Urban Ecology of Bats

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Photo by Rudmer Zwerver

About Me

Wildlife Human Interactions

ECKERD COLLEGE

University of the Sunshine Coast Australia

GBatNet

Urban ecology, studies how organisms interact with their environment in cities

Humans and Wildlife Increasingly Share Habitats - and Houses

The Anthropocene ‘age of man’ is marked by a decline natural habitat worldwide and an increase in man-made structures, leading to increased interactions between humans and wildlife.

Wildlife in the Anthropocene

Increasing humans is overall linked to decline in biodiversity but has variable impacts on species; some generalist species appear to thrive, others have increased rates of disease and stress measures in urban areas (Brunton et al., 2020; Iglesias-Carrasco et al., 2020).

Specialists

narrow niche

less adaptable because of specialized needs

more likely to become extinct

use a specific set of resources

easily affected by changing conditions

have an advantage when conditions are more constant

Generalists

broad niche

adaptable to many environments

less likely to become extinct

use a variety of resources

high range of tolerance

have an advantage when conditions change

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Urban Bats is not a Modern Term

Bats have co-existed with humans for thousands of years, and have roosted and conflicted with humans in structures ranging from grass huts to Mayan temples and European castles

Centuries of habitat and roost degradation in Europe have led to some species roosting almost exclusively in buildings and churches


1


2


3
quadrupedia.


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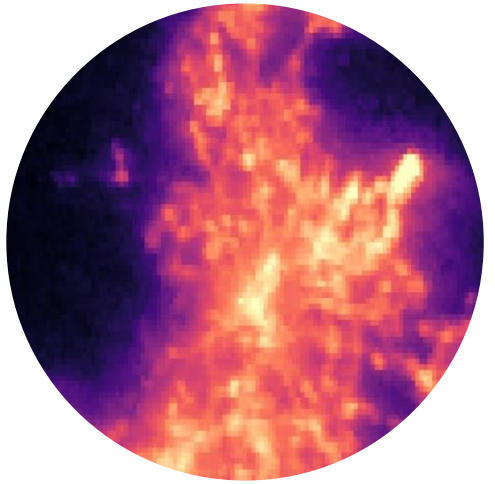
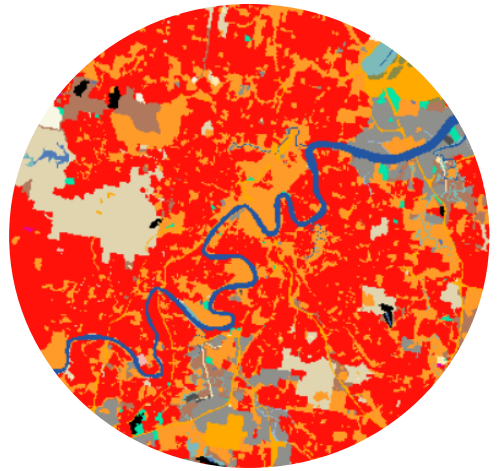
9

Urban

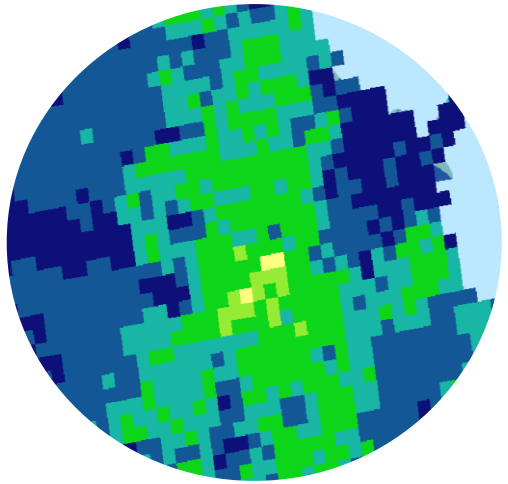
What is Urban? What is rural?
Depends who you ask.



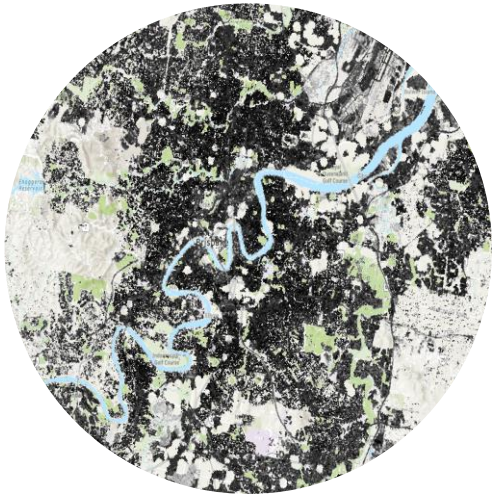
Average nightly radiance
(nanoWatts/cm2/sr)
VIIRS Nighttime Lights



Percent coverage of the
'urban' land-use type
ABARES Land Use



Estimated Population Density
(number of people per km^2)

