Cat research in the NESP Threatened Species Recovery Hub – a retrospective

Sarah Legge, John Woinarski and a team drawn from universities, government agencies, NGOs and Indigenous ranger groups, working across 12 sub-projects. Team members whose work features heavily in this presentation include Alyson Stobo-Wilson, Brett Murphy, Leigh-Ann Woolley, Jeremy Ringma, Mike Bode, Tida Nou, Jaana Dielenberg.

Project leaders in alphabetical order include: John Augusteyn, Mike Bode, Rob Brandle, Andrew Carter, Hugh Davies, Chris Dickman, Jaana Dielenberg, Tim Doherty, Bron Fancourt, Diana Fisher, Georgia Garrard, Matt Gentle, Graeme Gillespie, Aaron Greenville, Rosie Hohnen, Chris Johnson, Alex Kutt, Michael McGrath, Hugh McGregor, Katherine Moseby, Brett Murphy, Steve Murphy, Thomas Newsome, Tida Nou, Tony Pople, Julie Quinn, Jeremy Ringma, Dan Rogers, David Roshier, Emma Spencer, Alyson Stobo-Wilson, Dani Stokeld, Katherine Tuft, Linda van Bommell. We acknowledge the contributions of many other team members not named here.
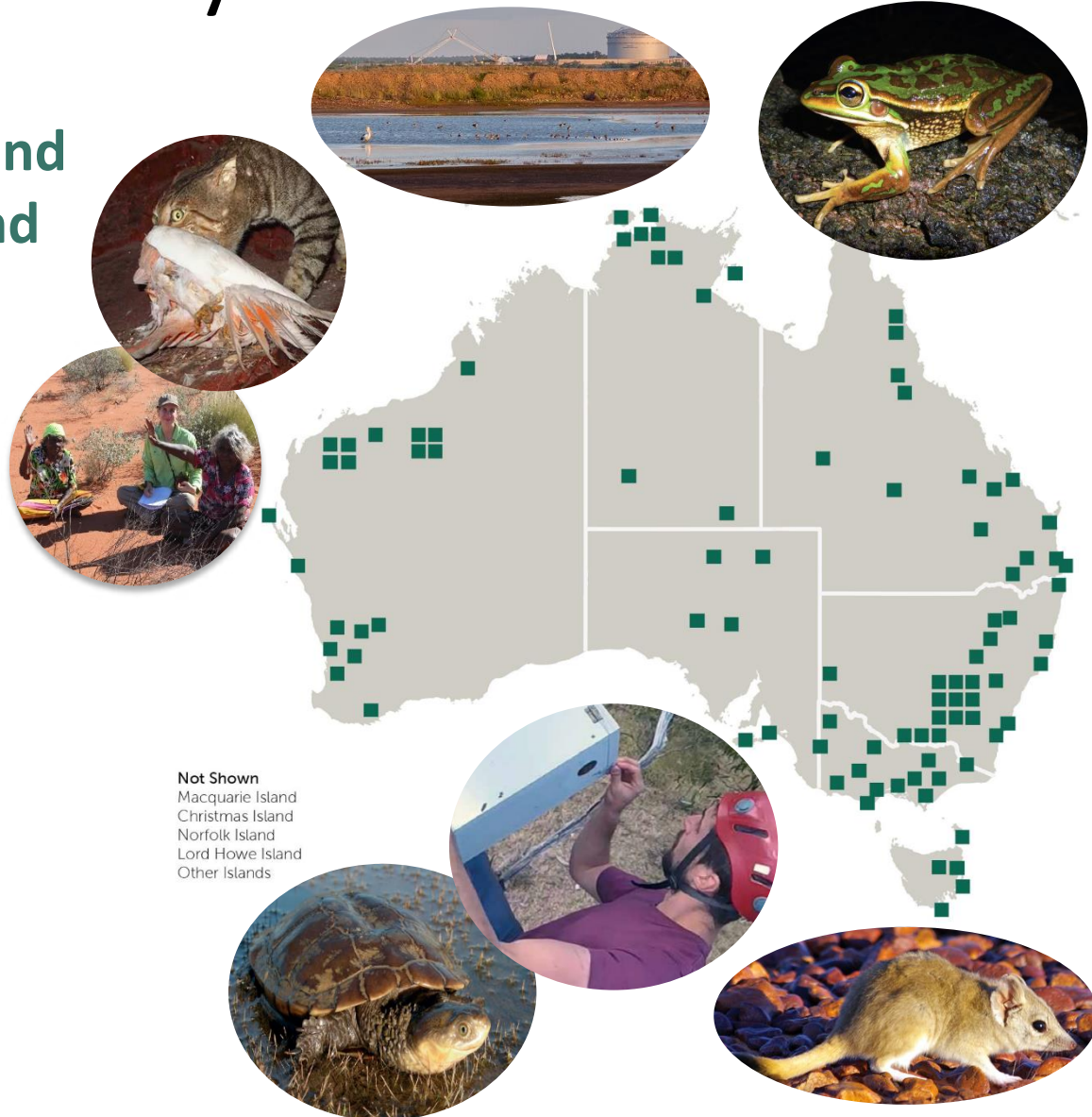
Sarah Legge
ex NESP TSR Hub
Charles Darwin Uni/Australian National Uni/Uni of Queensland

Picasso, 1939 Cat catching a bird

National Environmental Science Program Threatened Species Recovery Hub

The hub aimed to provide research and knowledge to help land managers and policy-makers recover threatened species and prevent extinctions

