Re-thinking ecological opportunities in an urban world

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The Anthropocene: a human-dominated epoch

Agricultural intensification: another 1 billion ha of vegetation converted by 2050

Deforestation is a leading cause of biodiversity loss.

Hundreds of tree-dependant species go extinct each year.

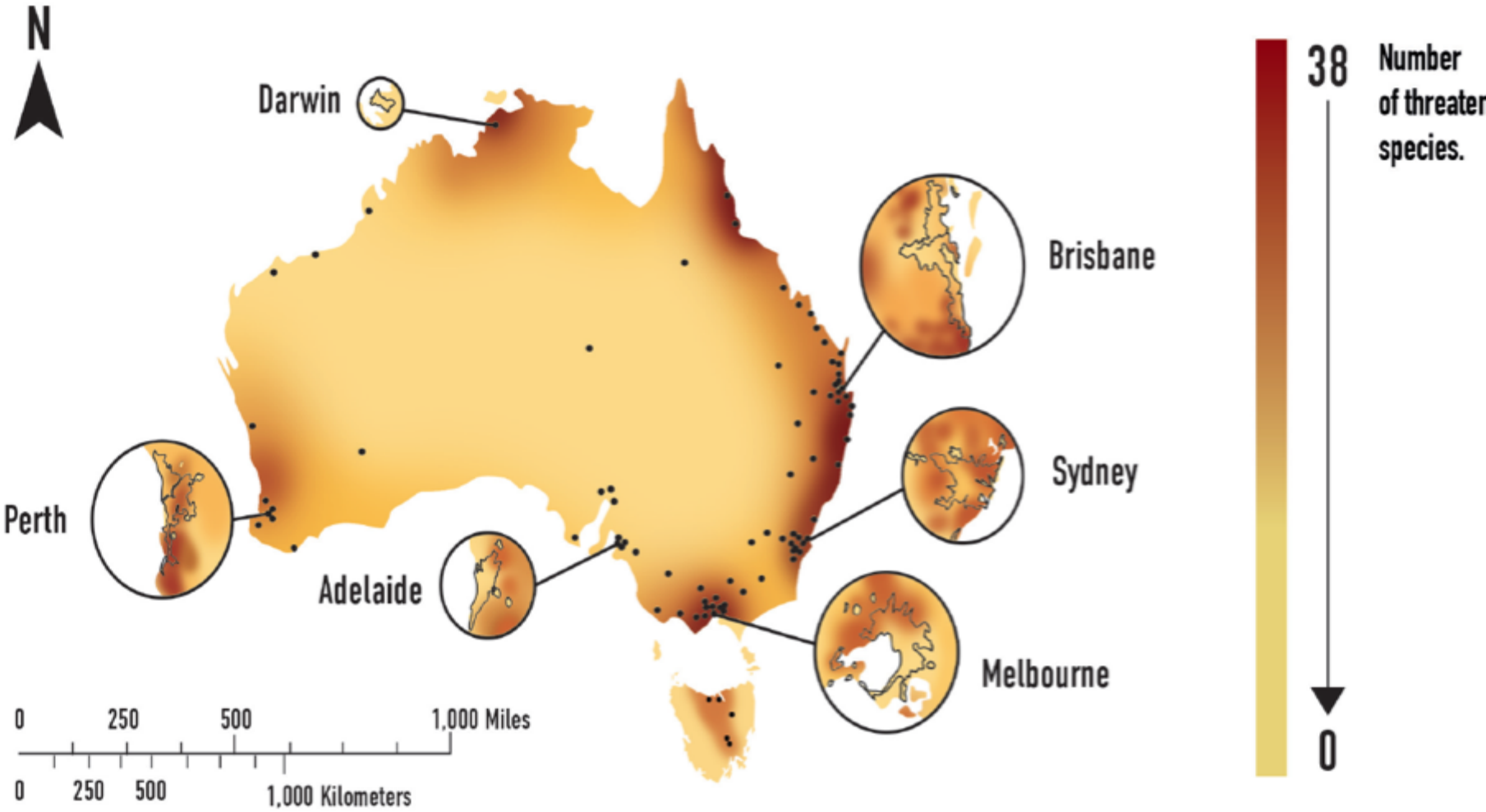
Urbanisation: 70% of human population (6.4 billion) to live in cities by 2050

In Australia, 3.2 million hectares of tree cover has been lost in the last 15 years.

