

# Urban Trees: Threats & opportunities for Auckland?

**Margaret Stanley (& team!)**

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<http://stanleylab.blogs.auckland.ac.nz/>



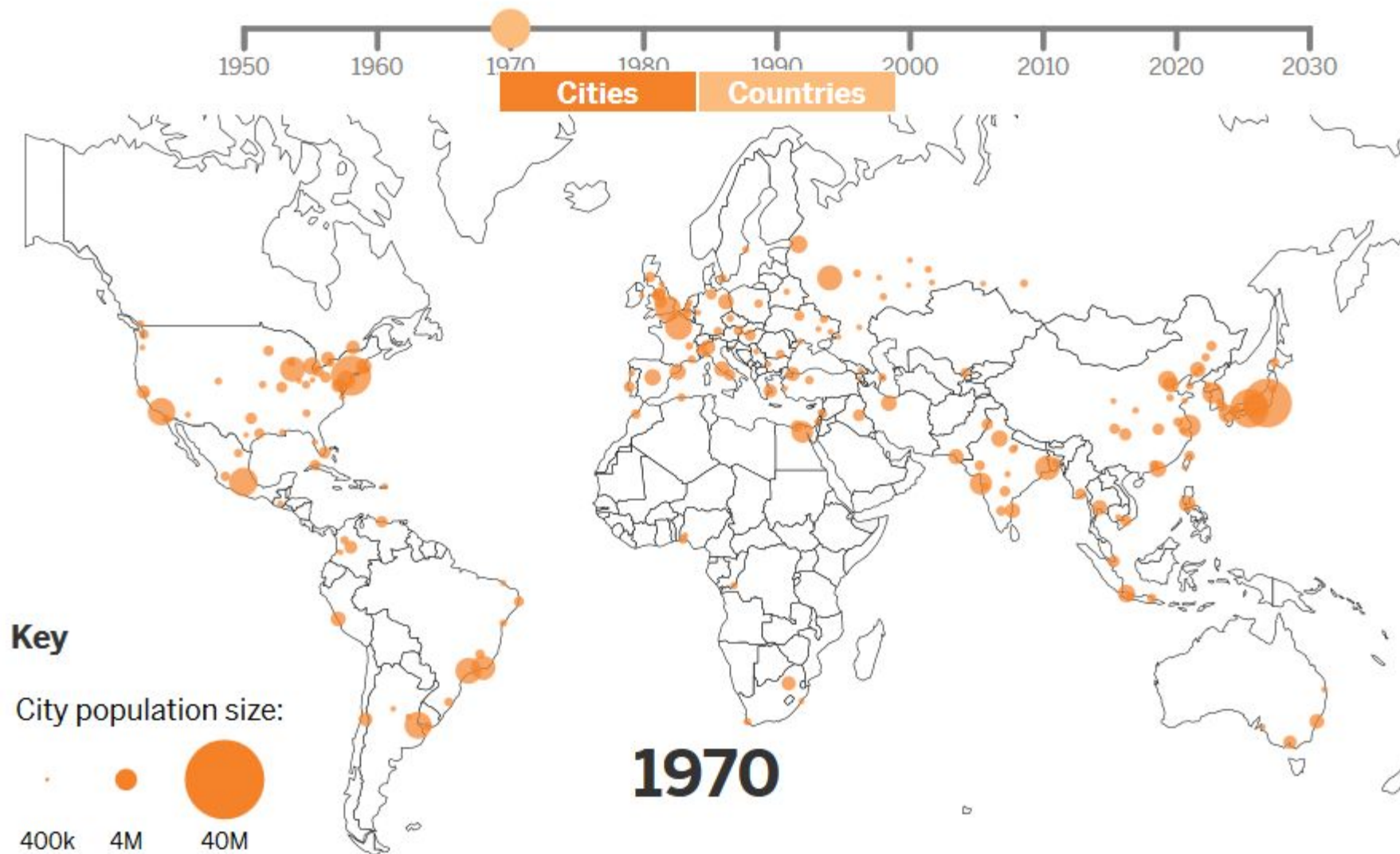
THE UNIVERSITY OF  
**AUCKLAND**  
NEW ZEALAND

SCHOOL OF BIOLOGICAL SCIENCES  
**SCIENCE**

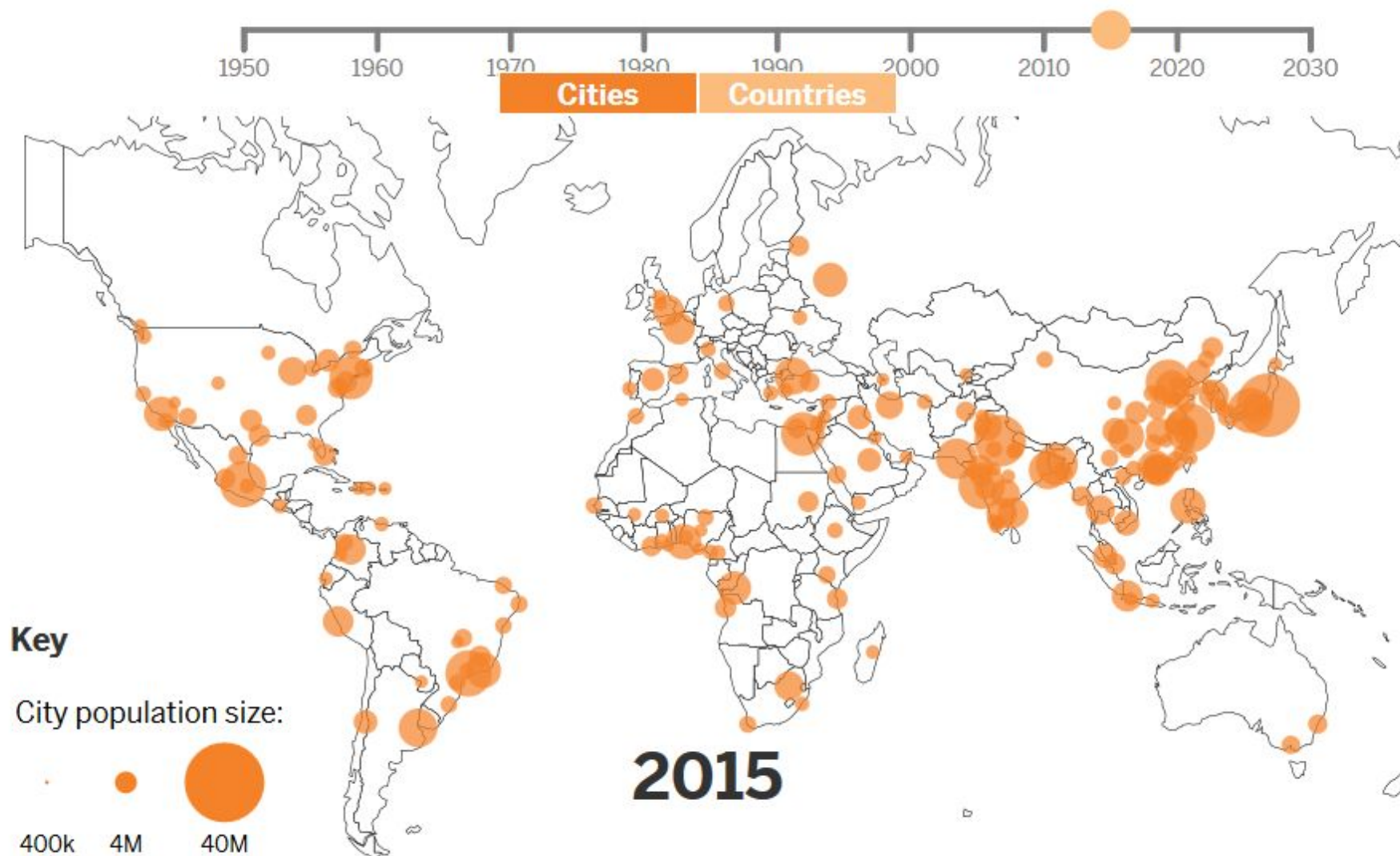
**cbb**<sup>o</sup>

CENTRE FOR BIODIVERSITY AND BIOSECURITY

## Changes in urbanization: 1950–2030



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# Nature connection = Environment values

**87% of NZers live in urban areas**

...but do city-dwellers connect to & value biodiversity?

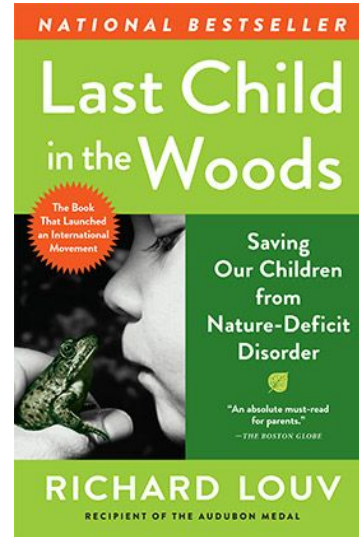




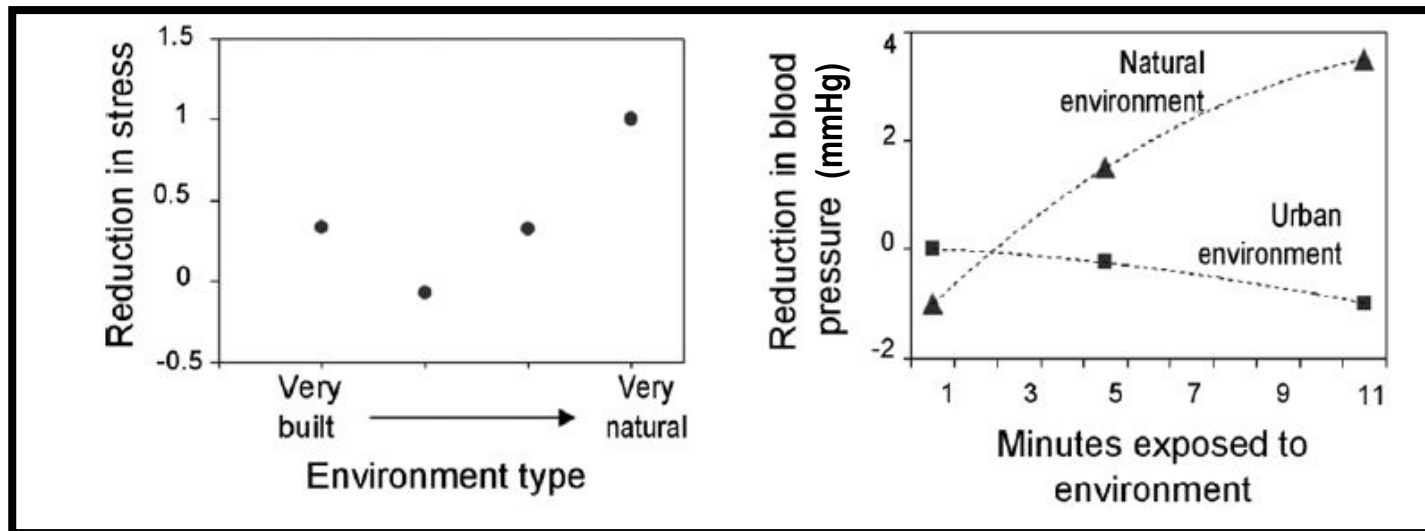
# Nature = healthy people?

## Nature Deficit Disorder (Louv 2005):

less time spent outdoors in nature  
= range of negative mental & physical effects



# Nature: human health & wellbeing



Shanahan, D. F., Fuller, R. A., Bush, R., Lin, B. B., & Gaston, K. J. (2015). The health benefits of urban nature: how much do we need?. *BioScience*, biv032.





Does the urban landscape matter?

