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Monitoring of Animal Underpass on NH 44, Pench Tiger Reserve, Maharashtra (2019 – 2022)

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महाराष्ट्र वन विभाग

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Wildlife Institute of India

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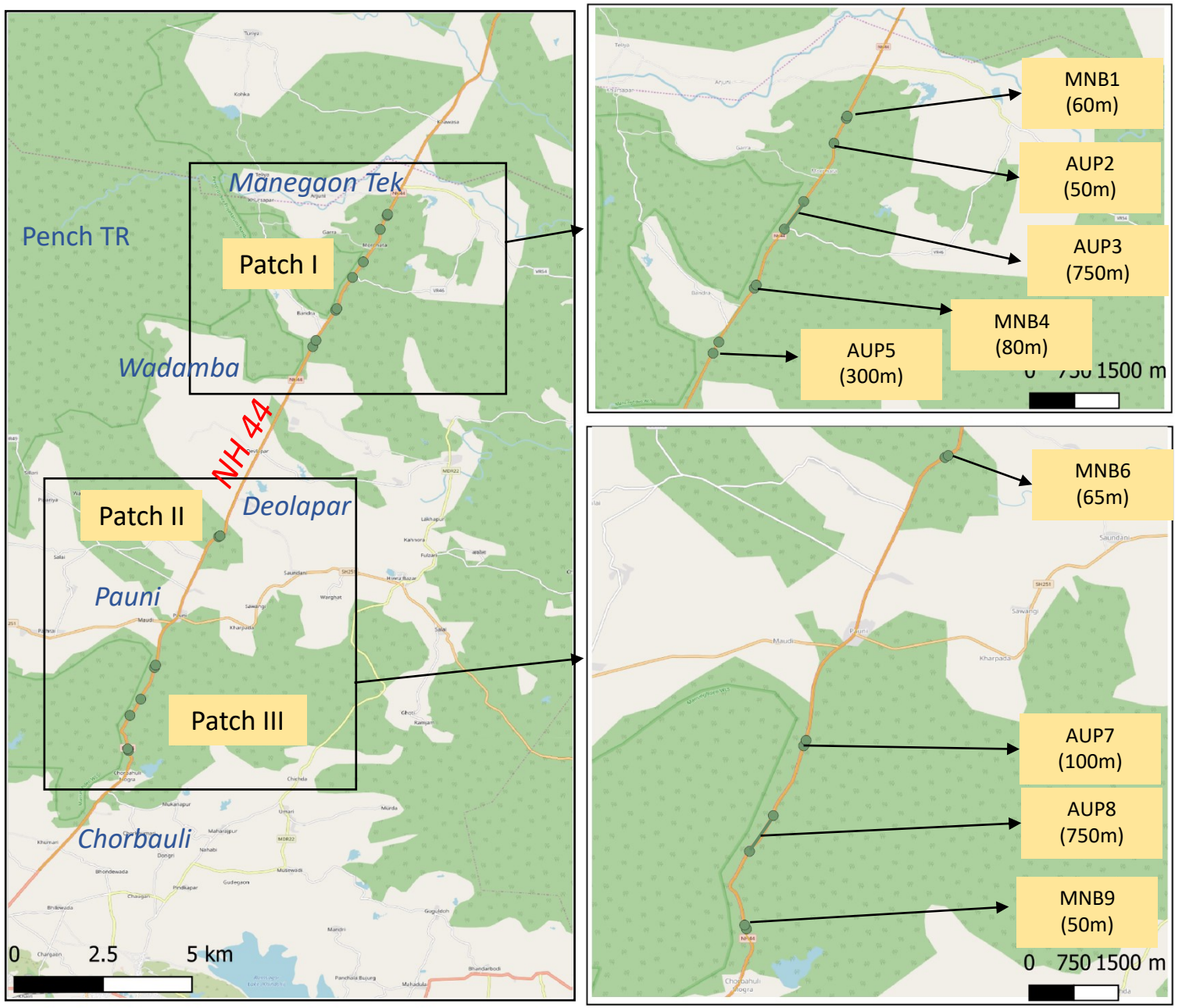
India’s first wildlife underpasses

A series of nine underpasses was constructed on National Highway 44 (previously 7) passing through Pench Tiger Reserve, Maharashtra

These underpasses (50 – 750 m wide) are the first animal underpasses to be constructed in the country to mitigate impacts of roads.