Equivalent to 100,000 MCG stadiums every year.

Disproportionate urban growth in global biodiversity hotspots

Australian cities and threatened species overlap

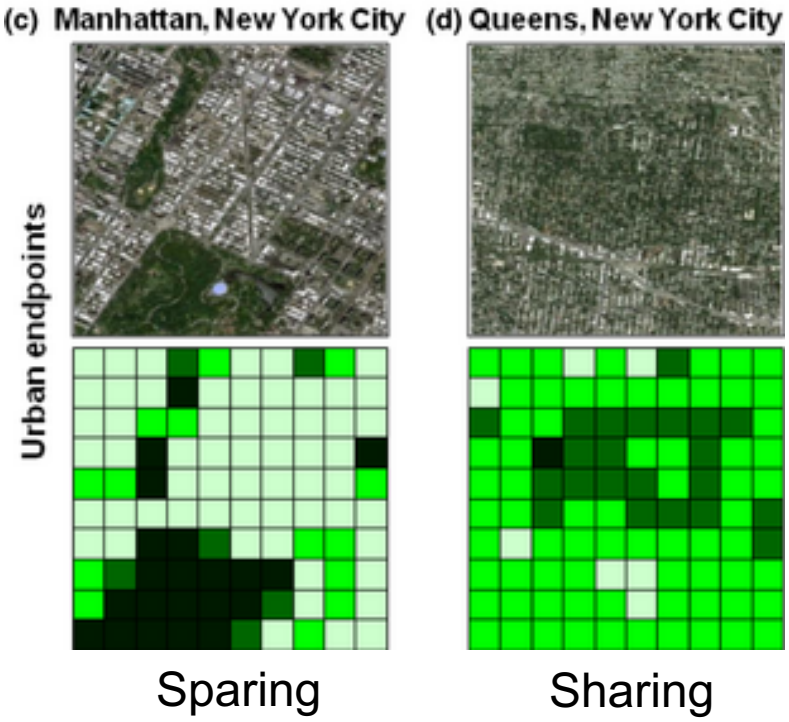


PART ONE

Creating liveable cities and wildlife habitat

➔ The amount of greenspace positively affects:

- Ground and arboreal mammals (e.g. Garden et al 2010, *Land Ecol)*
- Reptiles and frogs (e.g. Hammer & Parris 2010, *Ecol Appl)*
- Bats (e.g. Threlfall et al 2012, *Biol Cons*)
- Birds (e.g. Shanahan et al 2011, *Biol Cons*)



➔ How should we grow the world's cities?

- Reduced availability of habitat structure restricts ability for wildlife to adapt and persist in urban landscapes

Seedlings

Dead trees

Fallen logs

Litter & native groundcover

Hollows

Mid-storey shrubs

Urban greenspace and pasture: reduced availability of habitat structures

Spatial zoning: maximise use of available space and minimise risk

Spatial zoning: Balance human use and habitat preservation

Spatial zoning: innovative landscaping to safely retain ‘risky resources’

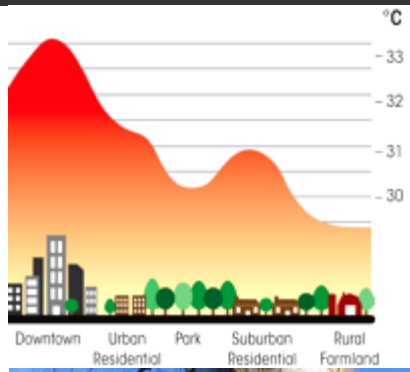
Management strategies can cater to both socio-economic and biodiversity needs