London suburbs:

**More street trees = fewer antidepressant prescriptions**

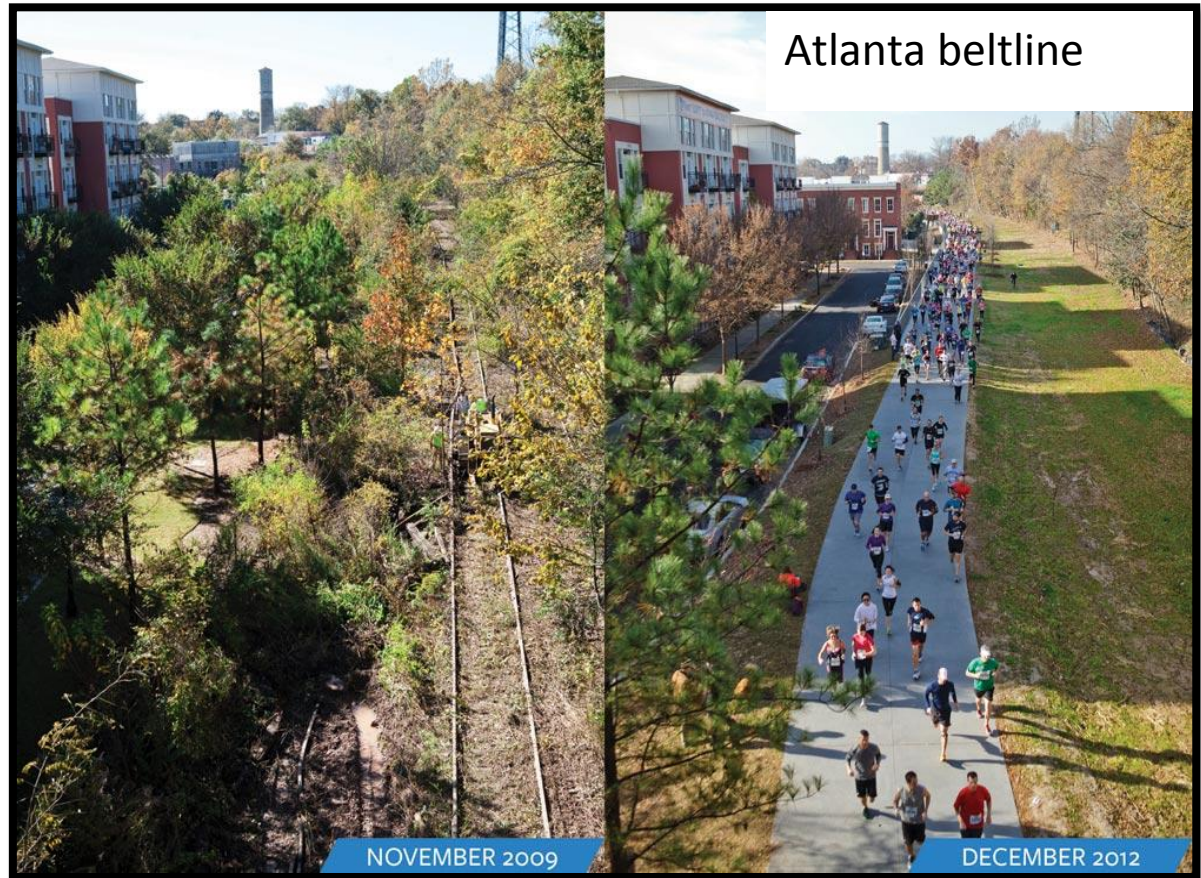
Taylor et al. 2015. Urban street tree density and antidepressant prescription rates—A cross-sectional study in London, UK. *Landscape and Urban Planning*, 136, 174-179.



# Nature: human health & wellbeing

Rongoā Kākāriki  
**GREEN**  
PRESCRIPTION

Crime Prevention  
Through Urban  
Design (CPTUD)



Stanley et al (2015). Emerging threats in urban ecosystems: a horizon scanning exercise. *Frontiers in Ecology and the Environment*, 13(10), 553-560.

# Do Aucklanders connect with nature?

Source: Auckland Council

## Park visitors: 10 yr Trend Auckland Regional Parks

More likely =

- NZ European
- >\$50K income
- Female
- Older

Less likely =

- Pacific & Asian



- Closer to home?
- Experience nature everyday?









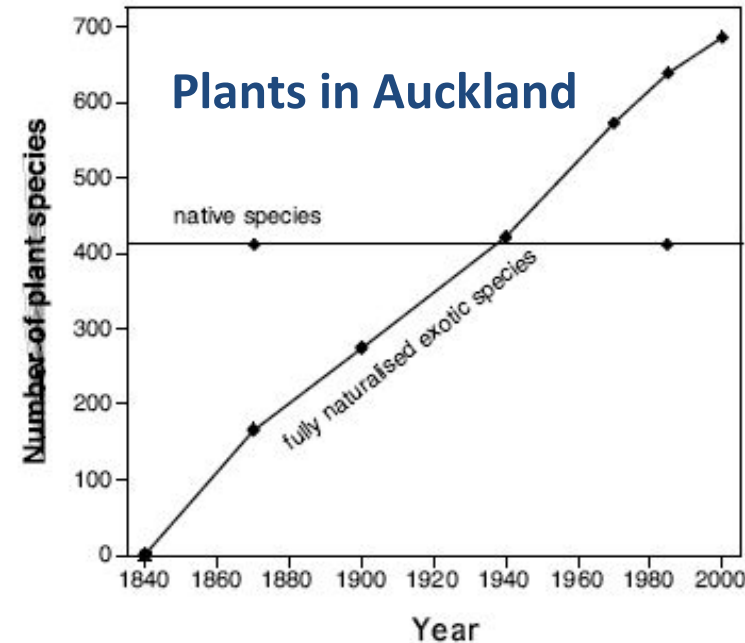


# Connecting with the 'right' nature?

Is any nature OK?

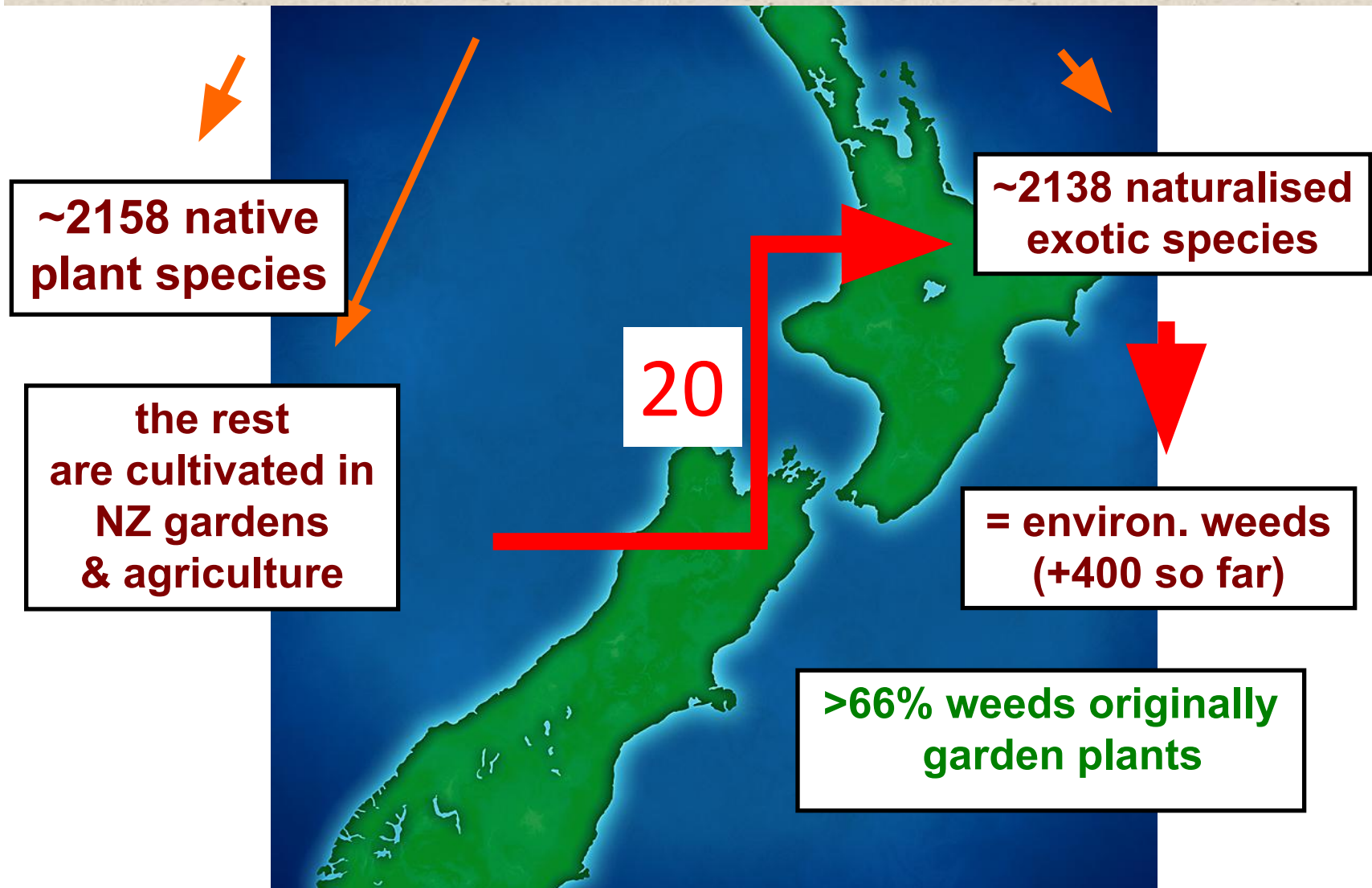
Should we be giving more complex messages?

Oh no precious...look at  
all them weeds  
precious... sssneaky  
weeds... I hates them!



>80% of our native plants found nowhere else in world!

# 25 000 plant species in NZ



STANLEY, MC., BASSETT, I.E. 'Environmental weeds in New Zealand: impacts and management.' In Austral Ark: The State of Wildlife in Australia and New Zealand. Editors: Holwell GJ, Stow A, Maclean N. 135-161. Cambridge University Press, Cambridge, UK. 2015. <http://dx.doi.org/10.1017/CBO9781139519960.009>



# Weeds in bush patches



Weeds in bush patches= the plants in gardens of closest human settlement/subdivision



Sullivan et al. (2005). Movement of exotic plants into coastal native forests from gardens in northern New Zealand. *New Zealand Journal of Ecology*, 1-10.



# Weeds in bush patches

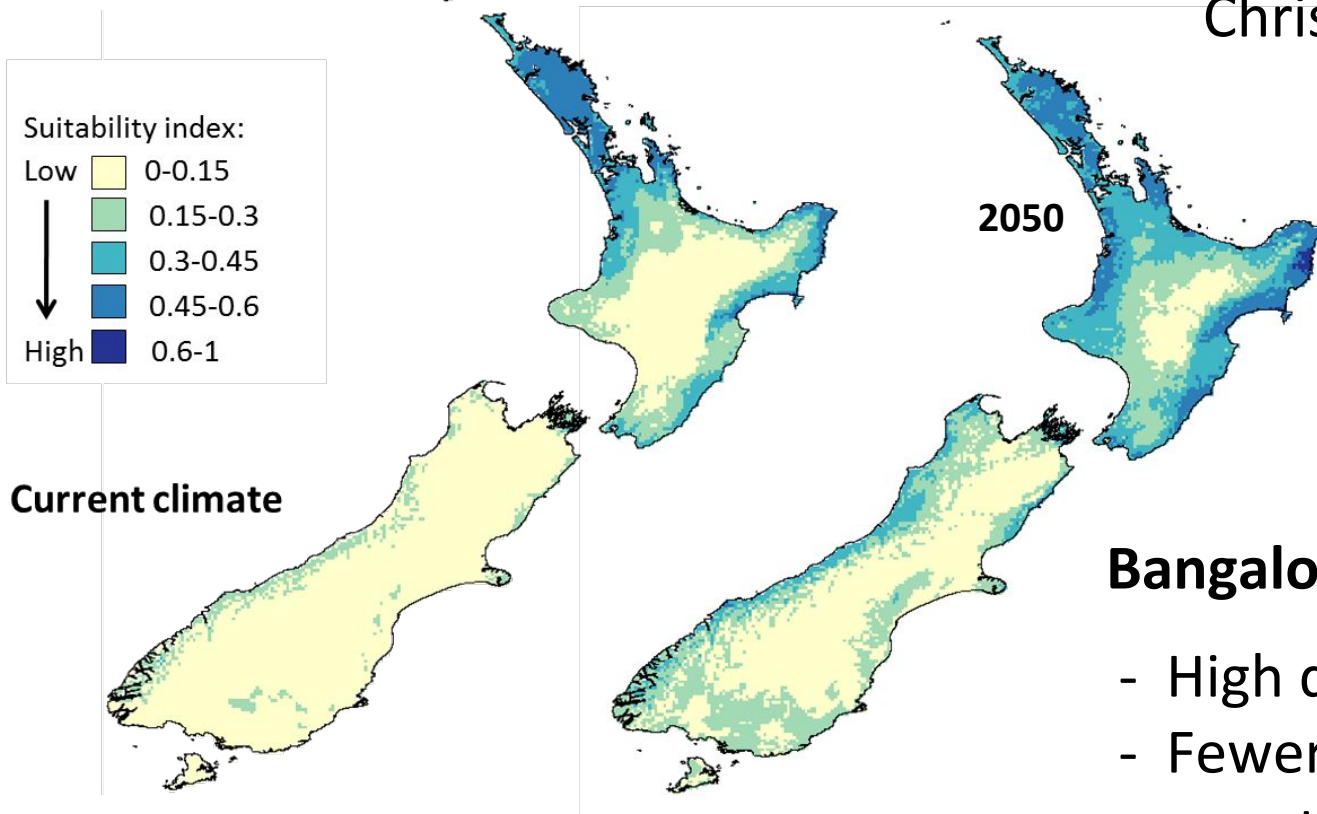
Bangalow palm – in St Johns Bush





# Weeds: climate change

PhD student:  
Christine Sheppard



## Bangalow palm

- High drought tolerance
- Fewer frosts = higher growth & survival
- Strongly outcompetes nikau

Sheppard et al 2015 Predicting plant invasions under climate change: are species distribution models validated by field trials? *Global Change Biology* 20 (9), 2800-2814



# Weeds & climate change: are we ready?

*New Zealand Journal of Ecology* (2016) 40(3): 398-405 © New Zealand Ecological Society.