Construction was completed by end of 2018, and WII started monitoring the structures since March 2019.



Monitoring design

Monitoring by camera traps
One camera per span (length between adjacent pillars) of underpass (15-30 m)

Which species are using the animal underpasses?

SPECIES	2019	2020	TOTAL
Barking deer		4	4
Chausingha		3	3
Chital	3450	10170	13620
Gaur	58	92	150
Hare	353	813	1166
Jackal	12	15	27
Jungle cat	250	309	559
Leopard	37	167	204
Mongoose	28	23	51
Monitor lizard	2		2
Nilgai	123	708	831
Palm civet	40	20	60
Pangolin		1	1
Porcupine	3	229	232
Rusty spotted cat	1	2	3
Sambar	49	108	157
Sloth bear	7	19	26
Small Indian civet	19	21	40
Tiger	155	352	507
Unidentified	71	101	172
Wild dog	261	777	1038
Wild pig	756	2646	3402
Wolf		14	14

21 wild mammal species
(excluding langur, rhesus macaque)

193% increase in use from 2019 to 2020

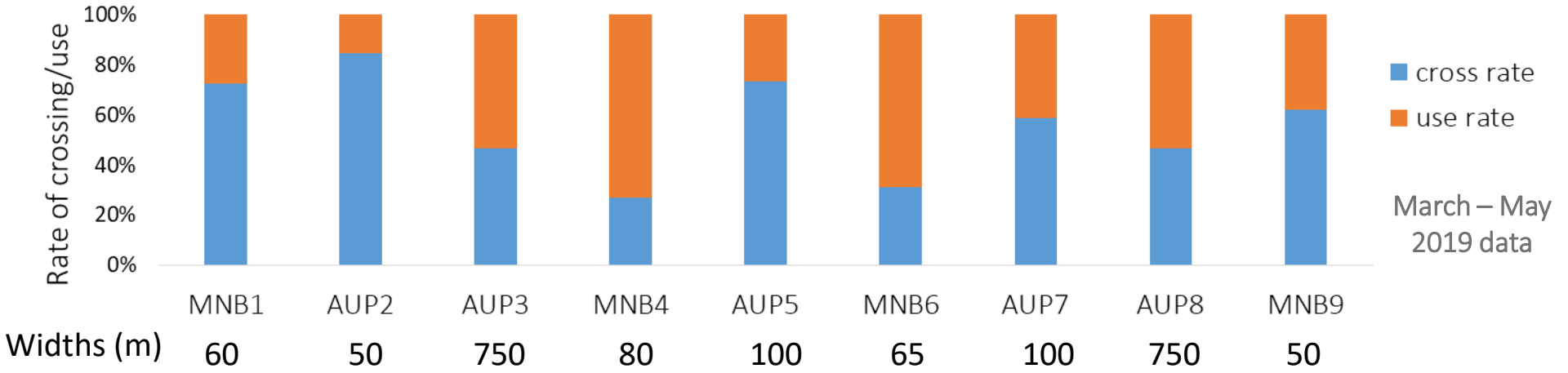
16 tiger individuals

Cuddeback Digital

What do we mean by captures of wildlife?
Why not crossings?

CROSSING: movement across the structure to get to the other side

USE: movement along the structure; resting/feeding/'**using**' the structure



Do animals immediately take to the underpasses?