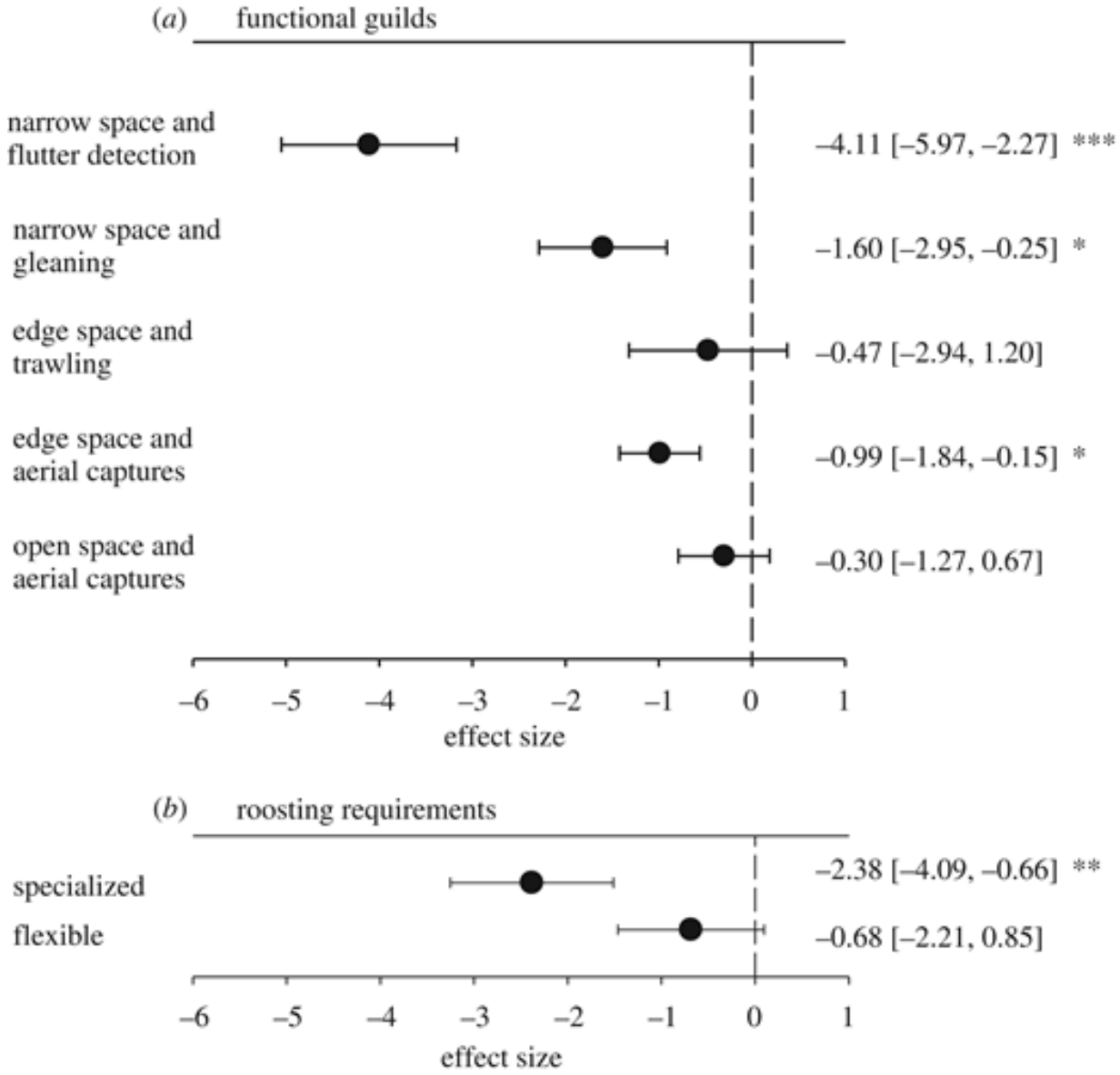


Percent coverage
of bare surfaces


1631221 © Doug Gimesy / naturepl.com

Traits that make Urban Bats

Urban Bat Traits:
Higher wing aspect ratio
Low echolocation
Long call duration
Small body size
Roost flexibility