## FORUM ARTICLE

Future-proofing weed management for the effects of climate change: is New Zealand underestimating the risk of increased plant invasions?

Christine S. Sheppard<sup>1,2\*</sup>, Bruce R. Burns<sup>1</sup> and Margaret C. Stanley<sup>1</sup>

<sup>1</sup>Centre for Biodiversity and Biosecurity, School of Biological Sciences, University of Auckland, Private Bag 92019, Auckland 1142, New Zealand

<sup>2</sup>Institute of Landscape and Plant Ecology, University of Hohenheim, 70593 Stuttgart, Germany

\*Author for correspondence (E-mail: [christine.sheppard@uni-hohenheim.de](mailto:christine.sheppard@uni-hohenheim.de))



Ban the high risk species:  
~220 proposed in RPMP

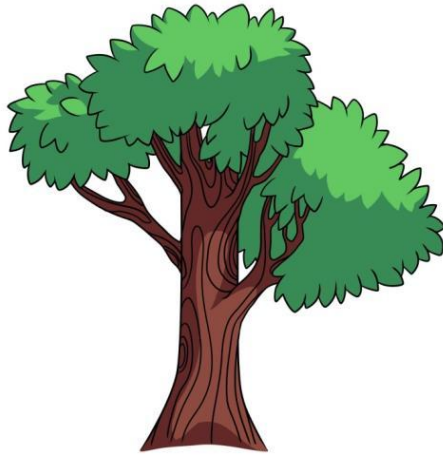
## Proposed Regional Pest Management Plan

November 2017



# Is there biodiversity in cities?

Hotspot



# Auckland has biodiversity!

## Beetle species in suburban Auckland

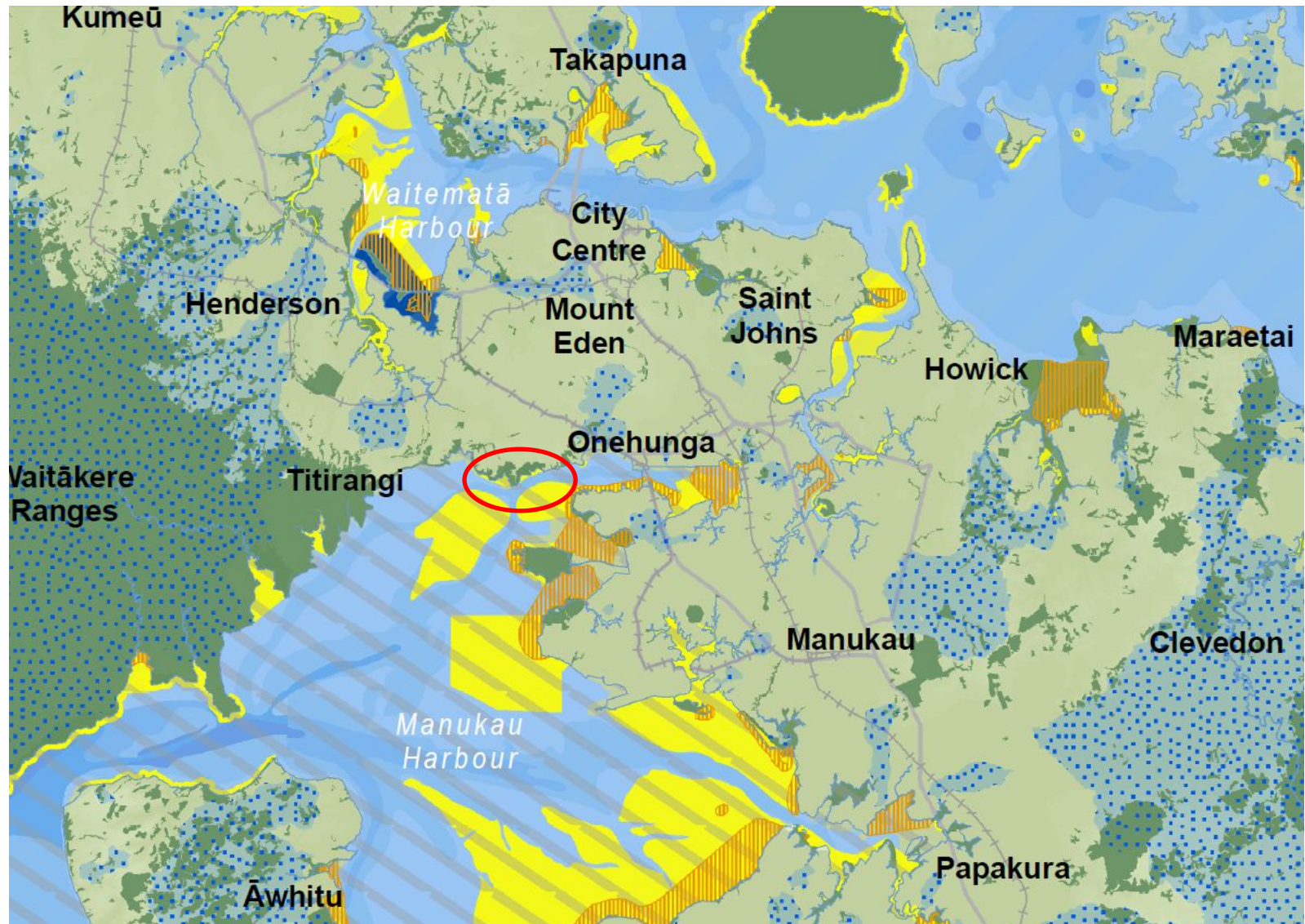
- 982 beetle species
- 753 of them endemic!



Kuschel, G. 1990. *Beetles in a suburban environment: a New Zealand case study*. DSIR Plant Protection Report no. **3**.

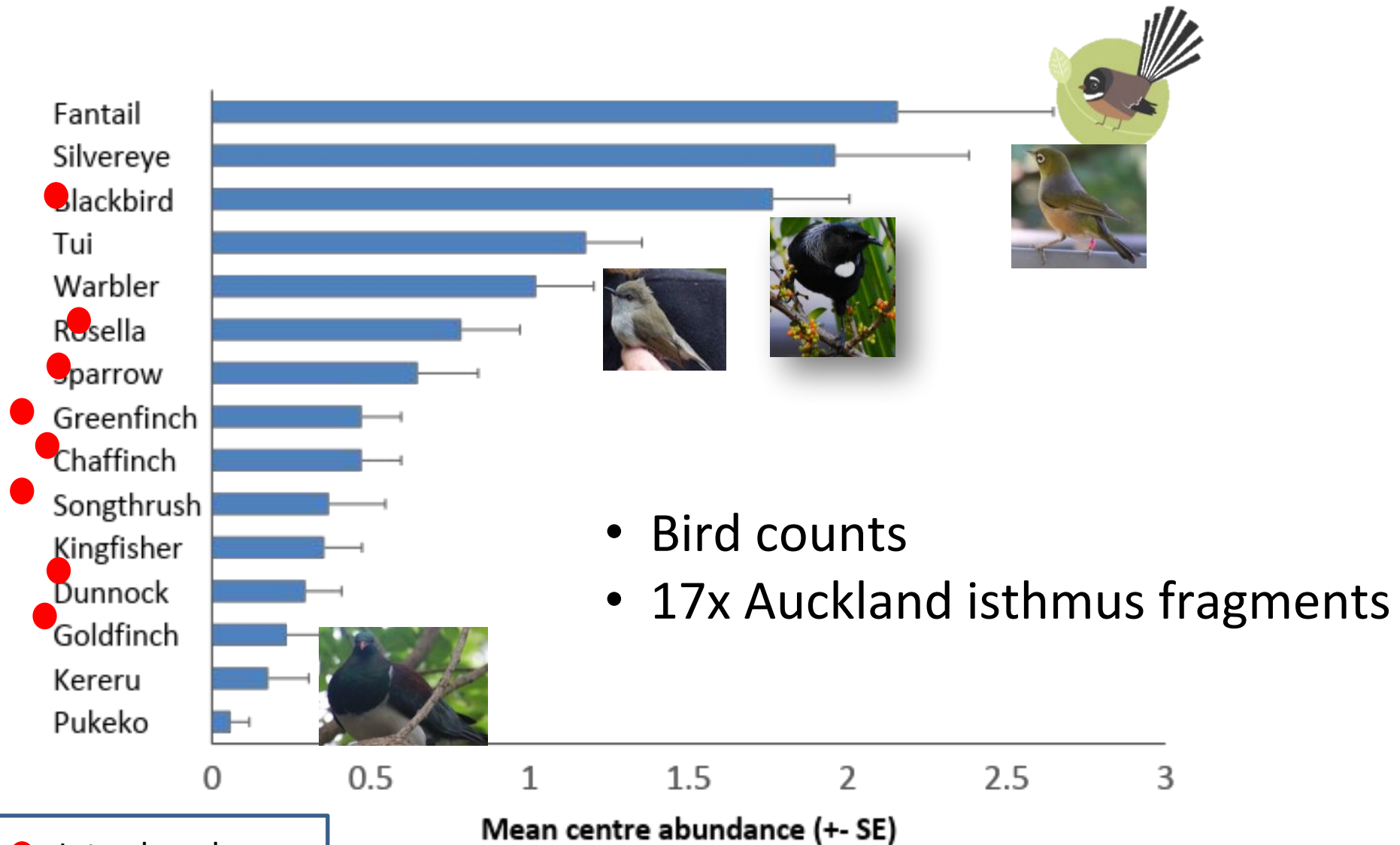


# Native forest fragments/patches



**Auckland Council: Significant Ecological Areas (SEAs)**

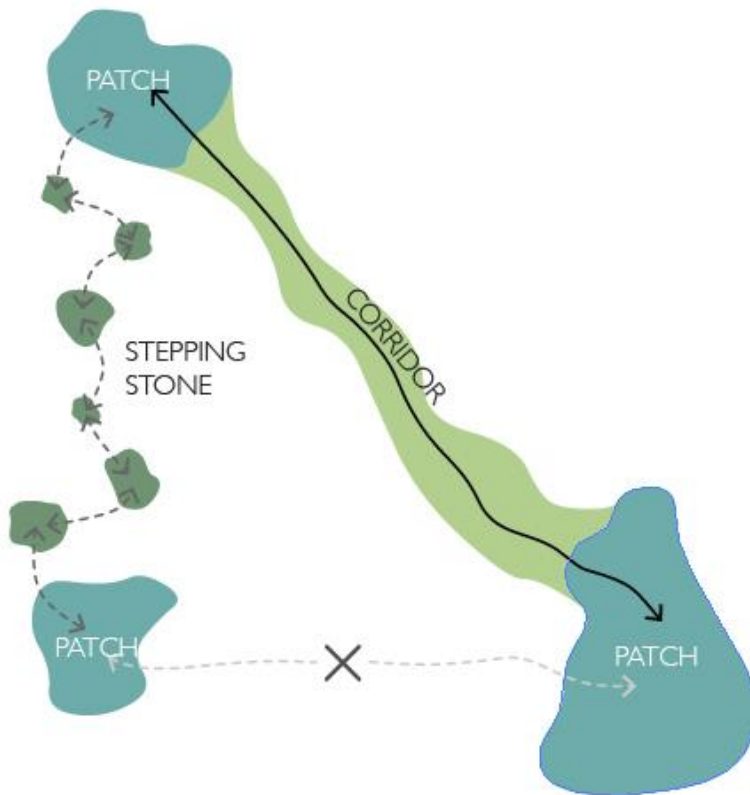
# Fragments: native dominance



● Introduced spp.



