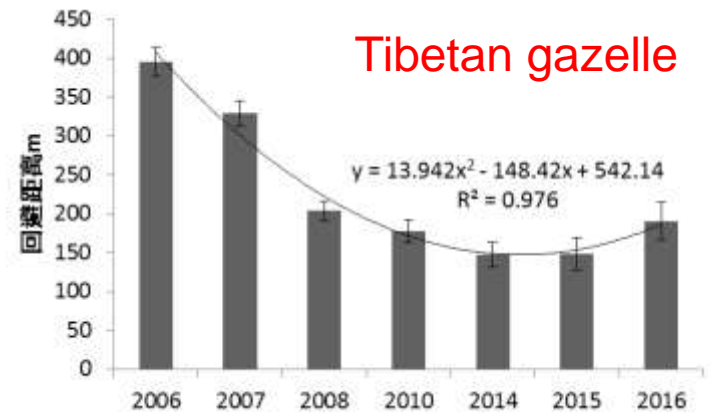
Each time, after reaching the highway and railway, the antelopes spent 20–40 days in that area, probably looking for passages and waiting

# Impact of transportation infrastructures on wildlife

- Wildlife may get used to the disturbance of the roads and railway



Road avoidance distance





What should we do?

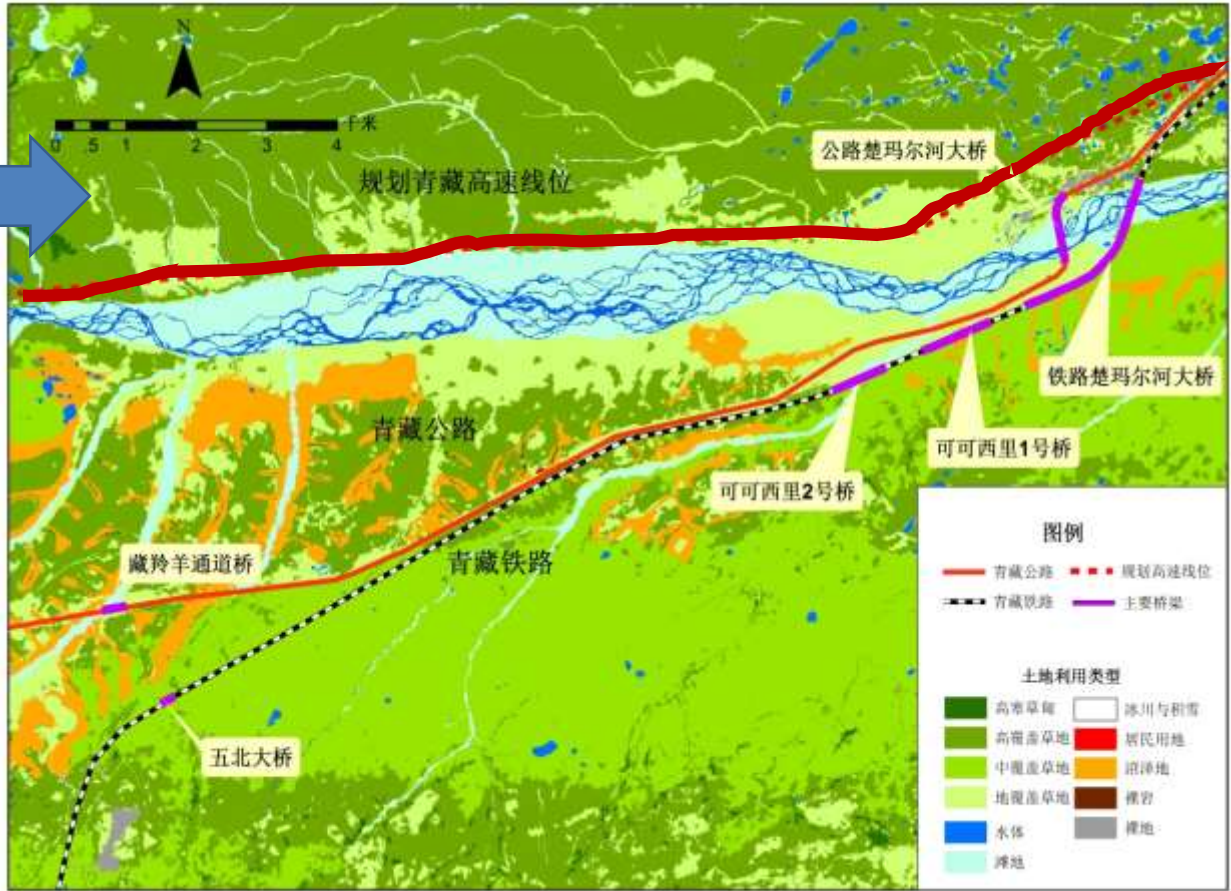
**The strategies**

# Wildlife protection along expressway

## Route selection

Key section: K2980-K3000

- Road avoidance distance:  $265.58 \pm 11.07m$
- Hide area
- Habitat quality
- Existence of crossings along railway