First time users

New learnings


10/13/2020 6:15 PM G1
Cuddeback Digital


7/30/2020 12:03 PM H26
Cuddeback Digital


3/29/2020 9:43 AM G2
Cuddeback Digital


Better together
3/14/2020 3:37 PM B1_
Cuddeback Digital


8/1/2021 4:01AM H24
Cuddeback Digital

Marking territories


11/9/2020 3:56 PM H16_
Cuddeback Digital


Fighting arena
6/21/2020 6:28 AM H10
Cuddeback Digital

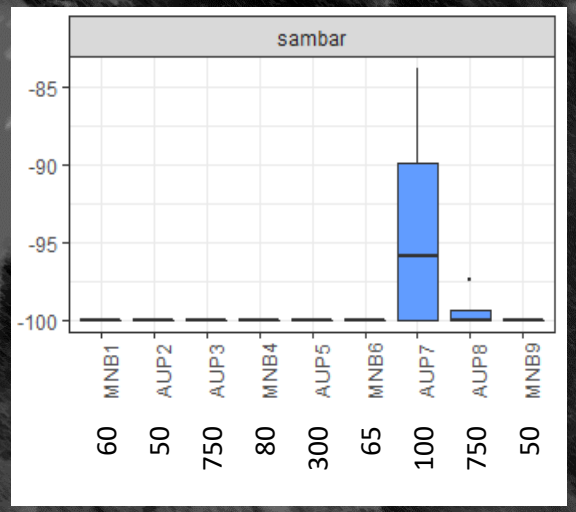
Resting spot

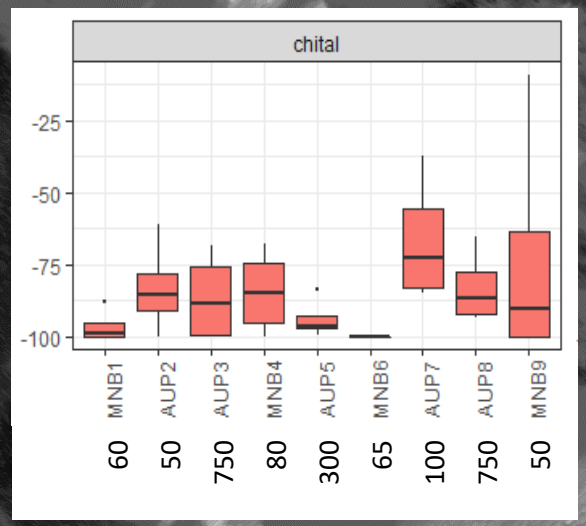

Naturalisation
7/15/2019
8:29 AM
H11
Cuddeback Digital

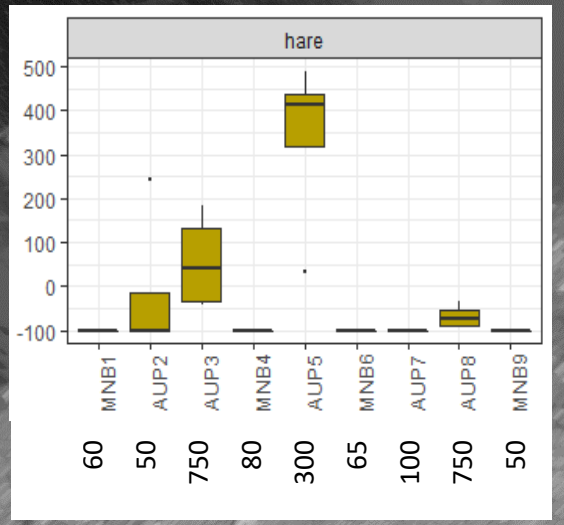
Naturalisation

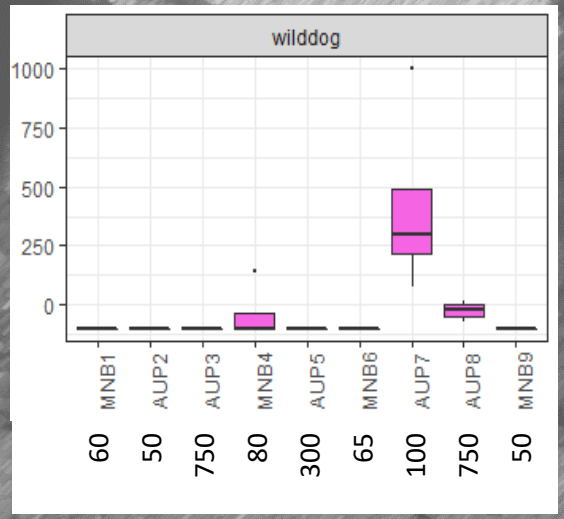
Can crossing structures mimic natural habitat?

$$\text{UNDERPASS PERFORMANCE} = \frac{\text{movement rate in underpass} - \text{movement rate in adjacent habitat}}{\text{movement rate in adjacent habitat}} \%$$









Negative performance:

sensitive species, probably not yet habituated to underpasses (sambar, nilgai);

species with high movement rates in adjacent habitat (chital)