# Fragments: What's important?



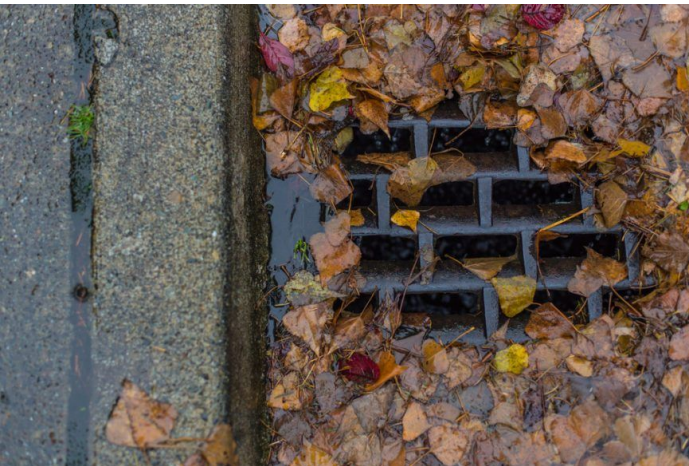


# Do we like trees where we live?





# Do we like trees where we live?





# There are risks & costs to having trees

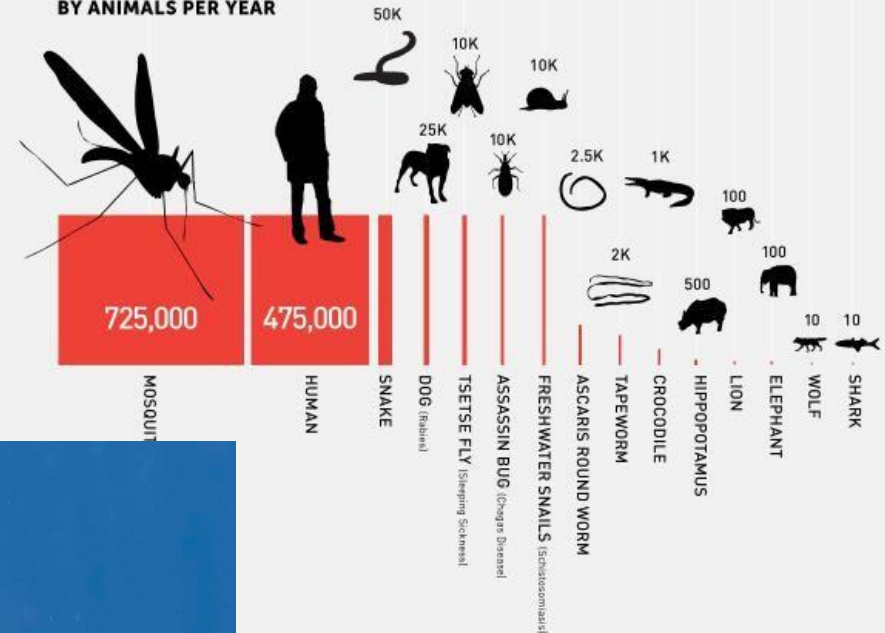




# WORLD'S DEADLIEST ANIMALS

NUMBER OF PEOPLE KILLED BY ANIMALS PER YEAR

**MOSQUITOWEEK**  
on gatesnotes.com



Source: Kasuriratne et al. [doi.org/10.1371/journal.pmed.0050218]; FAO [webcitation.org/1Qgg585MD]; Linnell et al. [webcitation.org/1038%2F436927e]; Alessandro De Maddalena. All calculations have wide error margins.

## SHARKS: HOW A CULL COULD RUIN AN ECOSYSTEM

As a Senate inquiry looks into minimising shark attacks, we consider what happens when humans meddle with this apex predator

*By Alana Schetzer, University of Melbourne*



More CO<sub>2</sub> + fewer trees



Climate change brings increase  
in 'extreme events'  
= storms



Storms cause tree death



People panic & chop more trees  
down



Fewer trees exacerbates climate  
change & flooding



Before planting new trees to improve the look of your yard, you will need to keep a few things in mind.

Before planting new trees to improve the look of your yard, you will need to keep a few things in mind.

Trees and shrubs will be pruned if they are within 10 ft of overhead power lines to help prevent outages.

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Trees and shrubs should be planted at least 10 ft away from ground-mounted transformers.

Plant large trees (over 35 ft when mature) at least 50 ft away from overhead power lines.

Plant medium trees (over 25 ft when mature) at least 25 ft away from overhead power lines.

It is best not to plant in this area. If you do, plant only low-growing trees and shrubs with a height of less than 15 ft when mature.

# Benefits: Do people know why trees are important?

- Ecosystem services
- Supporting biodiversity
- Increases property values
- Psychological and aesthetic benefits
- Increases health & wellbeing

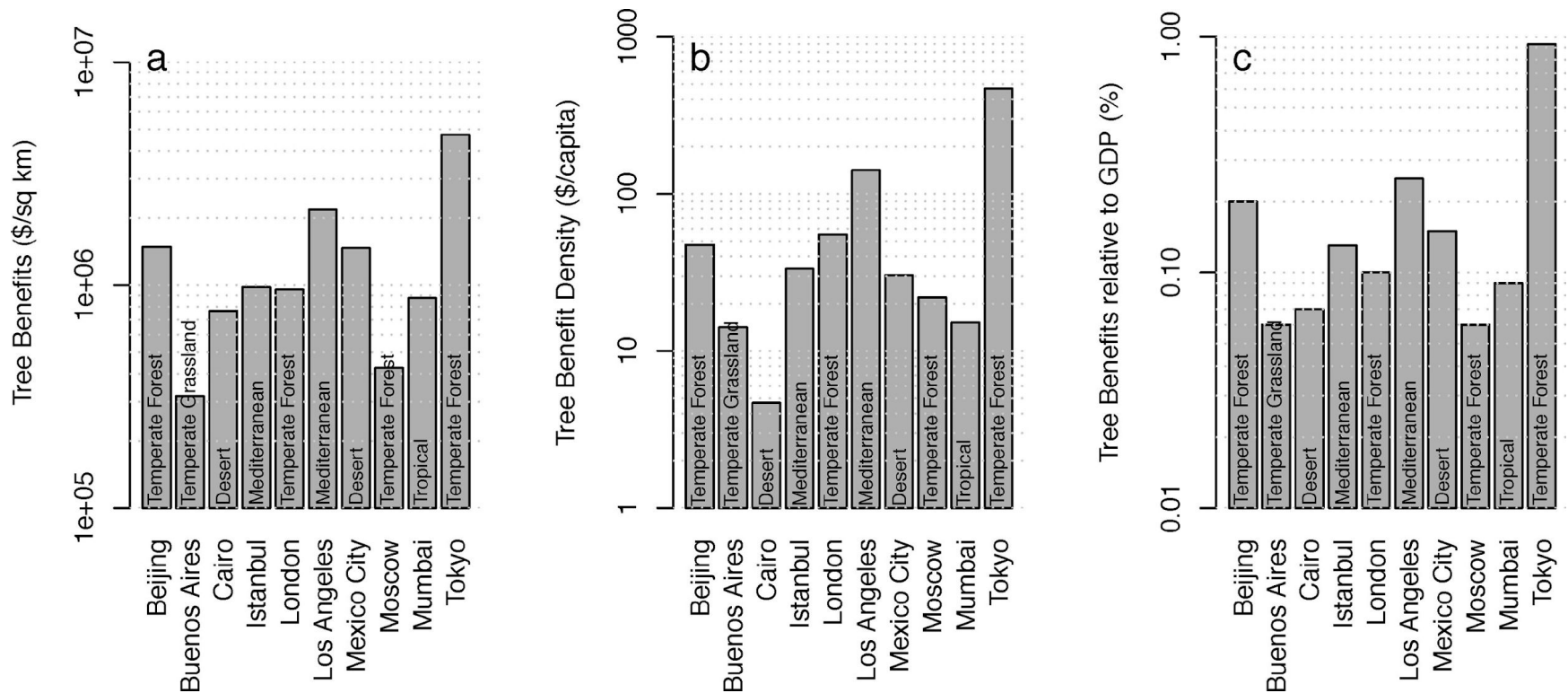




# The benefits of trees

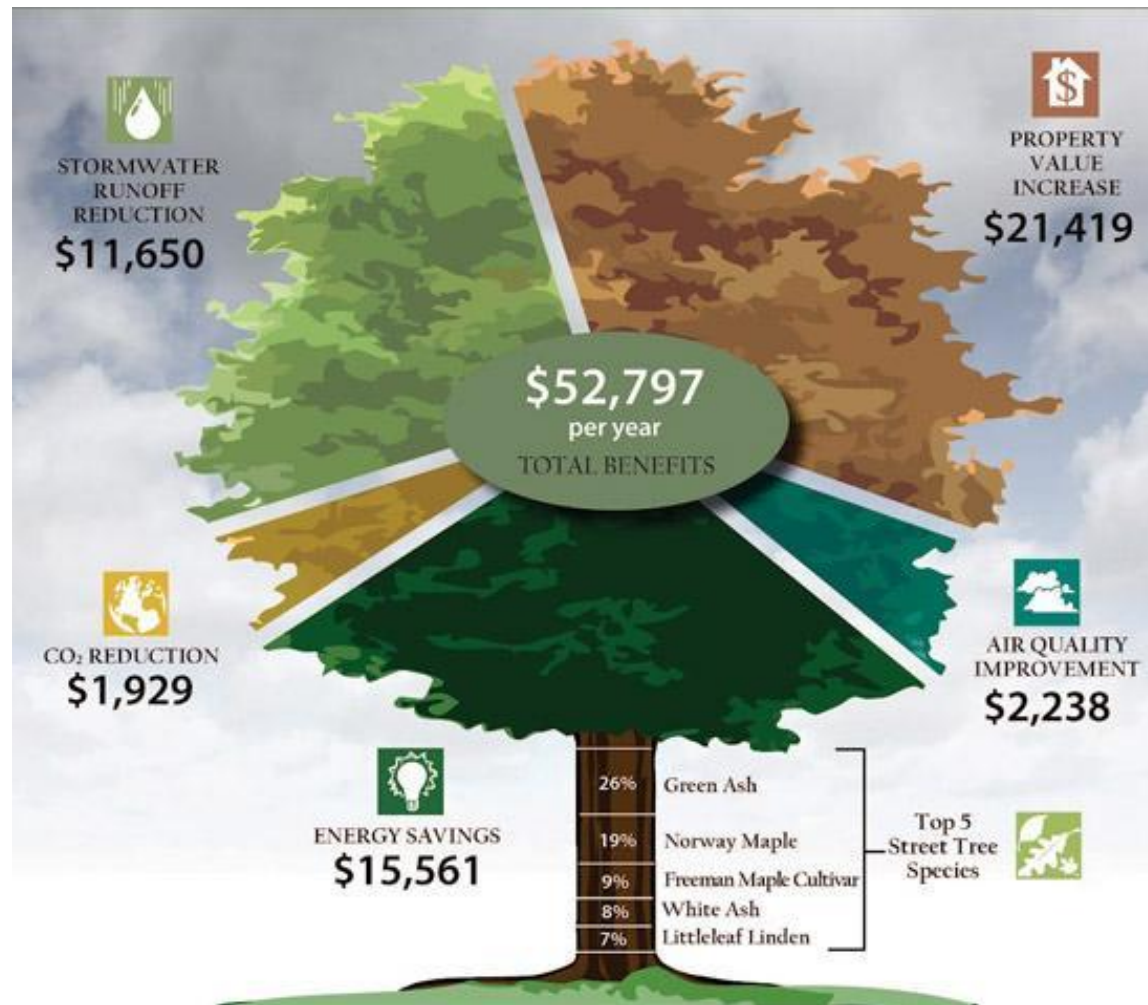
10% of all humans live in megacities (>10M people)

Urban trees in megacities = median benefit \$482M/yr



Endreny et al 2017 Implementing and managing urban forests: A much needed conservation strategy to increase ecosystem services and urban wellbeing. *Ecological Modelling* 360: 328-335

# The benefits of trees





# Native plants – knowledge deficit

- We know little about native plants (e.g. ecosystem services)
- Is the default to plant exotics? (data available)