Trait-dependent tolerance of bats to urbanization: a global meta-analysis

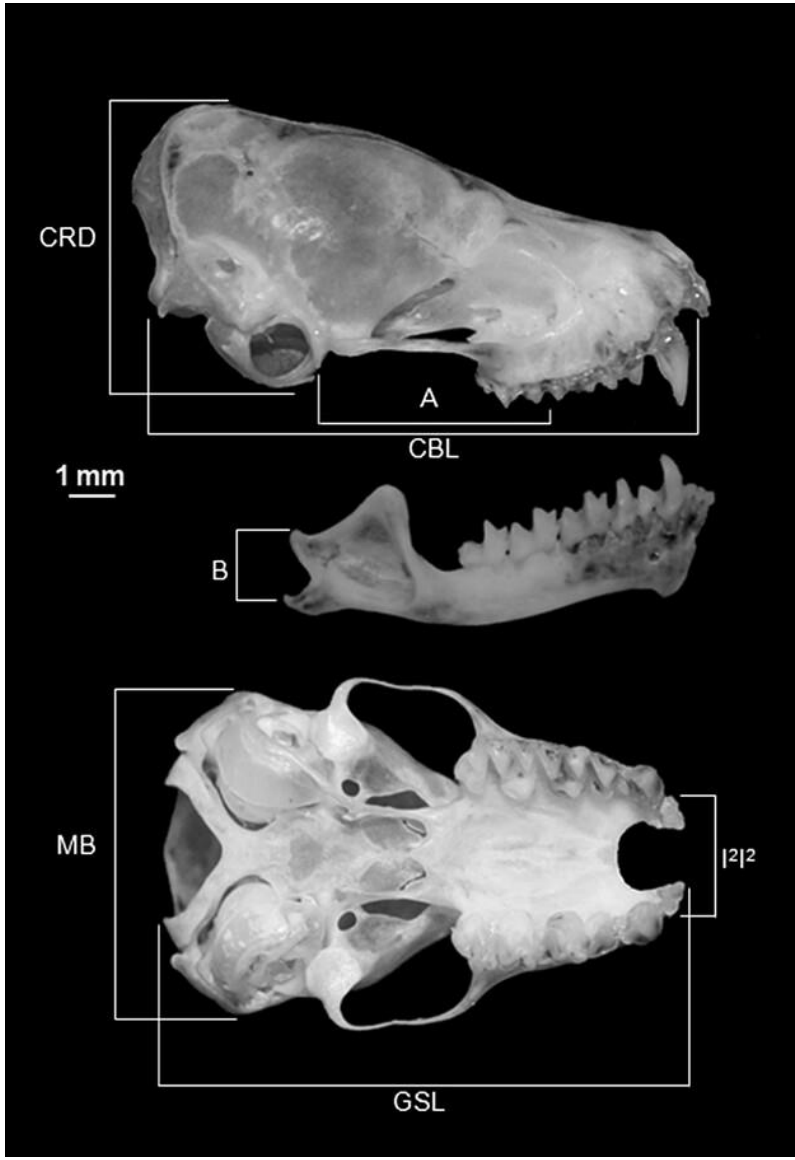
Urban affinity and its associated **traits**: A global analysis of **bats**

Benefits of urbanisation

Urban areas have artificial light, man made roosts, and increased heat - which can exclude many bat species

However, others may be able to benefit from this unique ecological niche

Earlier birth times, faster growth, and potentially even larger body size has been linked to urbanisation