Community education: encourage tolerance and dispel misconception

PART TWO

Scattered trees : Habitat structures that support life
: Vital ecological services
: Benefits for people

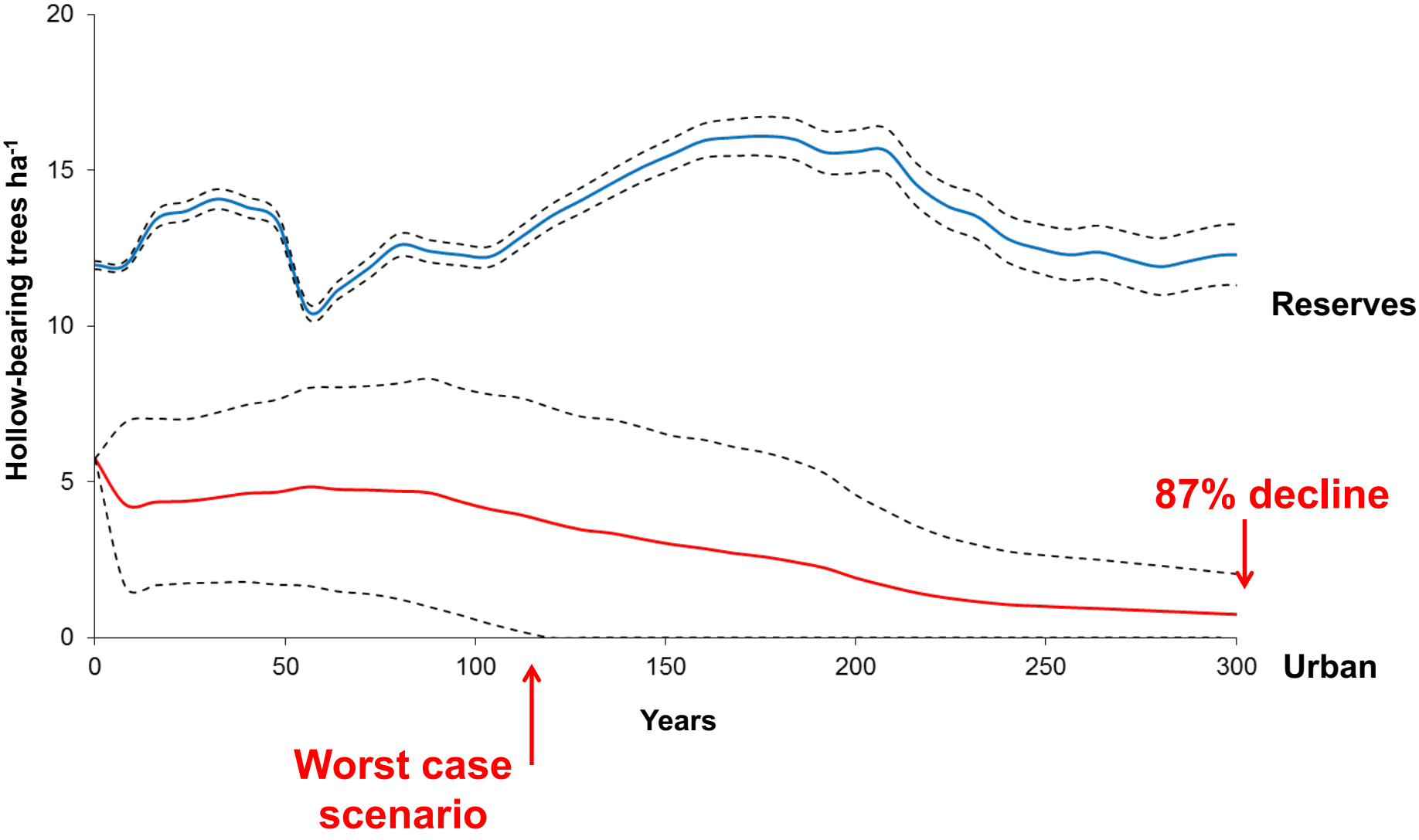
Flowers & nectar
Dispersal and adaptation
Shade (heat island effect)