- Address multiple outcomes when use native species

**= maximise native biodiversity**  
**= maximise cultural outcomes?**



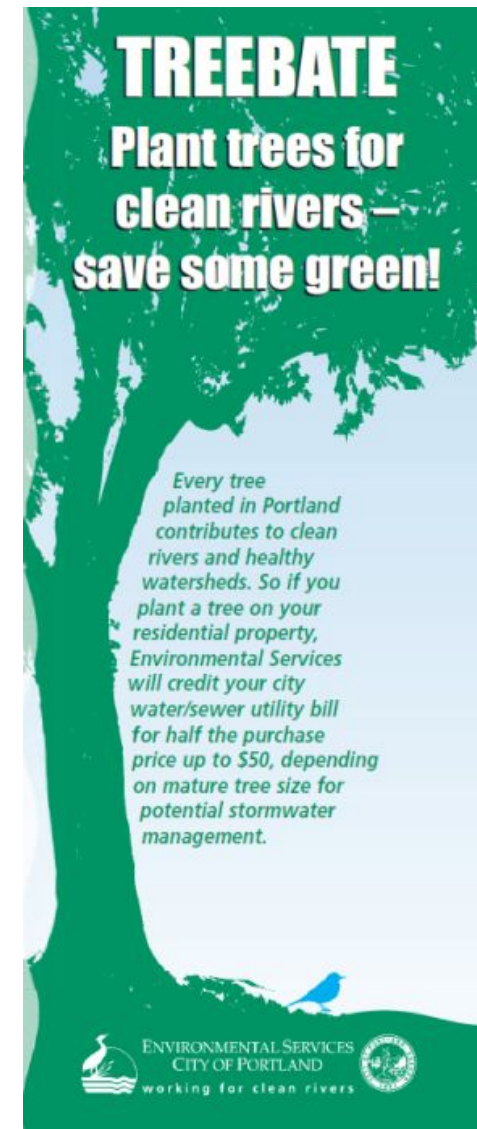


# Native plants get a bad rap





# Do people know why trees are important?

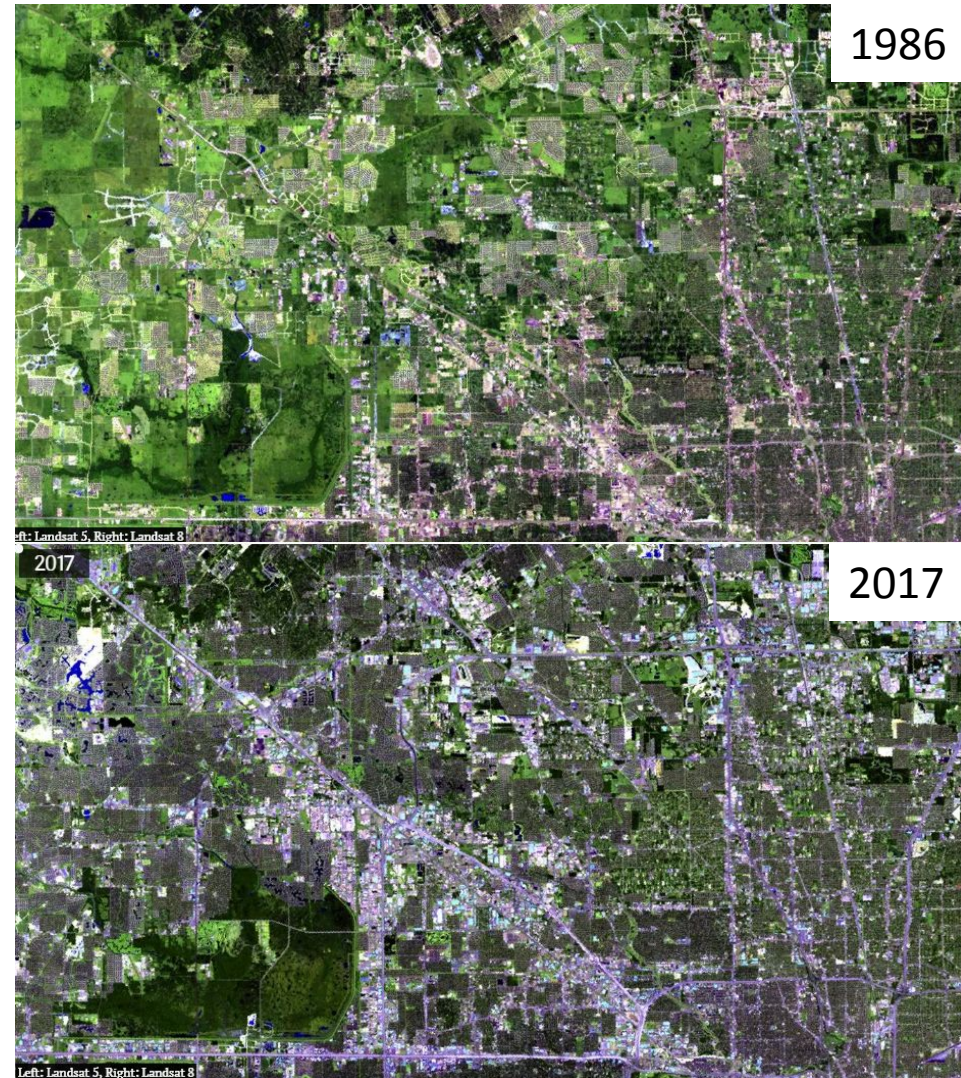


# What's the hook for encouraging vegetation in the city?

## Houston: vegetation loss

More impervious surfaces  
+ less vegetation

= higher flood impacts



<https://qz.com/1064364/hurricane-harvey-houston-flooding-made-worse-by-unchecked-urban-development-and-wetland-destruction/>

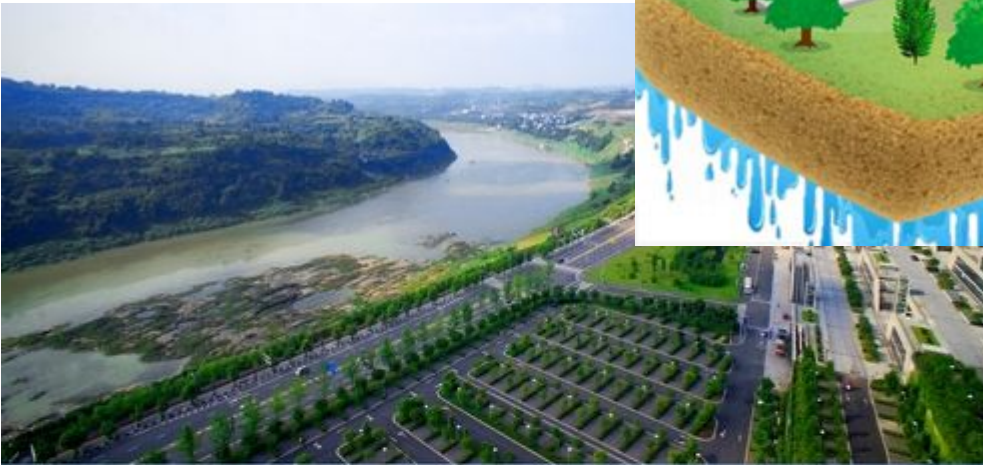


# SPONGE CITIES

CHINA'S PUSH FOR **GREEN** (NOT  
GRAY) INFRASTRUCTURE

30 Chinese cities will each  
receive 400-600 million RMB to  
pilot **green roofs, constructed  
wetlands, increased tree cover,  
and permeable pavements** to  
capture, slow down and  
filter storm water.

Source: Lauren Sidner | Design: Carl Hooks



# What's 'the hook' for encouraging vegetation in the city?

- For New Zealand city dwellers – is it flood mitigation?
- Can we encourage 'right tree, right place'?
- Is urban biodiversity more than urban trees?

**Are we looking after our existing urban biodiversity?**



# Housing intensification

- 1) Housing crisis – intensification of housing
- 2) Resource Management Act 2<sup>nd</sup> amendments removed general protection for urban trees (2012)

Likely to be further  
major loss of  
the 'urban forest'

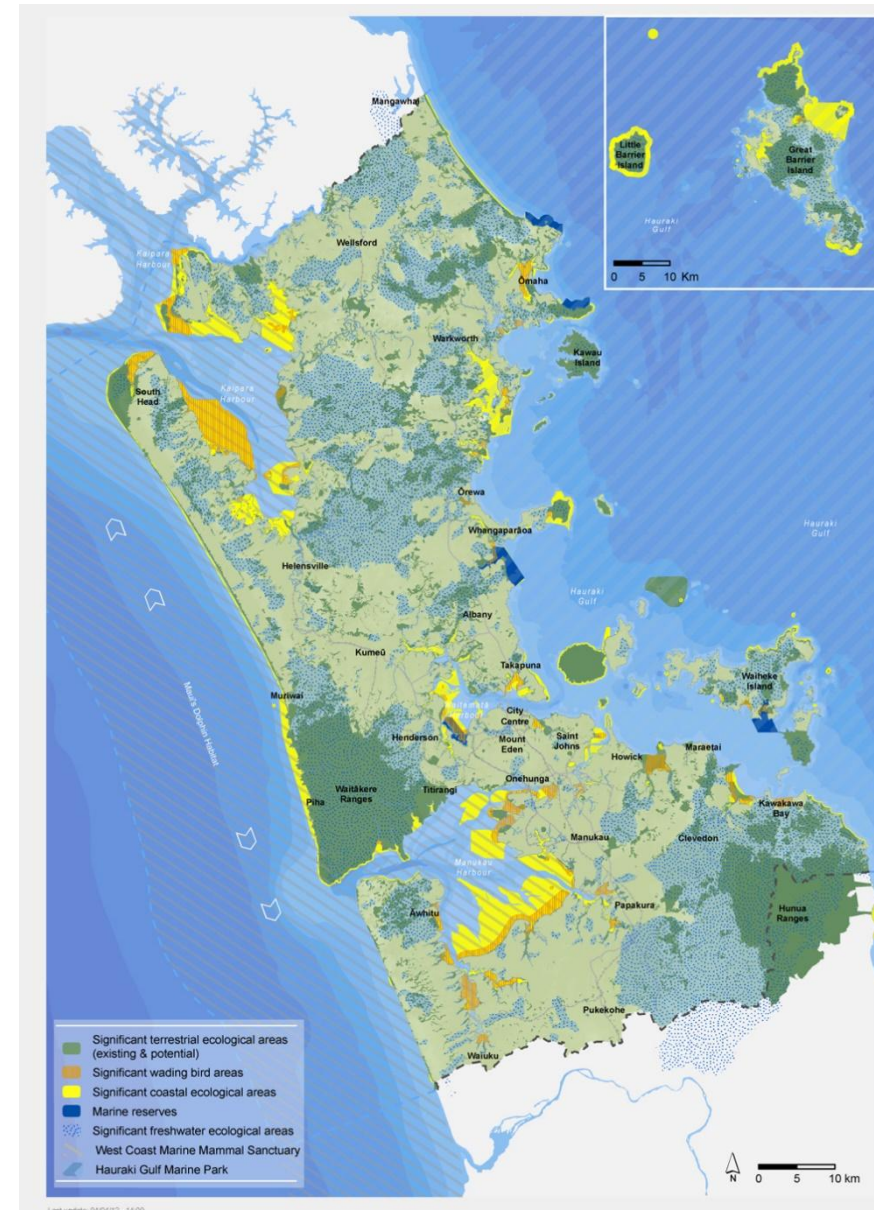
WYSE SV, BEGGS JR, BURNS BR, STANLEY MC. 2015.  
Protecting trees at an individual level provides insufficient  
safeguard for urban forests. *Landscape & Urban Planning*  
141: 112-122



# Threats to urban forest

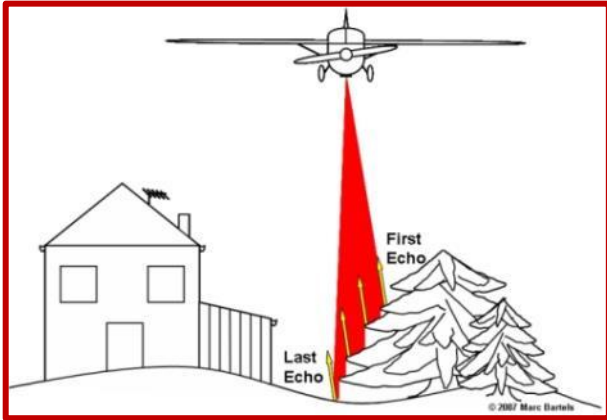
Councils (e.g. Auckland) trying to add protection:

- Significant Ecological Areas (SEA)
- Notable Tree Schedule (6988 trees)