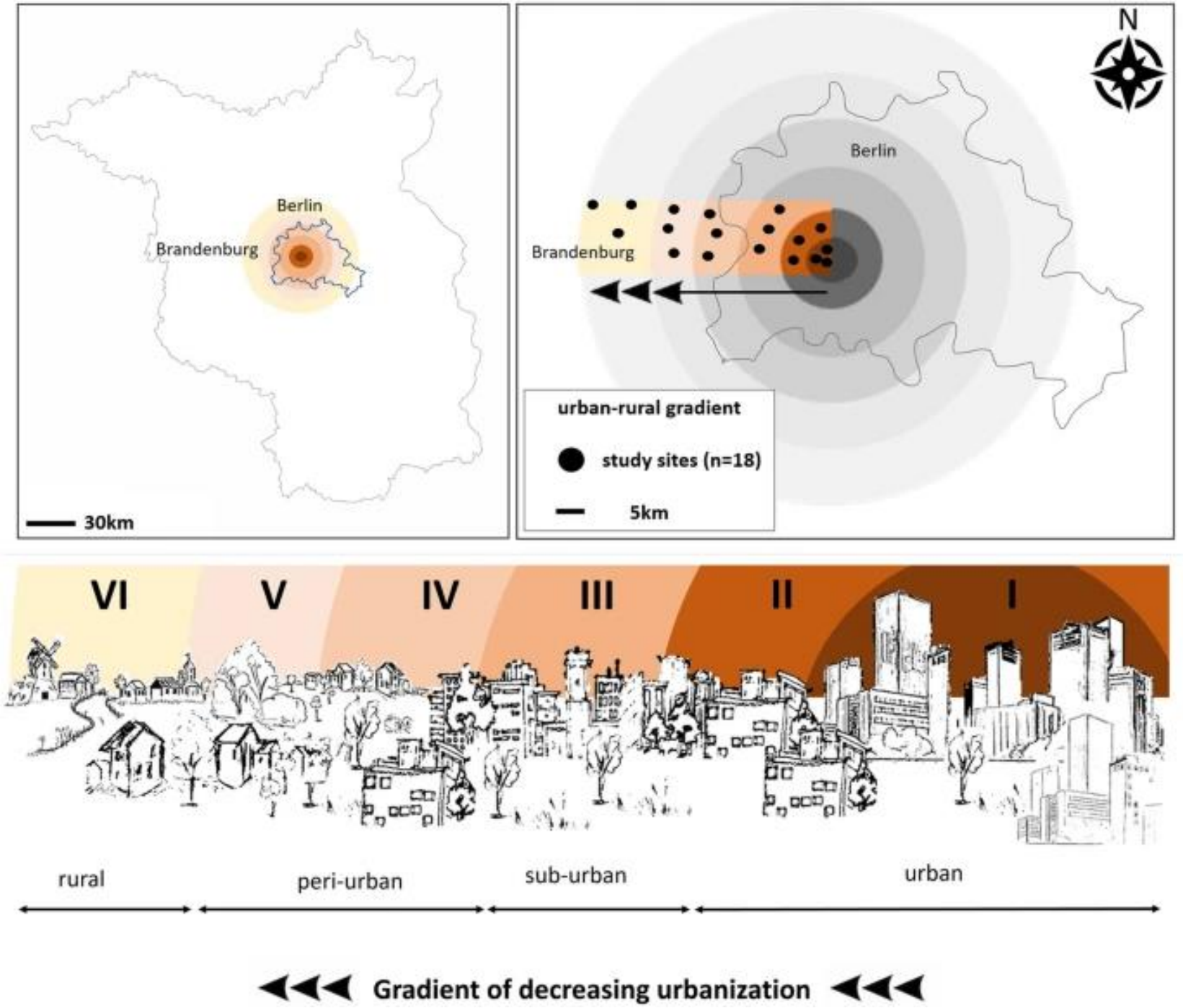


Cranial size has increased over 133 years in a common bat, *Pipistrellus kuhlii*: a response to changing climate or urbanization?
Alessandra Tomassini, Paolo Colangelo, Paolo Agnelli, Gareth Jones, Danilo Russo
Journal of Biogeography
2013
https://doi.org/10.1111/jbi.12248

Urban bat pups take after their mothers and are bolder and faster learners than rural pups

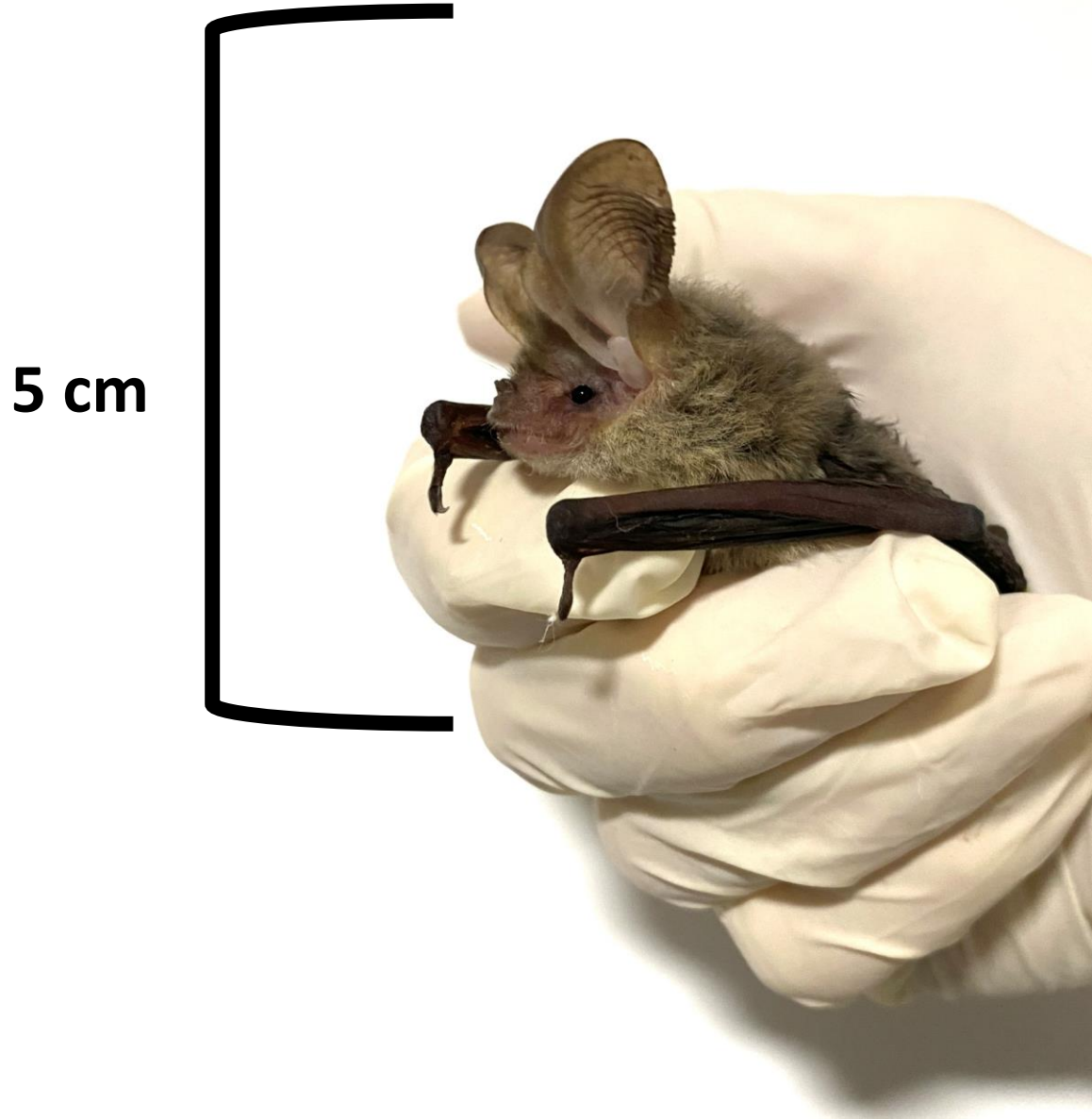
Harten, L., Gonceer, N., Handel, M., Dash, O., Fokidis, H. B., & Yovel, Y. (2021). Urban bat pups take after their mothers and are bolder and faster learners than rural pups. *Bmc biology*, *19*(1), 190.