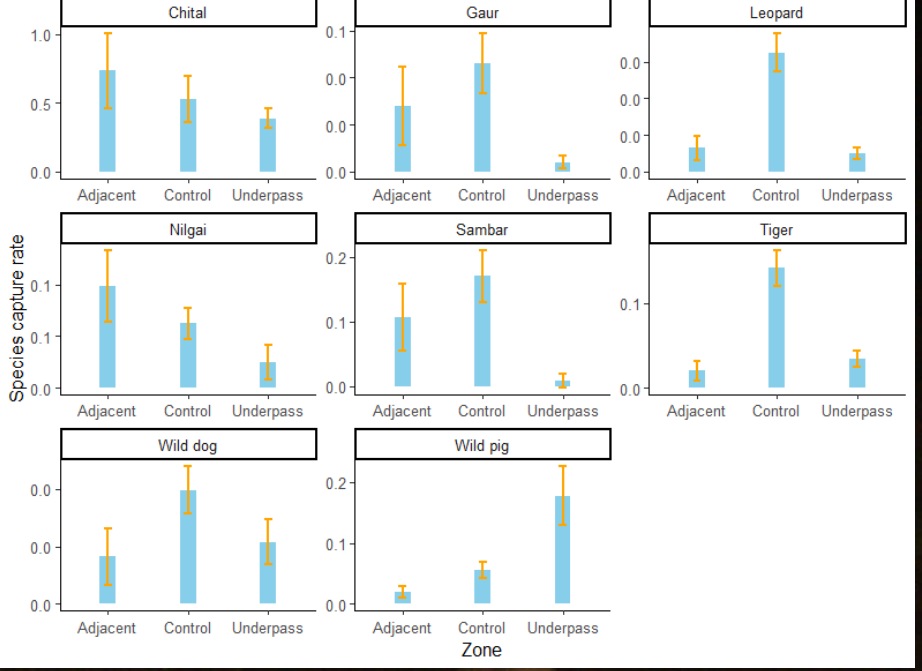
Positive performance:

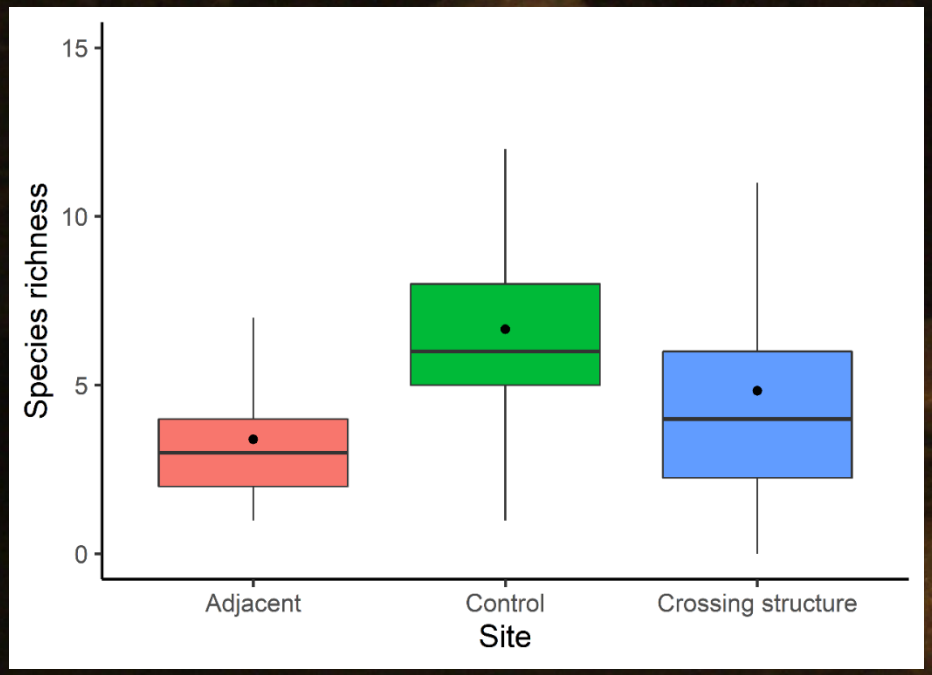
Mostly in big (>100 m) underpasses for species of open habitat types