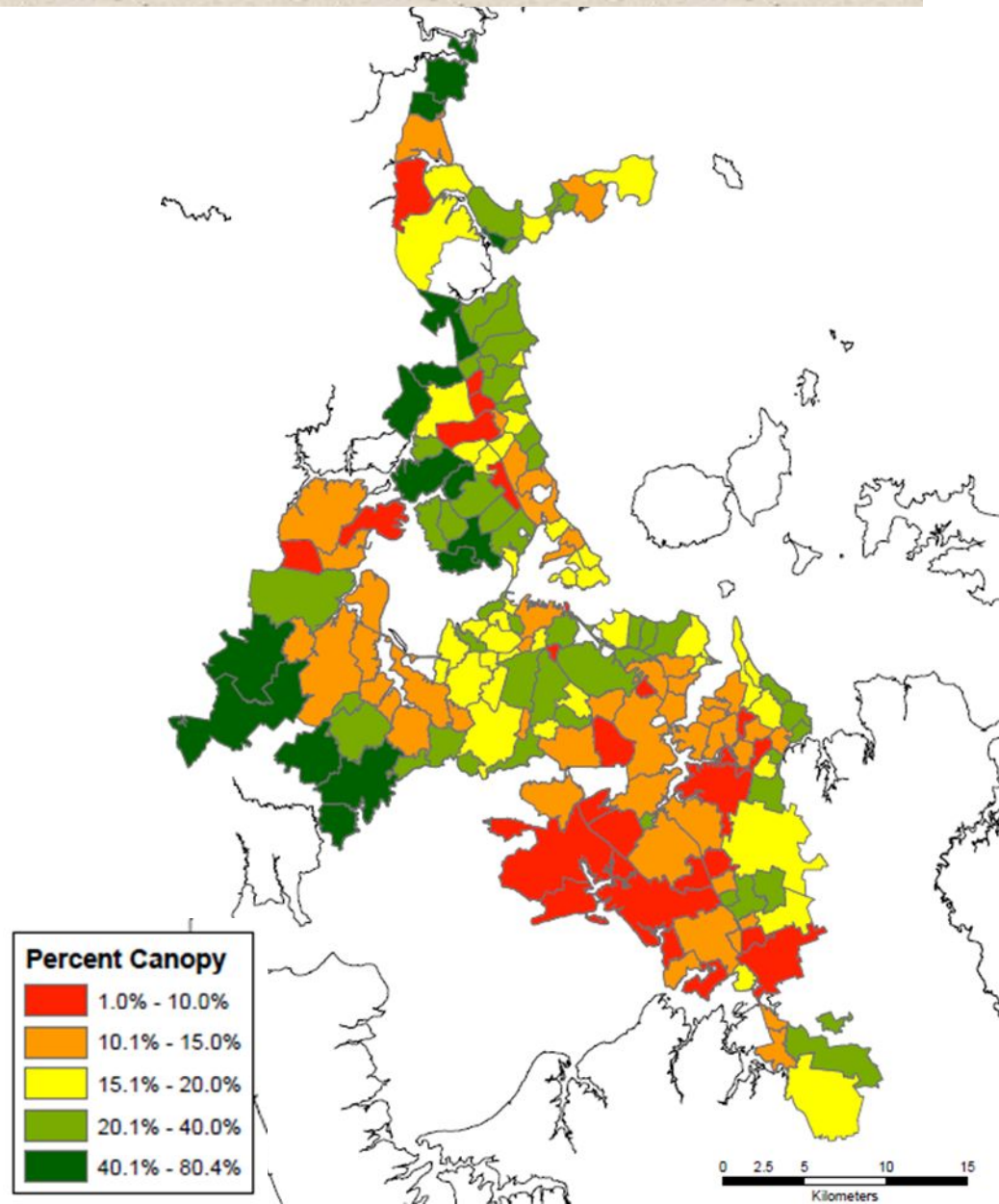
# Who has the urban forest?



2013 LIDAR data

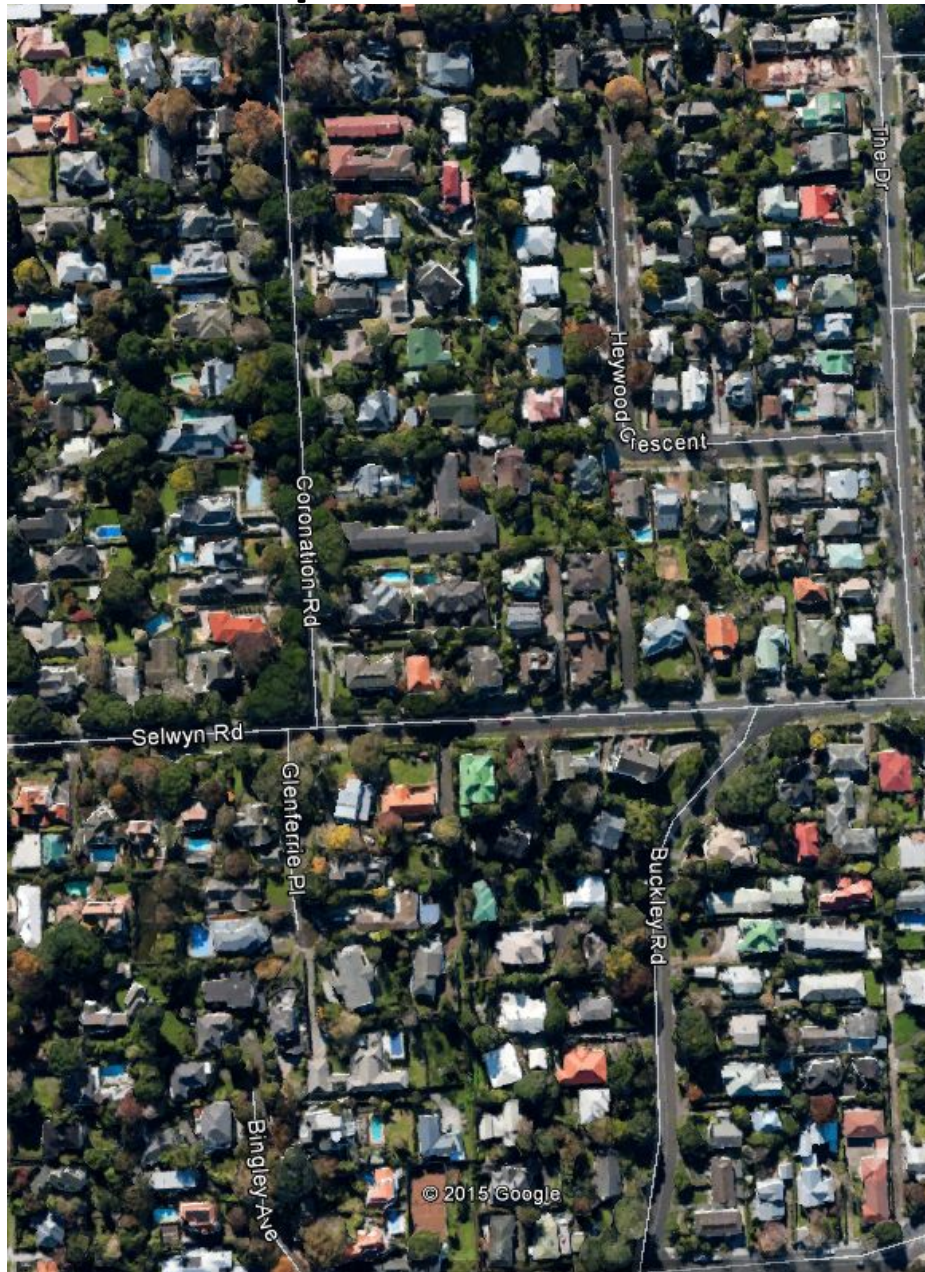
**Equity issues?**

**Craig Bishop: Auckland Council**





# Epsom



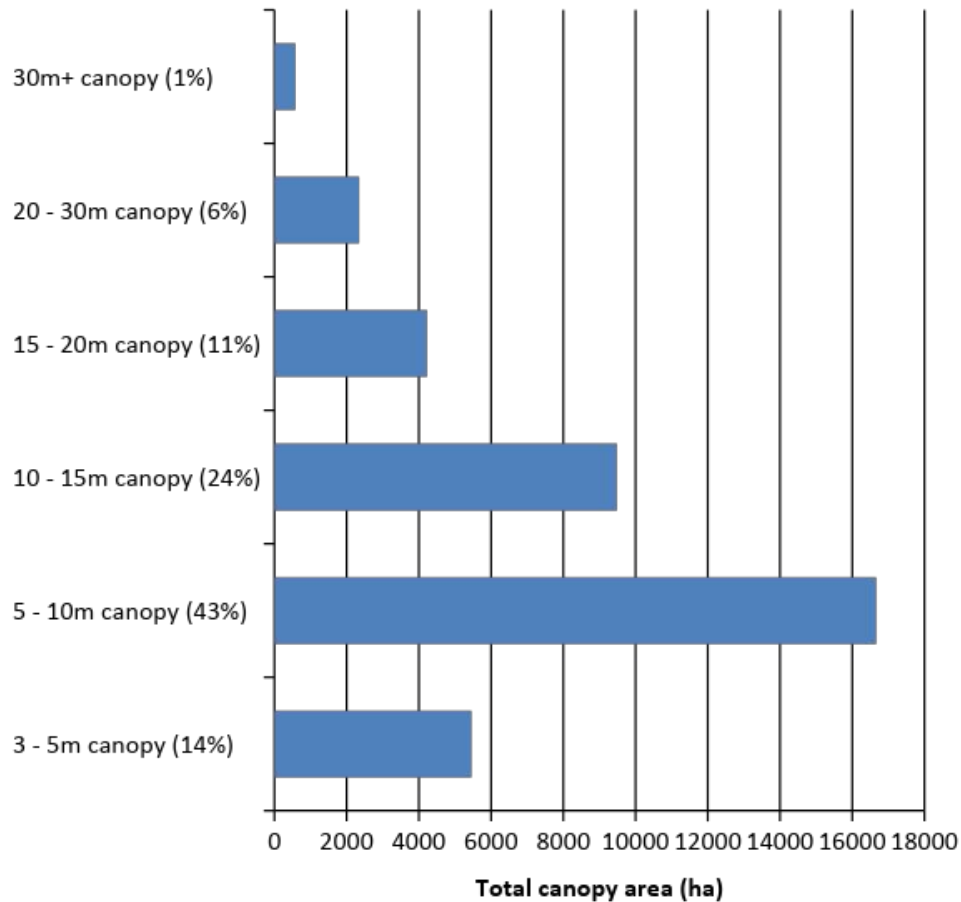
# Glen Innes





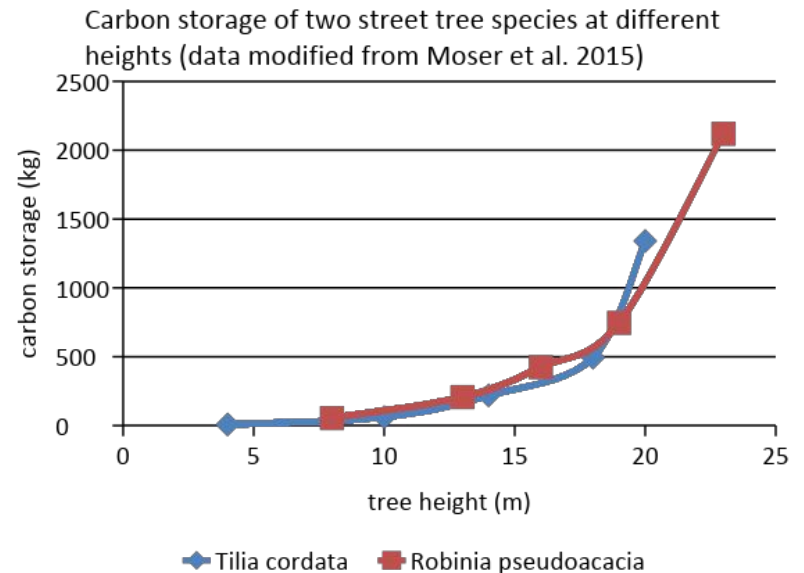
# Forest structure: short!