Changes in species diversity are common across urban gradients



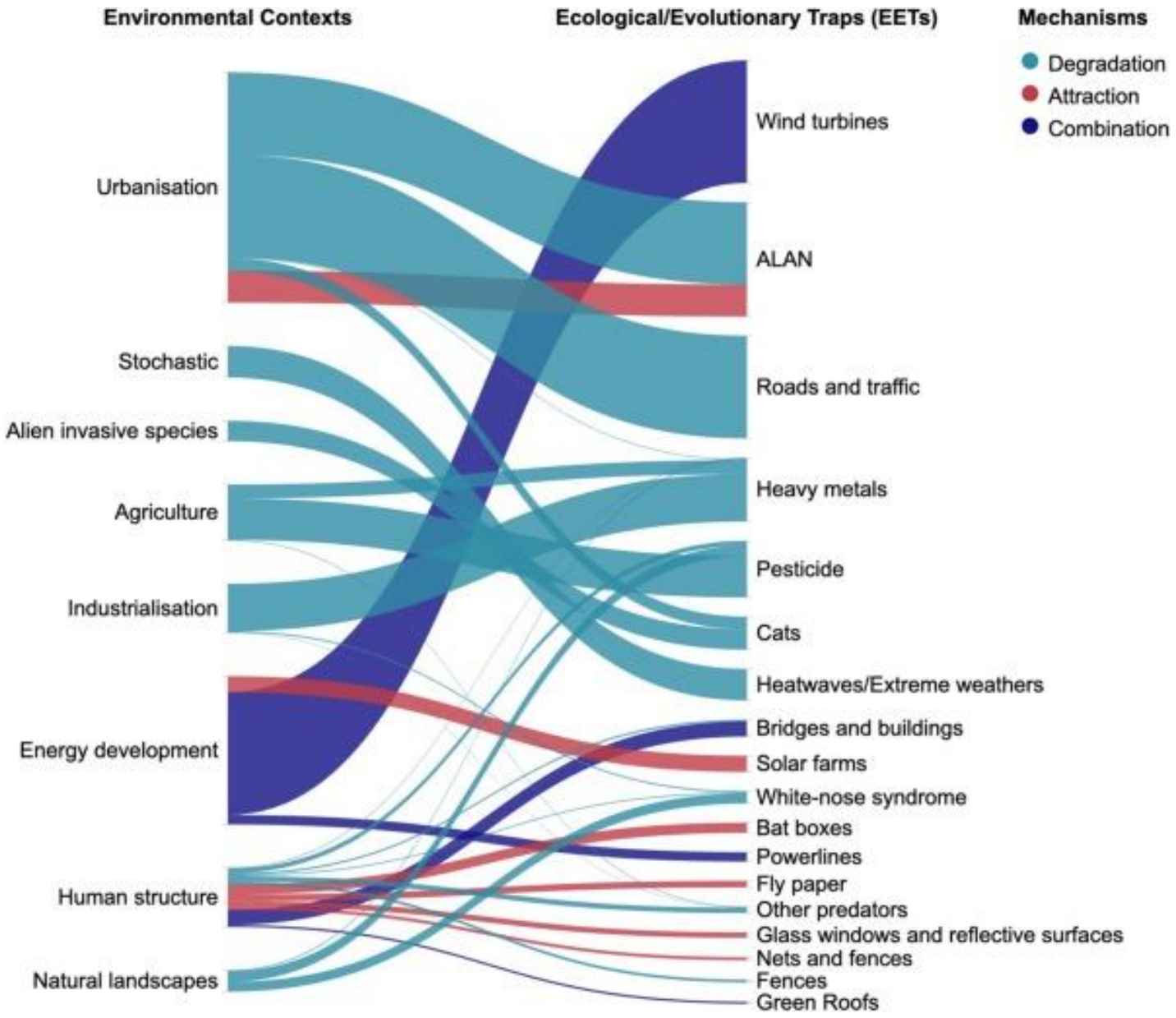
Starik, N., Gygax, L., & Göttert, T. (2024). Unexpected bat community changes along an urban–rural gradient in the Berlin–Brandenburg metropolitan area. *Scientific Reports*, *14*(1), 10552.