Dead braches & hollows
Crop pollination
Cultural significance

Peeling bark
Nutrients cycling
Air, soil, water quality

Logs & litter
Carbon storage
Real estate value


20
15
10
5
0
Hollow-bearing trees ha-1
0
50
100
150
200
250
300
Years
Reserves
87% decline
Urban
Worst case scenario


Day 1


Day 10


Day 18

Tree regeneration: 60% increase on current densities (60 seedlings ha^{-1})

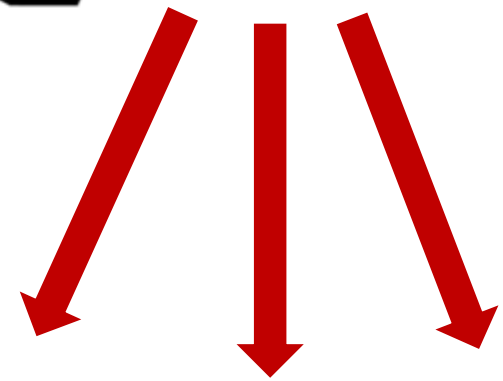
Hollow formation: 30% increase on current rate (artificial structures)

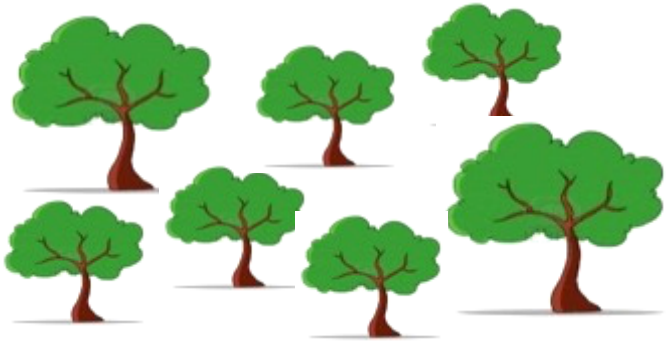
Maximise standing life: 40% increase on what is currently tolerated (450 years)

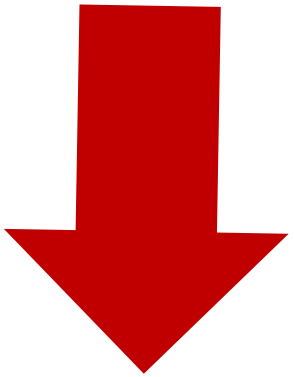
Before development

After development

Can many smaller trees provide equivalent habitat as a single large tree?





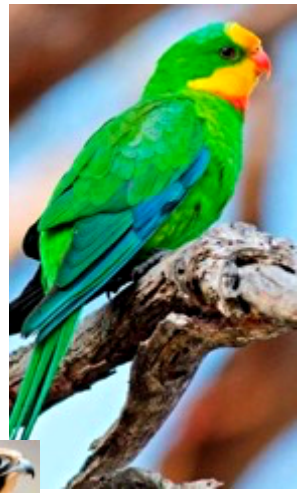


29%

species only recorded at large trees

Laughing kookaburra

Mistletoebird



Superb parrot

Olive-backed oriole

Brown falcon

Scarlet robin

White-naped honeyeater

Before-After Control-Impact (BACI)