Height class distribution of Auckland's urban forest

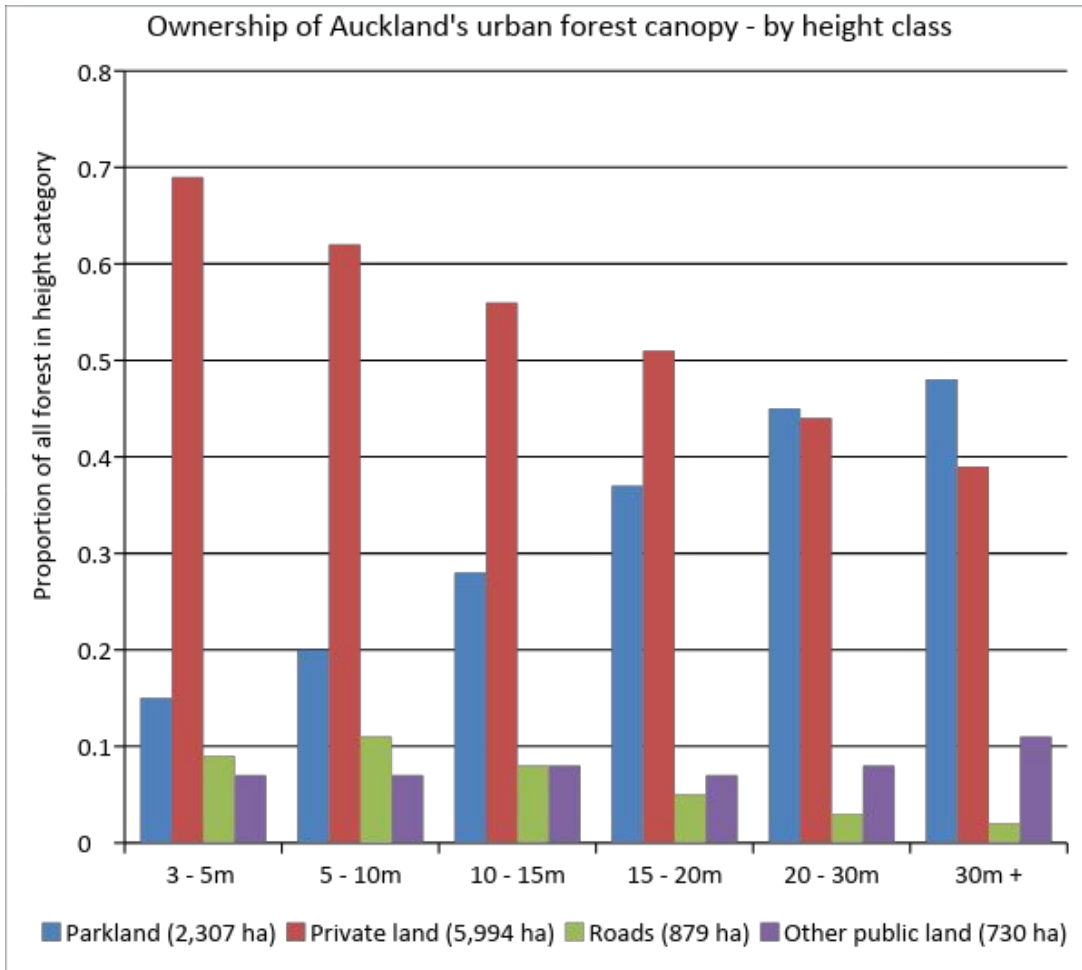


57% of trees = <10m high

93% of trees = <20m high



# Almost 50% of bigger (>20m) trees are on public parkland



**Craig Bishop: Auckland Council**

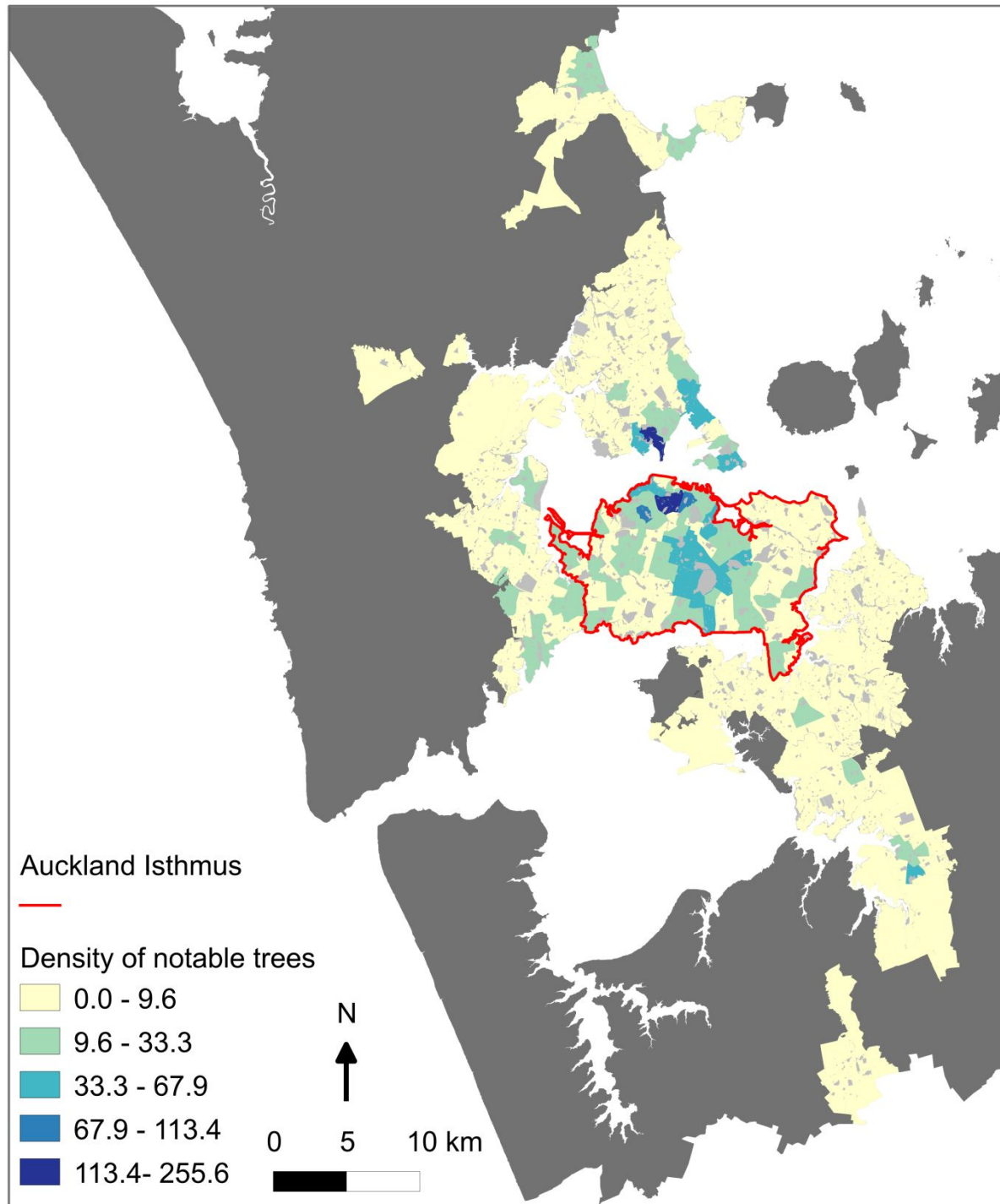


# ~50% of urban trees = no protection

- 63% of this urban forest (8m) = on private land
- Notable tree schedule protects ~15% of this privately-owned urban forest



WYSE SV, BEGGS JR, BURNS BR, STANLEY MC Protecting trees at an individual level provides insufficient safeguard for urban forests. *Landscape & Urban Planning* 141: 112-122



Density of Notable  
trees by Census  
Area Unit for  
private urban land



# Notable tree schedule insufficient

3471 natives (49 spp.) + 3517 exotics (193 spp.)



Tree species	Number of individuals
1. Pohutukawa	1430
2. Oak	903
3. London plane	619
4. Totara	513
5. Puriri	398
6. Norfolk Island pine	335
7. Kauri	294
8. Phoenix palm	253
9. Titoki	243
10. European olive	201



10% of the protected trees are declared weeds!

# Has the 'great chainsaw massacre' occurred?

- Are we losing trees? Different height trees?
- Are we planting TREES in our gardens/city (succession planning)

Still to come: Compare 2013  
with 2016 LIDAR data?

Strategic about which trees?  
e.g. biodiversity outcomes





# Reinstate general protection for urban trees

## What would it look like?

Is it height?

Are people letting trees grow higher?

– no need to get a resource consent at 3-4m?

Any compromises?



# Mayor launches Million Trees initiative

## Plantings for 2017

Where	How many trees, plants, shrubs
North West Wild Link	30,000
Whau River Project	15,000
Oakley Creek	15,000
Puhinui	30,000
Project Twin Streams	15,000
Atiu Creek	25,000
Waitawa	5,000
Mangemangeroa	5,000
Plus various local parks, Healthy Waters projects, schools and regional parks across the Auckland Region	30,000
Total for 2017	170,000

**Seedlings planted but mature trees still being chopped**

**How strategic are we being about urban trees?**

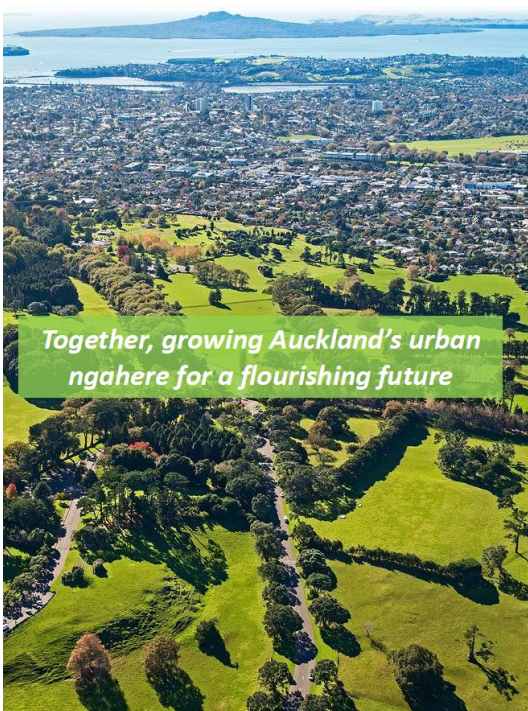




PANIC  
AND  
RUN  
AWAY

DOOM GLOOM





Together, growing Auckland's urban  
ngahere for a flourishing future

**DRAFT**

# Urban Ngahere/Forest Strategy





# Is there nature in large cities?

Large, intensively developed cities can be rich in biodiversity



Mexico



(City Biodiversity Index)

enspace



# How can (urban) Aucklanders contribute?

We can't create more bush patches in the city.....

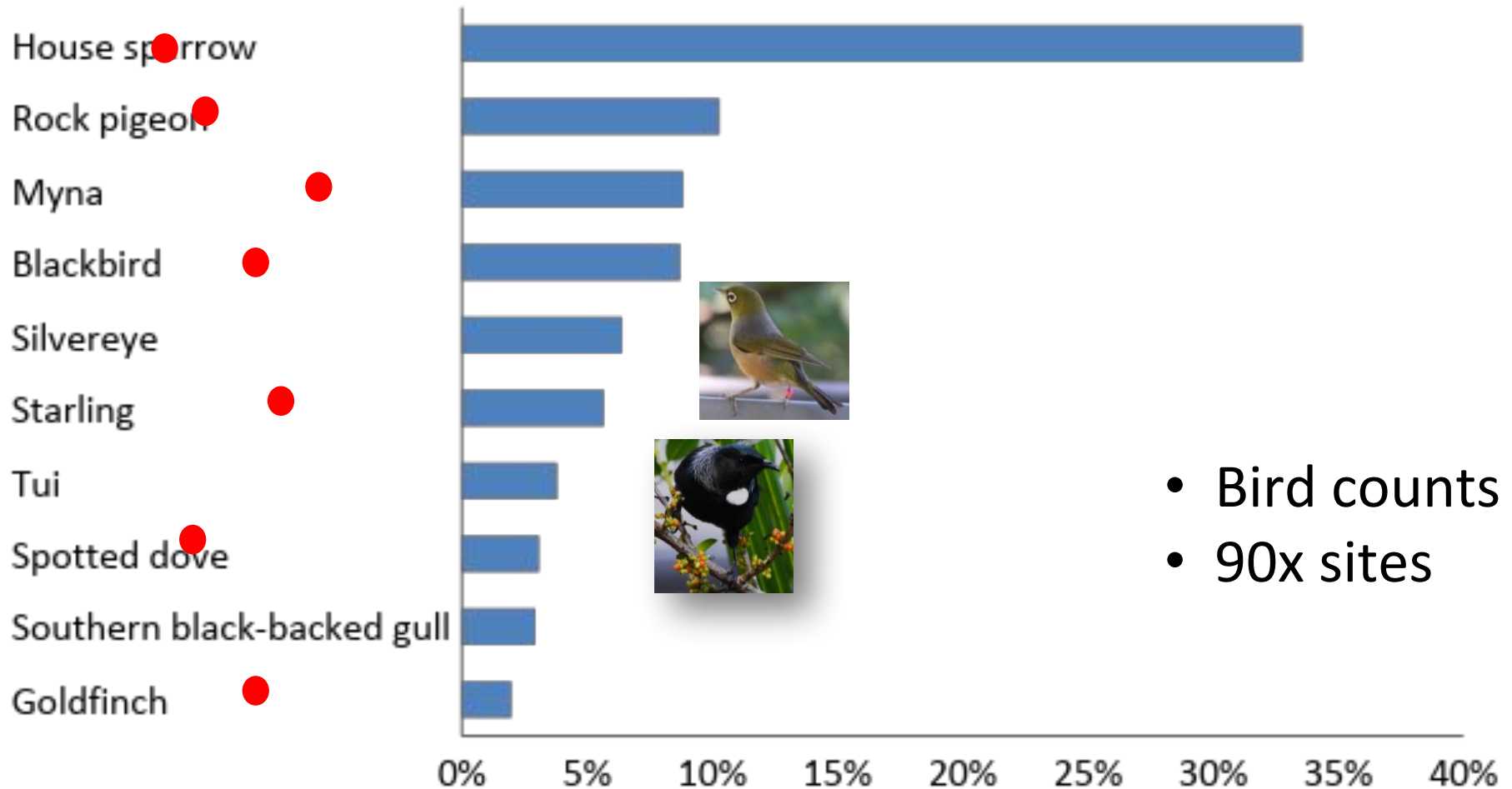
So....

What can we do in backyards?





# What birds are in the urban matrix?

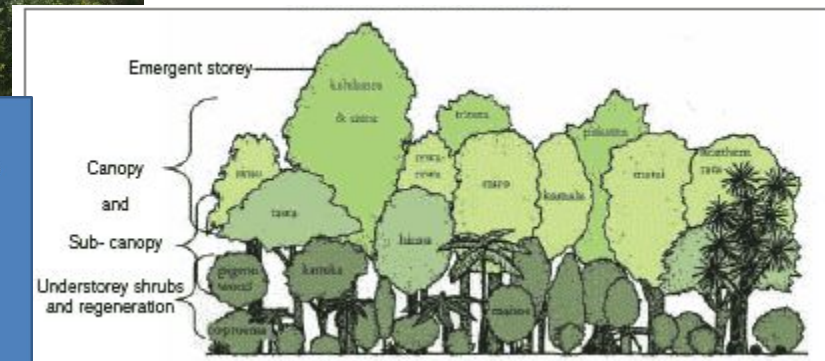


● Introduced spp.