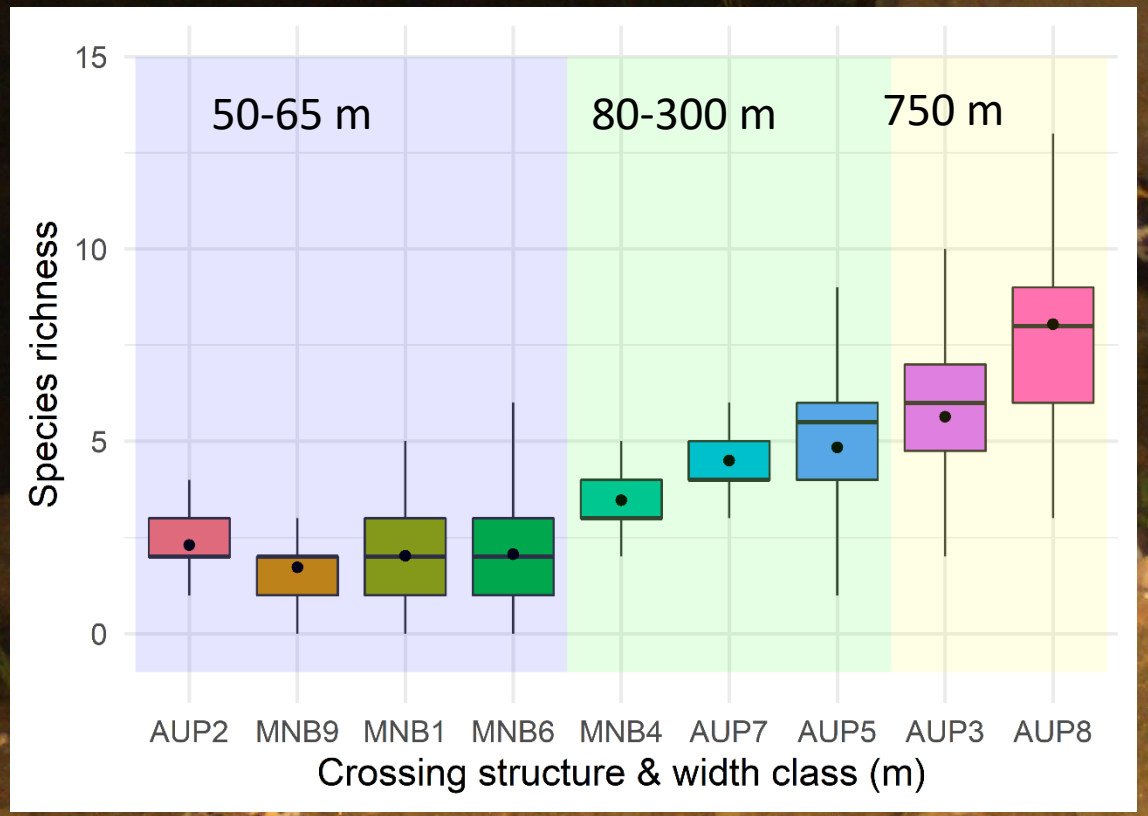
Movement rates under crossing structures similar to natural rates for some species