40 cm


5 cm

Ecological Traps

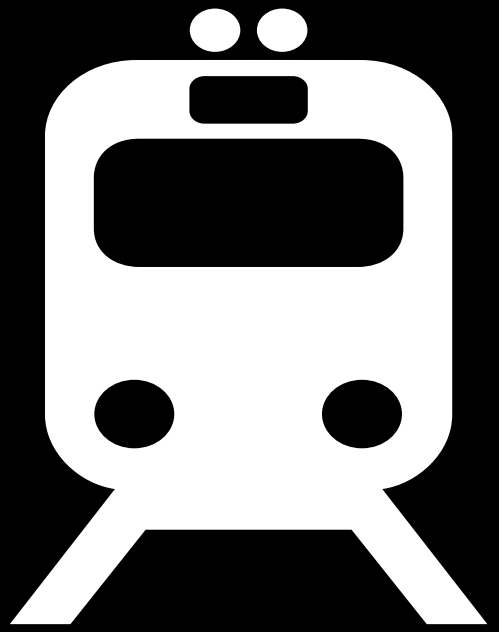
Urbanisation may act as an ecological trap, exposing bats to other threats



Tanalgo, K. C., Cruz, K. C. D., & Russo, D. (2025). Susceptibility of bats to ecological and evolutionary traps. *Biological Conservation*, *305*, 111110.

Bats and Light

Bats and sound



Jerem, P., & Mathews, F. (2021). Passing rail traffic reduces bat activity. *Scientific Reports*, *11*(1), 20671.

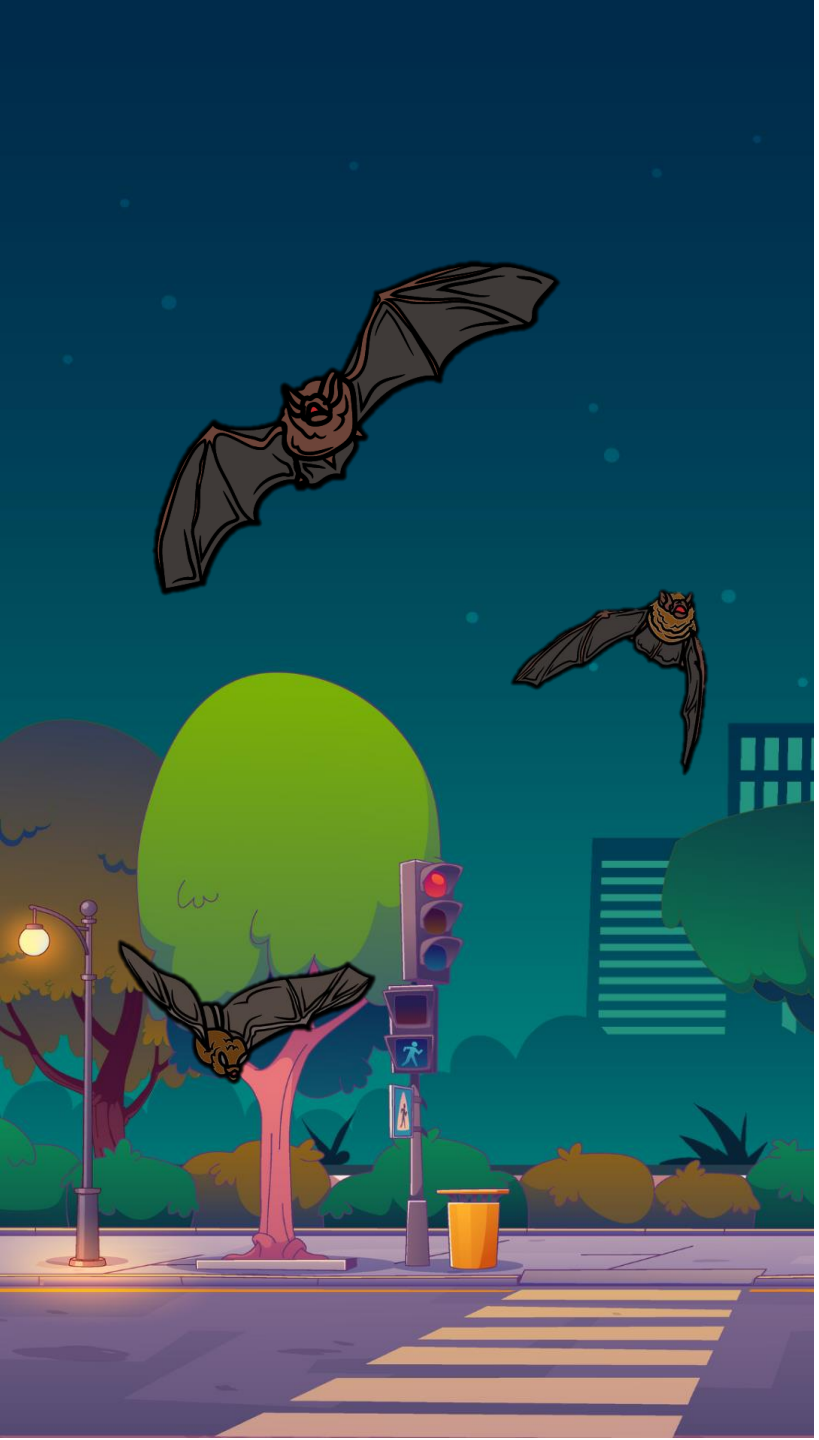
Genetic Dead Ends?