87%

occupancies by 6 common natives and exotics

Brushtail possum

Crimson rosella

Eastern rosella

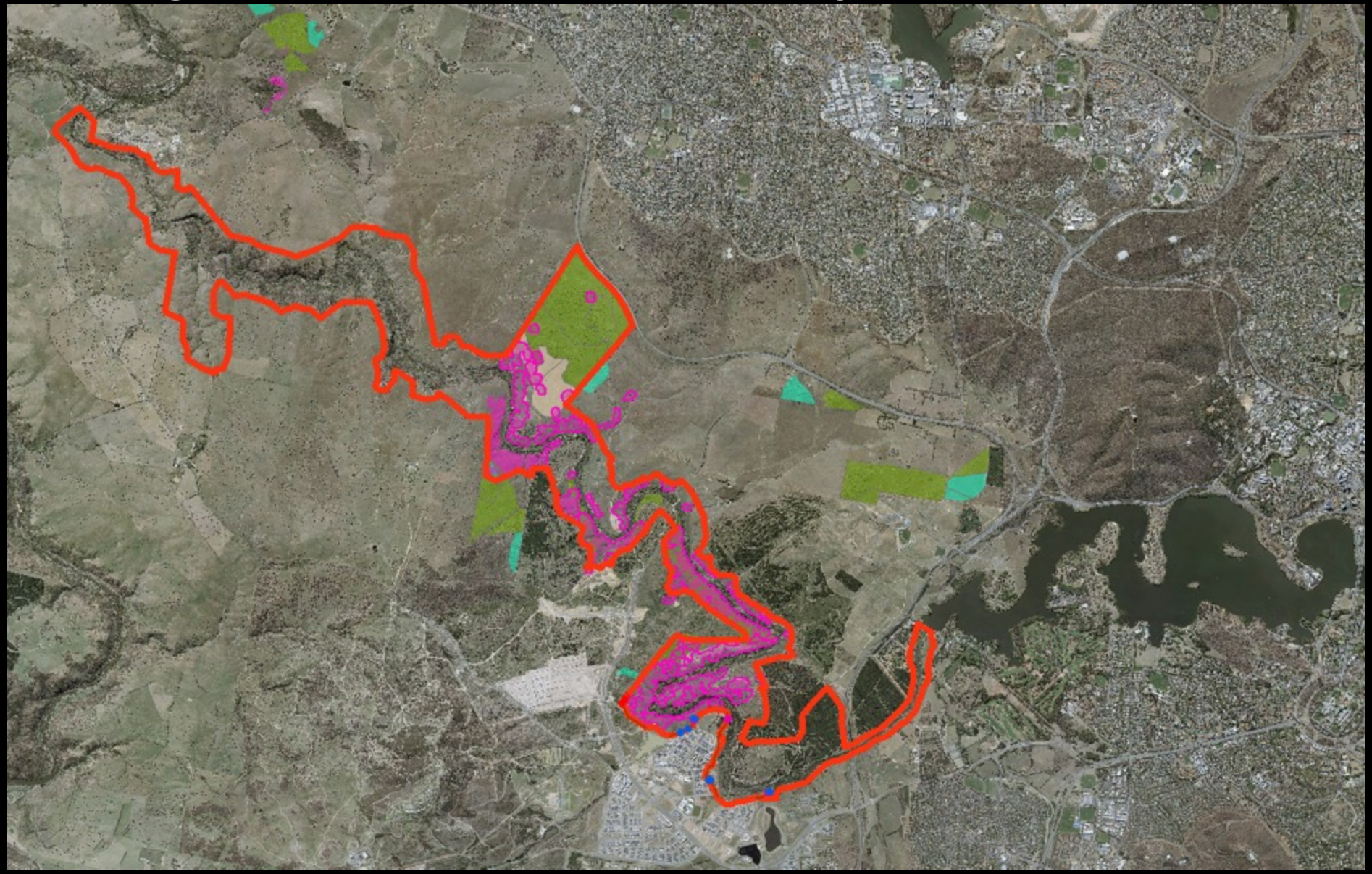
Common myna

Common starling

Honeybees

PART THREE

Molonglo River Reserve - Biodiversity Offset



Barrer Hill Restoration Project

Project overview

Step 5: [illegible]