## Urban matrix: Gardens need structure

## Shrub layer!

## Vegetation complexity



**MSc student: Sam Heggie-Gracie**



# Ellerslie International Flower Show Experience

Bush  
garden

Green lungs for  
small spaces

Green roof  
& cascade

Path  
cracks

Cultural  
harvest

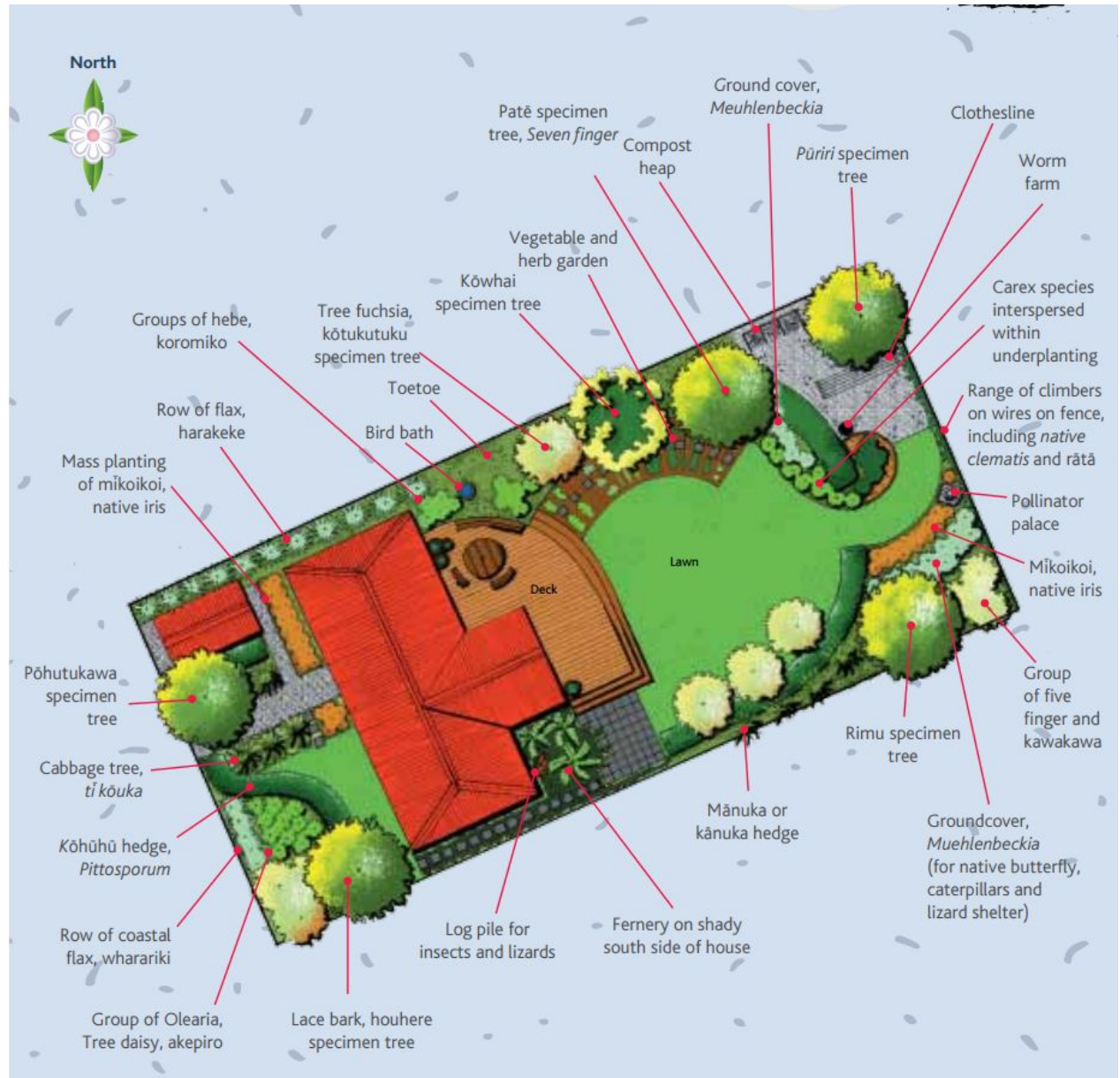
Treatment  
Train

Tapestry  
lawn

Urban Matrix of fine scale  
Canterbury nature







North

Ground cover, *Meuhlenbeckia*

Clothesline

Worm farm

Carex species interspersed within underplanting

Range of climbers on wires on fence, including *native clematis* and *rātā*

Pollinator palace

Mikoikoi, *native iris*

Group of five finger and *kawakawa*

Groundcover, *Muehlenbeckia* (for *native butterfly*, caterpillars and lizard shelter)

Rimu specimen tree

Mānuka or *kānuka* hedge

Fernery on shady south side of house

Log pile for insects and lizards

Row of coastal flax, *wharariki*

Group of *Olearia*, Tree daisy, *akepiro*

Lace bark, *houhere* specimen tree

Kōhūhū hedge, *Pittosporum*

Cabbage tree, *tī kōka*

Pōhutukawa specimen tree

Mass planting of *mikoikoi*, *native iris*

Row of flax, *harakeke*

Groups of *hebe*, *koromiko*

Bird bath

Toetoe

Tree fuchsia, *kōtukutuku* specimen tree

Kōwhai specimen tree

Vegetable and herb garden

Compost heap

Patē specimen tree, *Seven finger*

Pūriri specimen tree

Lawn

Deck



# PLANTING FOR POLLINATION - NATIVE PLANT SPECIES GUIDE

Keen gardeners can ensure their garden is a pollinator's paradise by using the Landscapes for Life pollinator wheel and this more detailed species list. The table below provides some general information on native plant pollinators and seed dispersal. For further advice and to view native planting guides visit: [www.aucklandcouncil.govt.nz](http://www.aucklandcouncil.govt.nz)

We know that wind, birds, insects, lizards and even bats play a role in the pollination of our unique flora. For some plant species the actual pollination mechanisms are still unknown. Pollination is a largely under researched area of New Zealand plant ecology. We do know that most native plants are pollinated by insects. Flowers often use scents to attract insects, not all these scents are attractive to humans e.g. some flowers attracting flies will smell like rotten meat. Bird-pollinated flowers tend to be large and colourful and often have plenty of nectar to reward the birds e.g. kowhai. Wind-pollinated flowers tend to have small white or pale coloured petals and in some case no petals e.g. carex grasses.

Common name	Plant species	Pollination type					Flower colour	Seed dispersal mechanism
		Wind	Bird	Insect	Lizard	Bat		
Tall trees								
kahikatea	<i>Dacrycarpus dacrydioides</i>	x					cones	bird
rimu	<i>Dacrydium cupressinum</i>	x					cones	bird
northern rata	<i>Metrosideros robusta</i>		x	x	x		red	wind
pōhutukawa	<i>Metrosideros excelsa</i>		x	x	x	x	red	wind
tōtara	<i>Podocarpus totara</i>	x					cones	bird
miro	<i>Prumnopitys ferruginea</i>	x					cones	bird
matai	<i>Prumnopitys taxifolia</i>					x	cones	bird
rewarewa	<i>Knightia excelsa</i>		x	x		x	red	wind
Trees								
tītiki	<i>Alectryon excelsus</i>			x			white	bird
taraire	<i>Beilschmiedia tarairi</i>		x				pale green	bird
tawa	<i>Beilschmiedia tawa</i>	x	x	x			pale green	bird
karaka	<i>Corynocarpus laevigatus</i>		x	x			white	bird
kohekohe	<i>Dysoxylum spectabile</i>		x	x			white	bird
kānuka	<i>Kunzea ericoides</i>			x	x		white	wind
pukatea	<i>Laurelia novaezelandia</i>	x		x			pale yellow/ green	wind
kōhūhū, pittosporum	<i>Pittosporum tenuifolium</i>		x	x			dark red	bird
kōwhai	<i>Sophora microphylla</i>		x				yellow	gravity/ water
pūriri	<i>Vitex lucens</i>		x				pink	bird
Large shrubs								
makomako, wineberry	<i>Aristotelia serrata</i>			x			pink	bird
rangiora	<i>Brachyglottis repanda</i>			x			white	wind/gravity
NZ broom	<i>Carmichaelia australis</i>			x			white/pink	gravity
putaputawētā	<i>Carpodetus serratus</i>			x			white	gravity
māmāngi	<i>Coprosma arborea</i>	x					green	bird/ insect/ lizard
kanono	<i>Coprosma grandifolia</i>	x					green	bird/ insect/ lizard
shining karamū	<i>Coprosma lucida</i>	x					green	bird/ insect/ lizard
karamū	<i>Coprosma robusta</i>	x					green	bird/ insect/ lizard
ti kōuka, cabbage tree	<i>Cordyline australis</i>			x			white	bird

Where do I buy these?







# Urban matrix: what's important?

Messy is good – manicured is bad

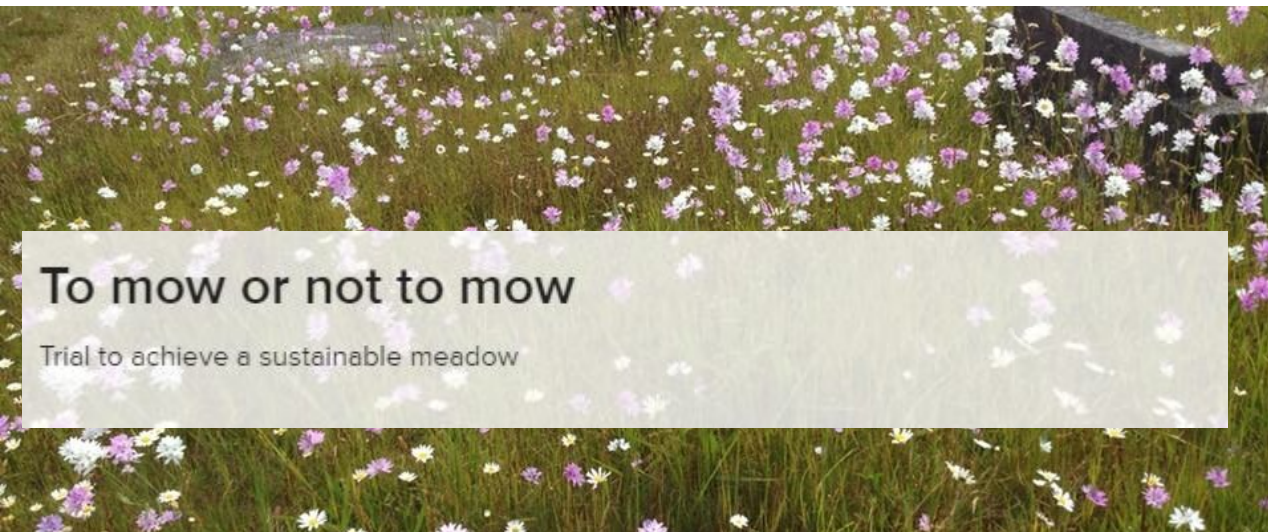




# Biodiverse berms!



??? ha berms in Auckland?





# New research suggests Kiwi tradition of mowing the lawn could be bad for the environment

Mon, Nov 6

Share



Source: 1 news



BecStanley

@botan\_ical

Following



#lowmow in Geneva. Europe you are WAY better than NZ accepting wild in cities. I'm now returning to Auckland, land of close clipped lawns.









PROUD PARTNER OF

**THE  
BLOCK**  
ON POINT NZ

**+HR=E**



# Role of developers

## Focus group theme:

- Council should be tougher on developers

If you let a developer do the landscaping you're going to get the cheapest whatever is popular tree you'll plant, they don't care, they don't actually care about what it looks like or how easy it is to maintain, or what it's going to grow into they're just like what looks nice to sell this house right now.

- *Urban Trees Focus Group Participant response*



# Biodiverse housing developments





# Biodiverse playgrounds





# Biodiverse sports grounds









# Biodiverse golf courses

- Auckland total area = 943 ha
- 19-92ha average
- 32% of golf courses 'not used' (wooded/off-green)



- **Lots of exotic trees & possums!!**
- **POTENTIAL is huge!**

# 3Rs – riparian, road, rail

Rail corridors = weed corridors?



Lots of little green space...great potential









Shade – temperatures + UV protection

Well-being – ‘feel good’ factor

Challenge & excitement!

Air quality – reduction in air pollution exposure



# Missed opportunity – cycle/walkway



# Why aren't we seeing more green infrastructure?

“Partly it is because planners are wary of new technologies and disruption to embedded practices.”

Community acceptability?



Discarded because of maintenance costs?



**Matthews et al 2016. Here's how green infrastructure can be easily added to the toolkit. The Conversation**