Keep the expressway far away from existing highway and railway as far as possible

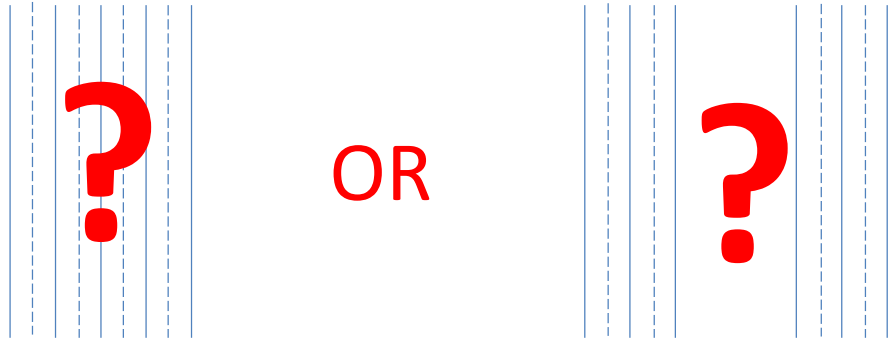


# Wildlife protection along expressway

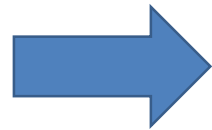
## ➤ Median strip

Key section: K2980-K3000

Divided vs. undivided highways



- Tibetan antelope: **diurnal animals**
- Divided highways: **light is better**
- Experimental bridge: **two lanes(width 10m, height 5m), successful**

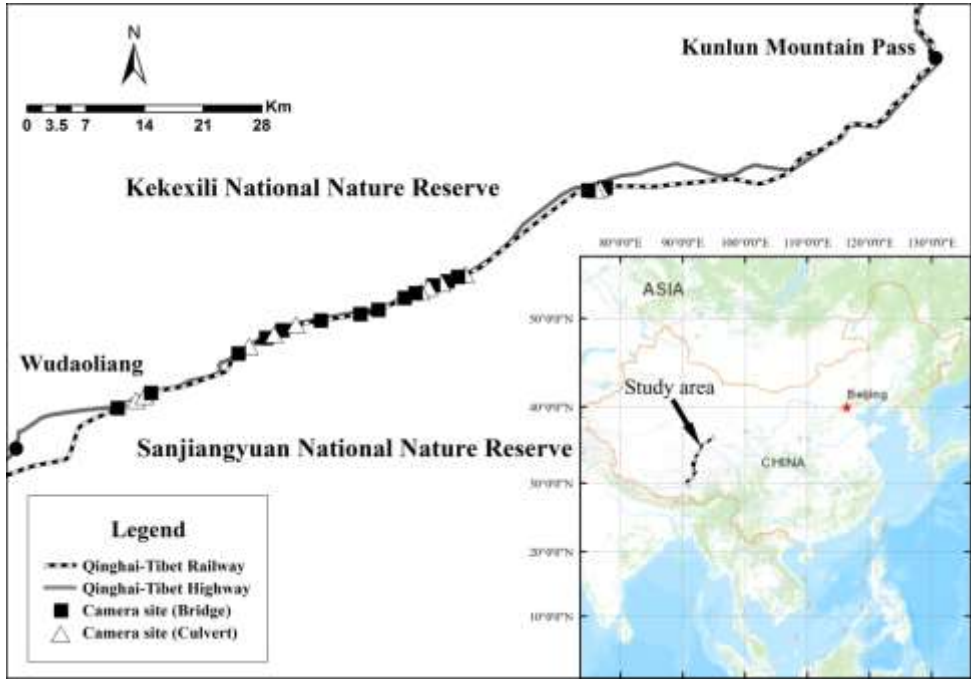


- **Divided highway**
- **The Width of median strip is 50-100 m to help Tibetan antelope to cross the road ASAP**

# Wildlife protection along expressway

## Wildlife crossing structures

- 51 infrared cameras
- 2014-2016
- 14 small bridges , 11 culverts,  
1 big bridge



(Wang et al, 2017;  
2018)