Species richness under crossing structures is less than that inside forest

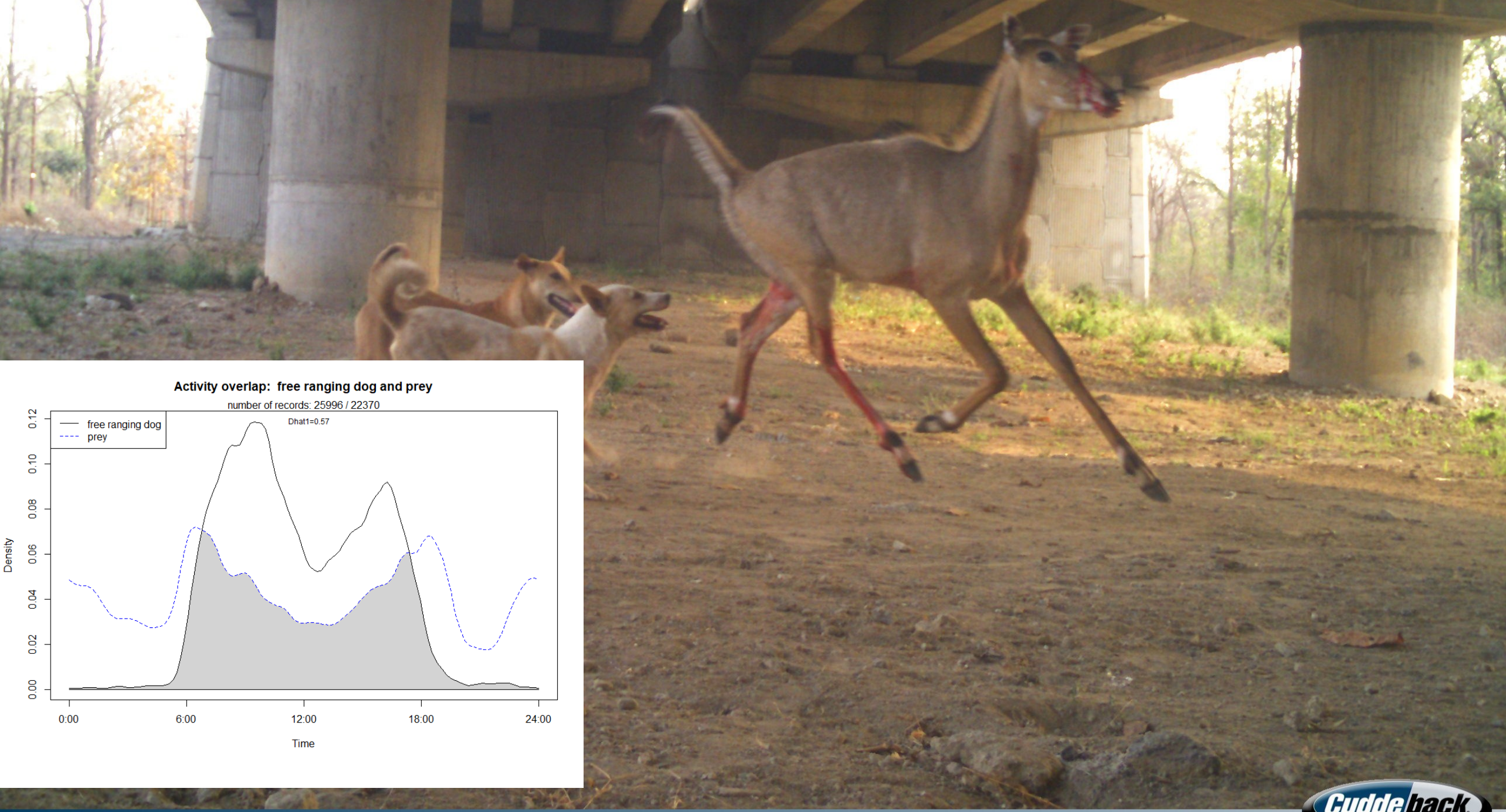
Mean species richness increases with crossing structure width.







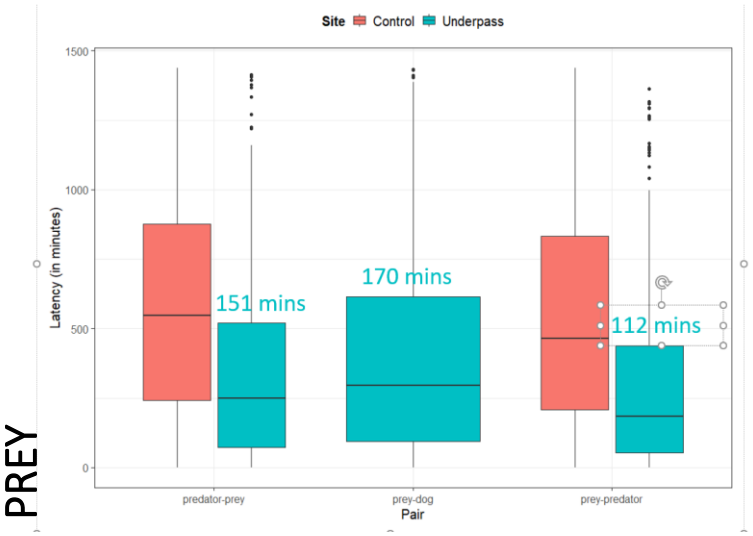
Wild dog haven?

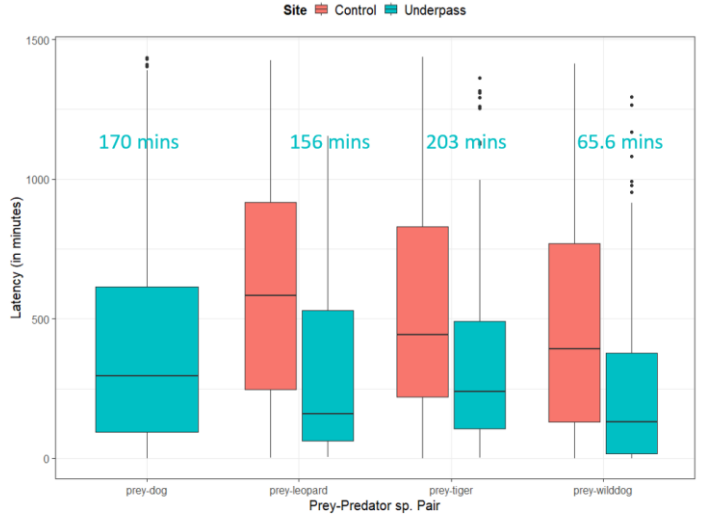


Cuddeback Digital

Do underpasses act as ‘prey traps’?