Wildlife response

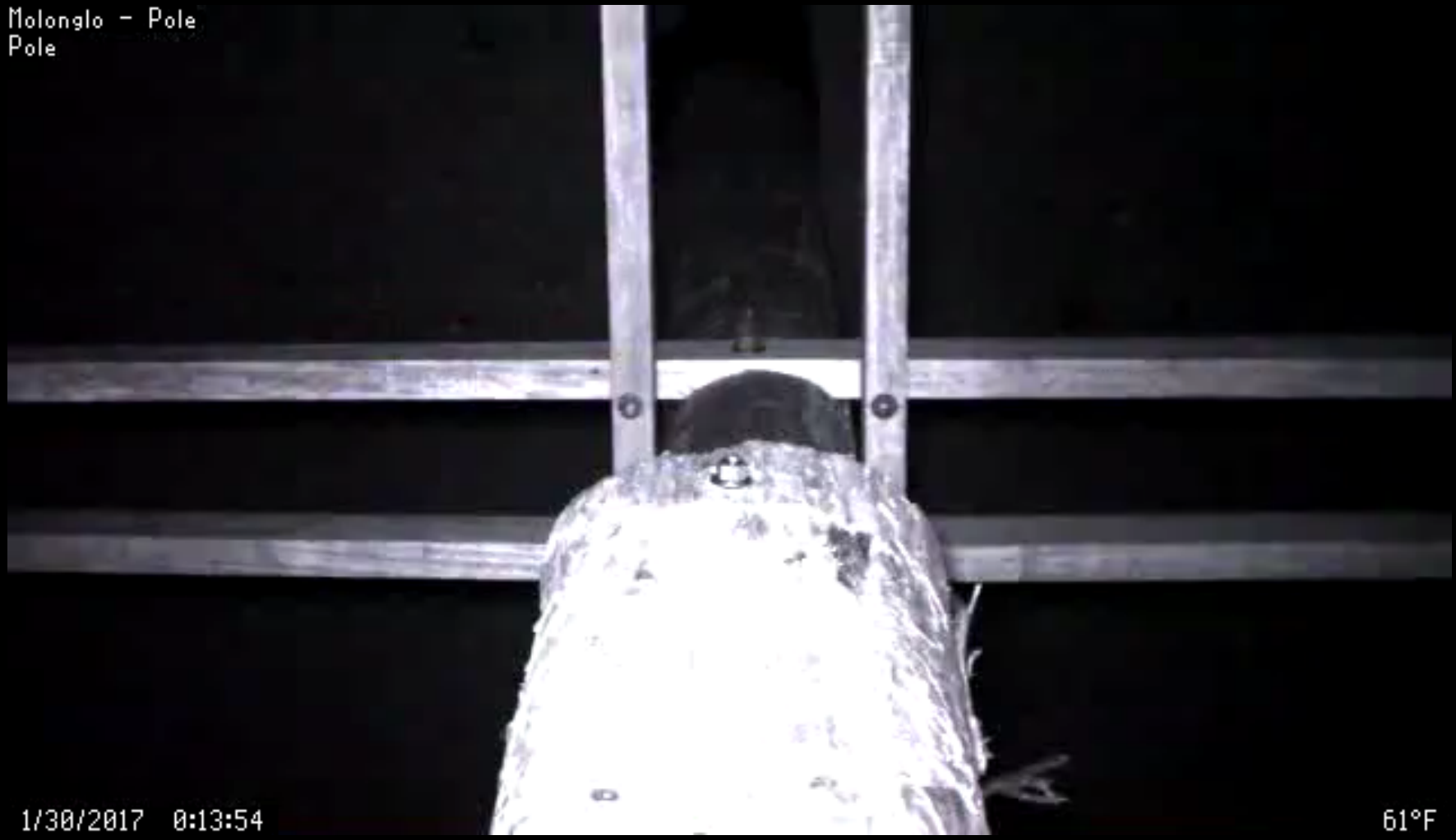
Bird visitation within minutes!

Wildlife response

Bird visitation within minutes!