# Wildlife protection along expressway

## Wildlife crossing structures

Migration season of Tibetan antelope

Key section: K2980-K3000

Type: overpass and underpass

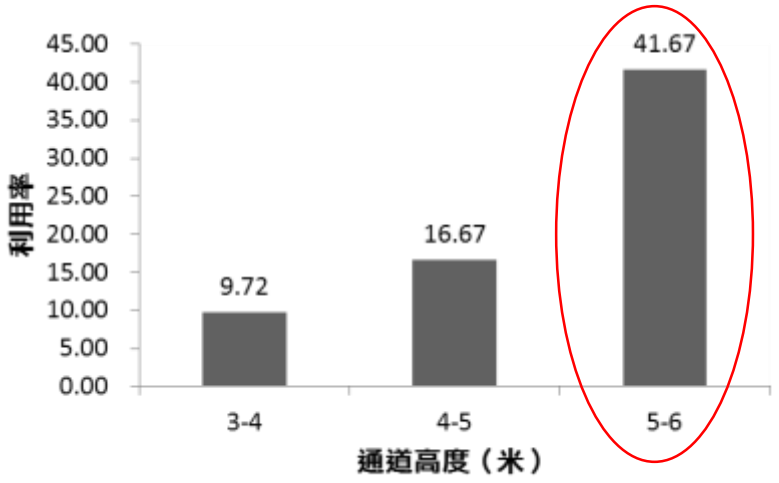
Height > 5 m

Openness index > 129

Other measures: noise barrier, vegetation restoration, alert sign, etc.



openness  
index=Height×Width/Length



Relationship between height and crossing number

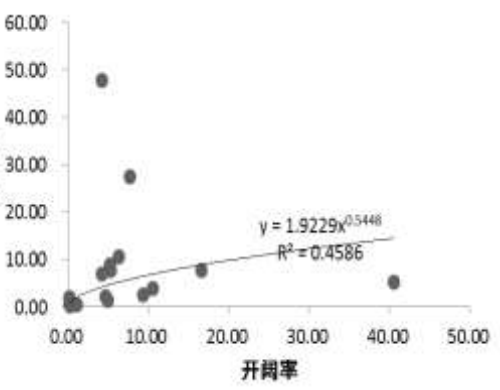
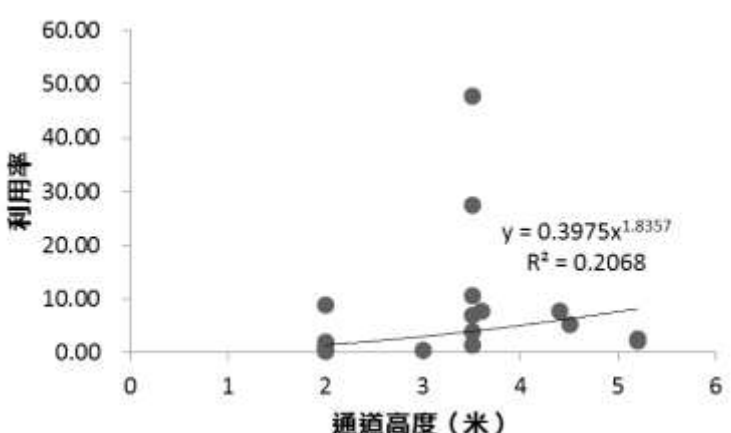
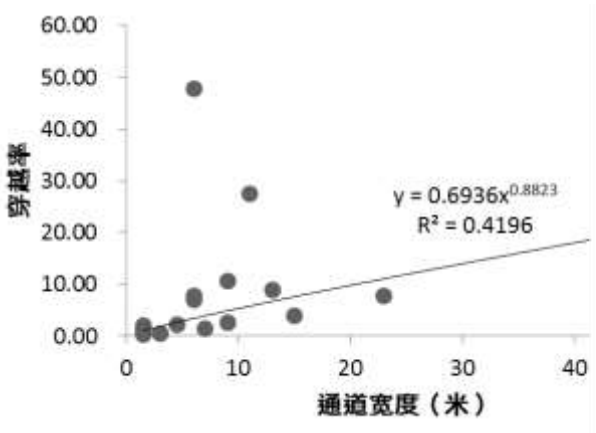


Experimental bridge, K2998

# Wildlife protection along expressway

## Wildlife crossing structures

No migration season of Tibetan antelope



Height > 3.5 m

Width > 6 m

Openness index > 4.2



- **Wildlife protection along expressway**

- **Wildlife crossing structures**

**Tibetan gazelle, Kiang, etc**

- ✓ **Type:** overpass and underpass
- ✓ **Other measures:** noise barrier, vegetation restoration, alert sign, etc.

Species	Openness Index	Width	Height	
Kiang	> 4.2	> 3 m	> 2.5 m	
Tibetan gazelle	> 4.2	> 6 m	> 4 m	
Wild yak				Unknown, more data are required

Thank you for your attention!

Any questions?

Email is better





## **Dr. Yun Wang**

**Research Center for Environment Protection and Water  
and Soil Conservation**

**China Academy of Transportation Sciences (CATS)**

**240 Huixinli Chaoyang District, Beijing, China**

**Tel: (8610)58278232**

**E-mail : wangyun80314@163.com**