PREY



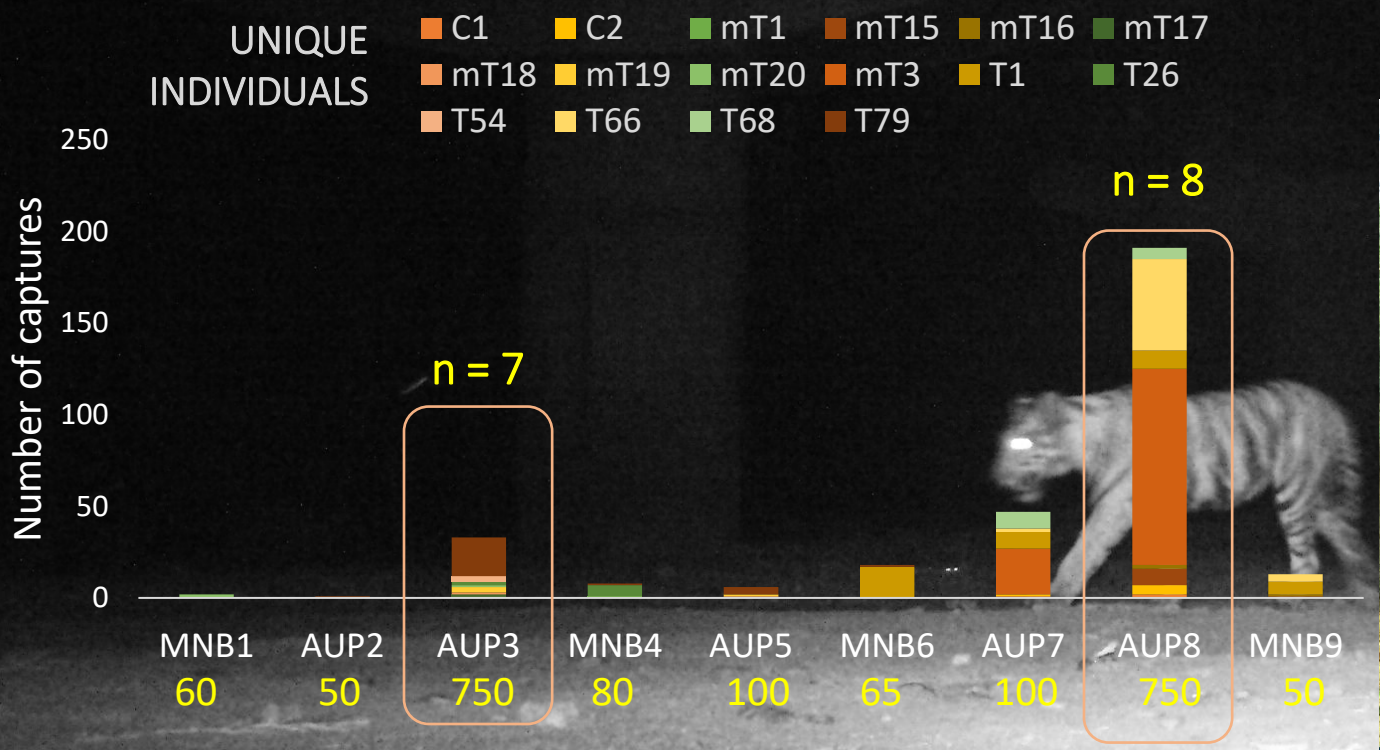


Latency (time)

PREDATOR/DOG

No evidence of underpasses acting as ‘prey-trap’. Wild dog-prey latency time is the least (65.6 minutes).

What is the use of underpasses by tigers?