Wildlife response

Wildlife response

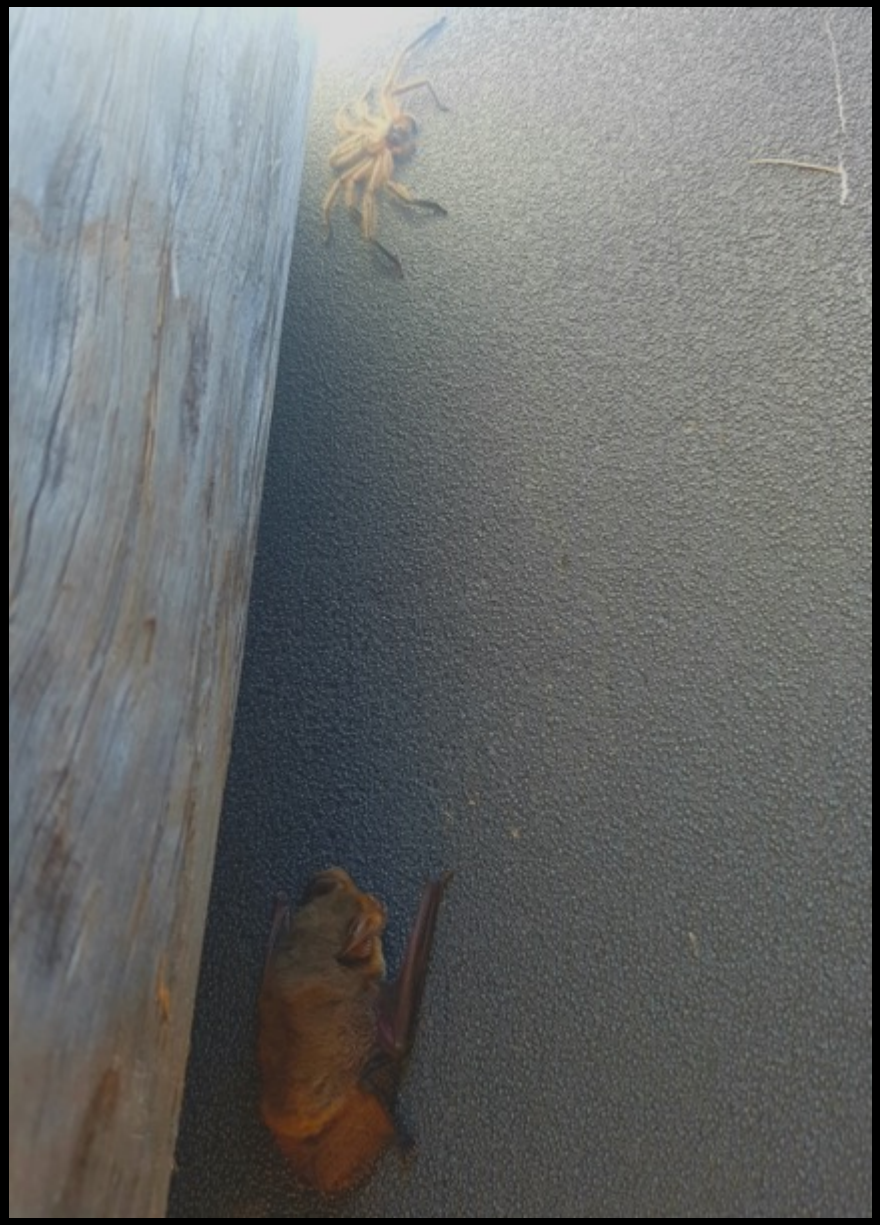


Artificial bark

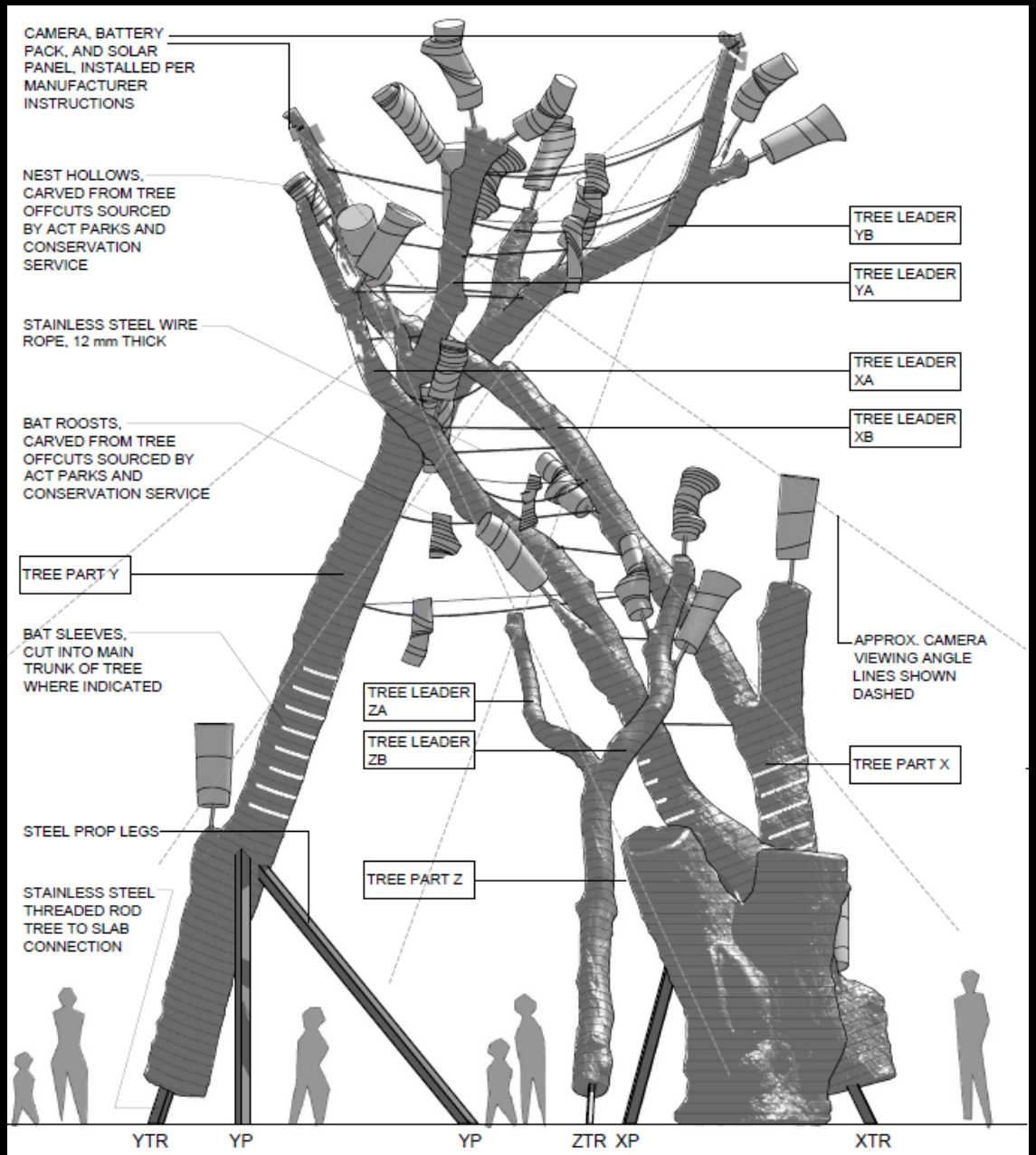
Invertebrates within days!

Artificial bark

Artificial bark



Art + Habitat



"LIFE SUPPORT"

By

Joyce Hwang

3D printing

Take home messages:

1. Improve management of habitat structures in space and time in urban landscapes

2. Scattered trees are keystone ecological structures with disproportionate value

3. Explore novel creations and innovation in restoration practice