Gorecki, Vanessa, Boyd Tarlinton, Stuart Parsons, Monika Rhodes, and Caroline Hauxwell. "Population structure and gene flow among culvert roosts of the trawling bat, the large-footed Myotis Myotis macropus." In *20th Australasian Bat Society Conference*. 2022.

Stressed out Bats?

Stress is linked to greater risks of disease, but we still don’t understand how urbanisation is linked with disease risk and stress

Mixed results across species and regions, with very little research



Research Spotlight

Bats are common wildlife in Australian urban landscapes, and provide both valuable ecosystem services and the potential for human/wildlife conflict through zoonotic disease transmission.

Examining where bats utilise anthropogenic roosts can allow us to predict what habitats require increased conservation, and identify potential conflict hotspots


Look
Behind
up

Finding Roosts

Citizen Science is an emerging tool in urban research

iNaturalist

Urban Bat Roosts in Australia

Houses

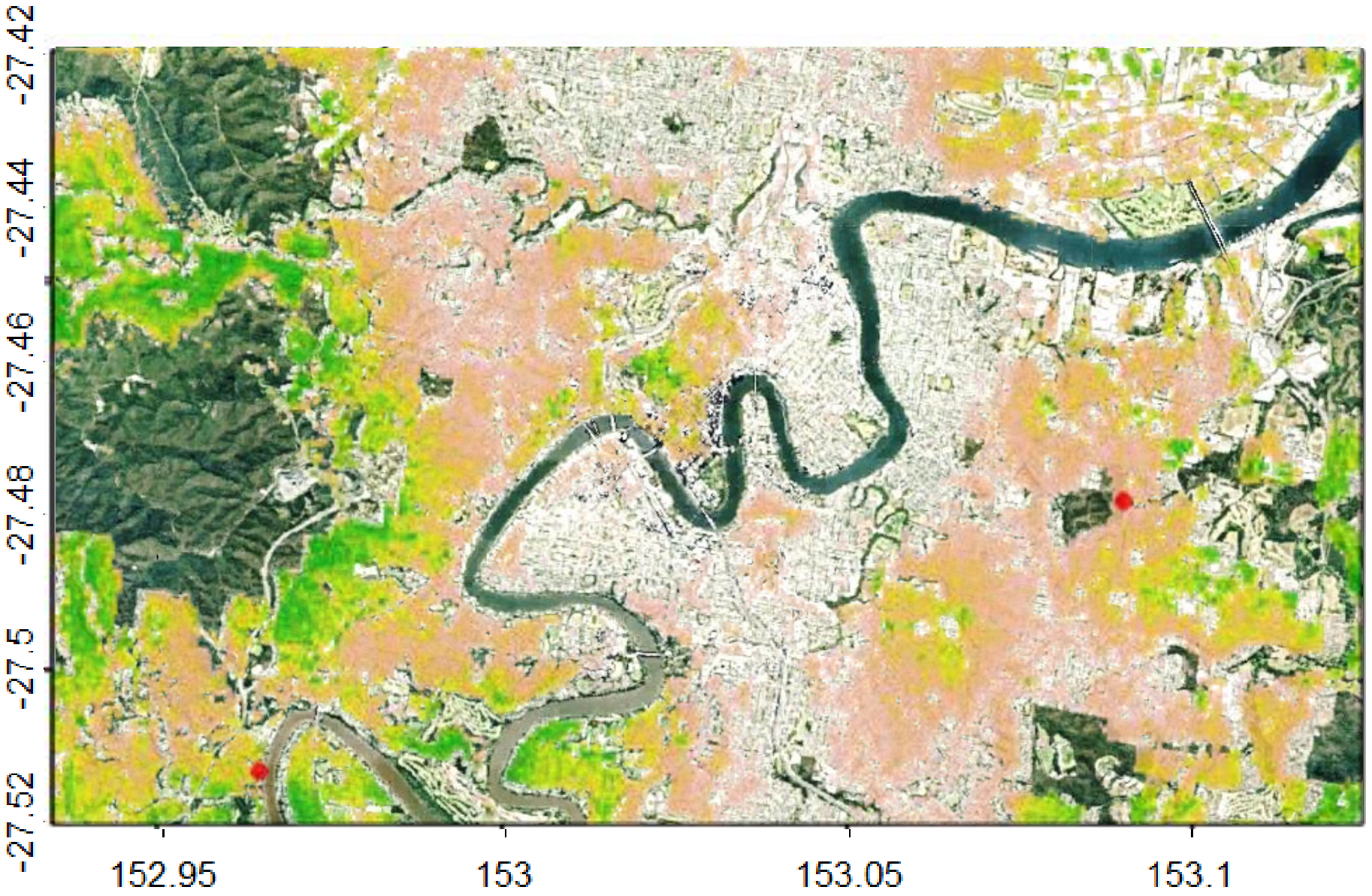
Umbrellas

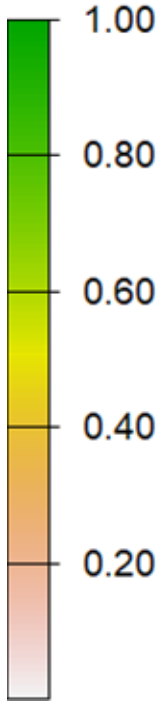
Wood Bridges

Road Culverts

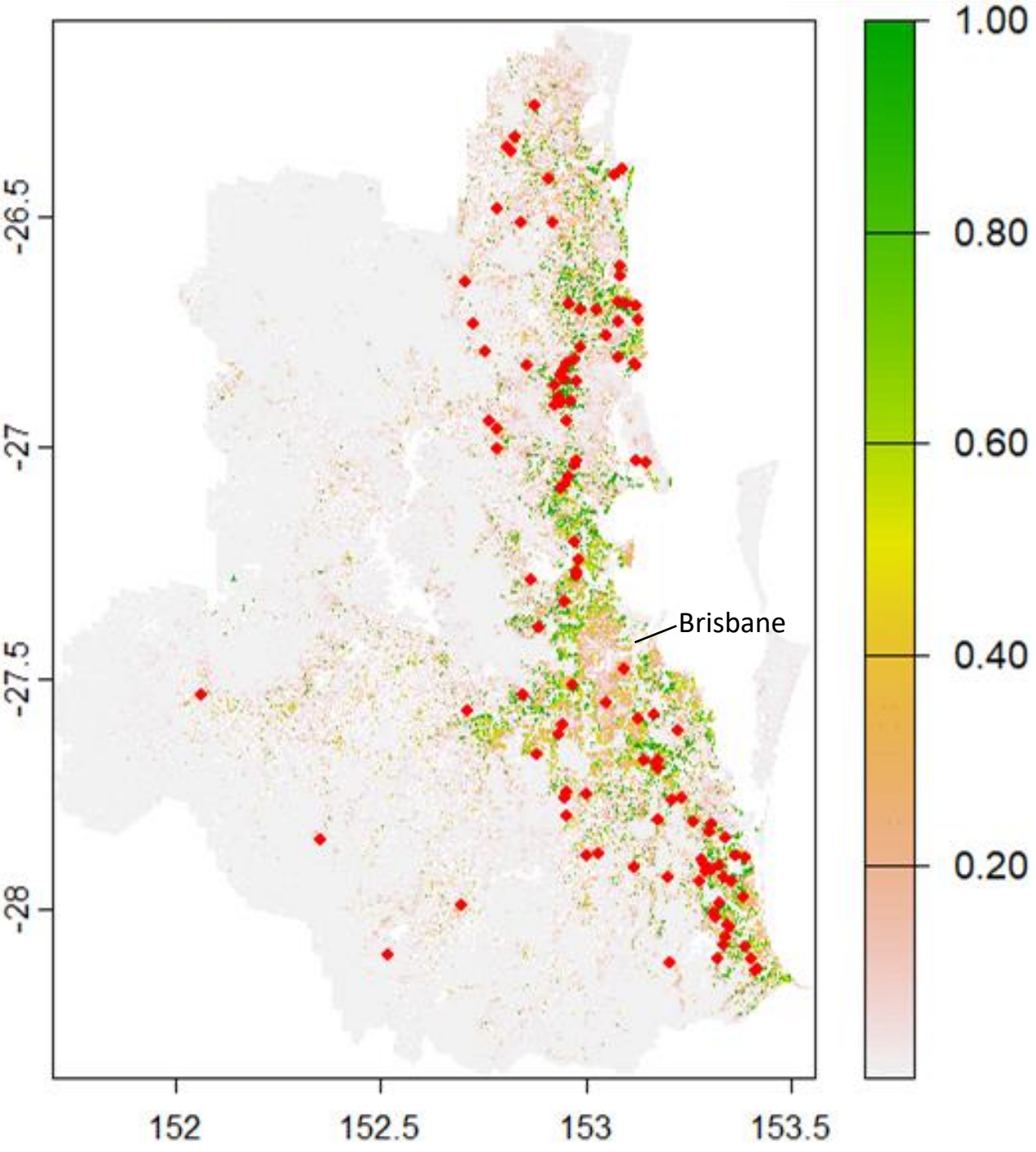

LIVE
LIKE HEAVEN IS ON EARTH
LOVE
LIKE YOU HAVE NEVER BEEN HURT
LAUGH
LIKE NO ONE IS LISTENING
SING
AS IF NO ONE CAN HEAR
DANCE
AS IF NO ONE IS WATCHING
DREAM
LIKE THERE ARE NO IMPOSSIBILITIES
PLAY
LIKE THERE ARE NO WINNERS
GIVE
LIKE YOU HAVE PLENTY
SMILE
TILL YOUR FACE HURTS
CHERISH
YOUR FAMILY & FRIENDS EVERYDAY

Scotorepens





AUC: 0.92
Mean Probability Score of Roost 70%



126 total records
111 after 1km spatial thinning

Scotorepens

South East Queensland

Habitat Suitability Model

Questions?

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