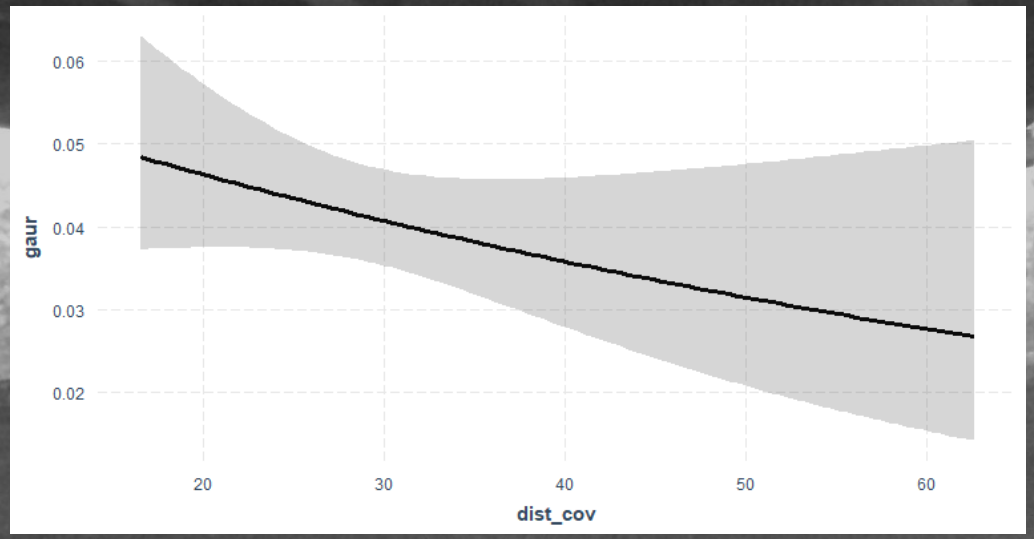
16 Unique Individuals

Tigers of NH 44

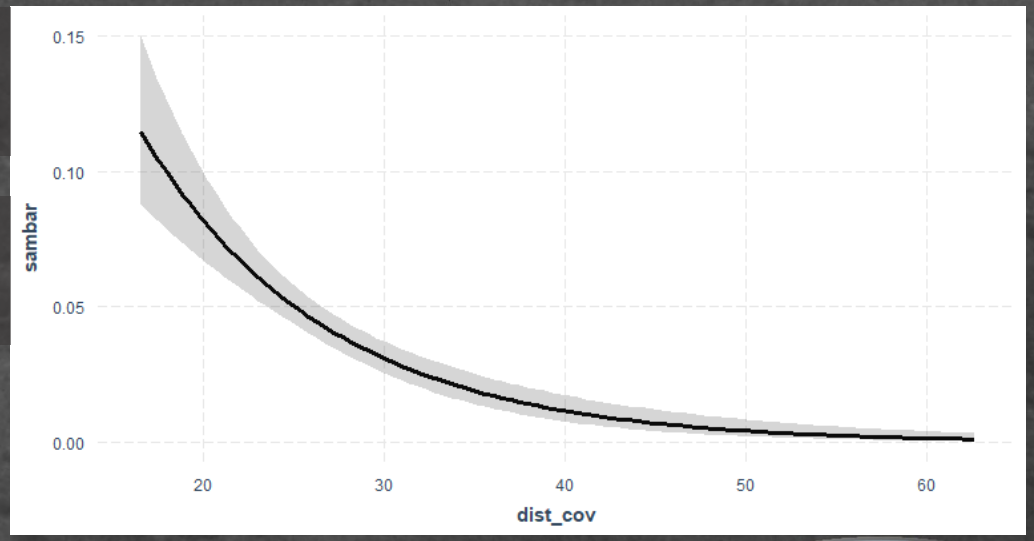
At least 16 tiger individuals during March 2019 – December 2020.

These include six individuals that have been captured inside the Pench Tiger Reserve, Maharashtra, and at least 3 cubs/sub-adults.

Management inputs



Vegetation cover near underpass increases use by herbivores



Human use decreases use by some mammals

ACKNOWLEDGMENT

- PCCF (HoFF), Maharashtra
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- FD, Pench Tiger Reserve
- DD, Pench Tiger Reserve
- MD, FDCM, Nagpur
- CCF (T), Nagpur Div.
- DCF (T), Nagpur Div.
- RFO – Pauni, Deolapar, Chorbauli (Pench TR) Pauni (T), Deolapar (T)
- Akanksha Saxena
- Long-Term Monitoring Team (Pench)
- Forest guards
- Field assistants