- 2015-2021

- 11 partnering orgs

- ~ 200 collaborating orgs

- 147 research projects

- 260 staff, researchers, students

Not Shown
Macquarie Island
Christmas Island
Norfolk Island
Lord Howe Island
Other Islands

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

Australian National University

THE UNIVERSITY OF MELBOURNE

CHARLES DARWIN UNIVERSITY

RMIT UNIVERSITY

THE UNIVERSITY OF WESTERN AUSTRALIA

australian wildlife conservancy

UNSW AUSTRALIA

THE UNIVERSITY OF SYDNEY

UNIVERSITY of TASMANIA

Cat research in the TSR Hub – the context

1. In other countries, cat impacts are contested and there is widespread opposition to cat management

2. In 2015, cat management had become a priority for the Australian gov:
   - A key plank in the first Threatened Species Strategy
   - 3rd iteration of the feral cat TAP released

Greg Hunt on Twitter: "We're eradicating feral cats to protect Australia's precious species like this eastern barred bandicoot #WerribeeZoo https://t.co/7XhbrBxBlU" / Twitter

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- Cat research in the TSR Hub was co-designed with the Aust Gov and many other stakeholders.
- An overarching aim was to provide a compelling, comprehensive evidence base to inform the community and build social licence for feral and pet cat management.
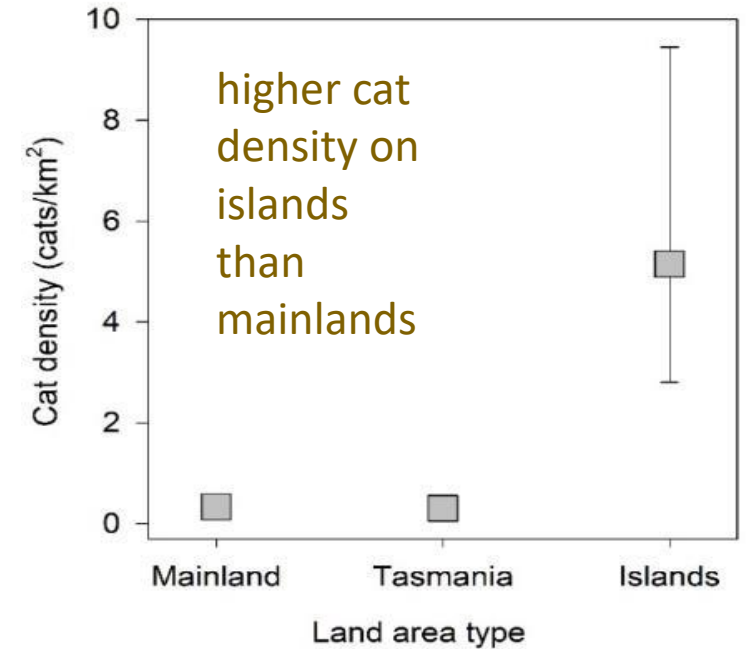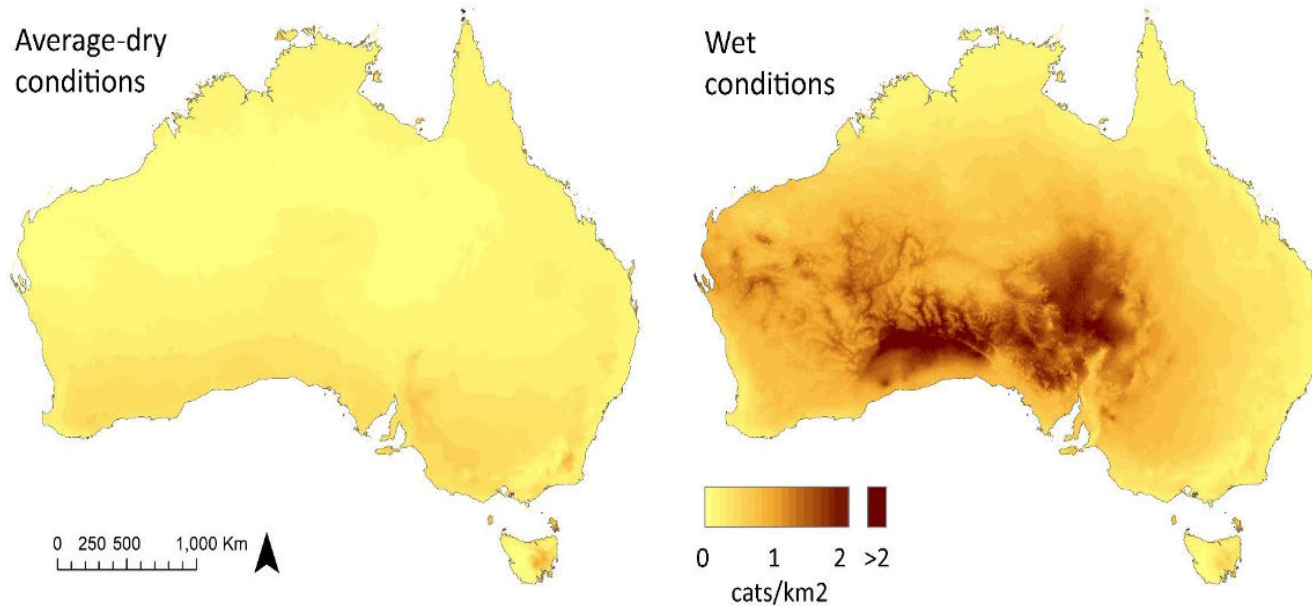
Cat research in the TSR Hub

1. Trial options for cat management in different contexts

2. Improve the evidence base that underpins management:
   - How are cats distributed across Australia?
   - What are the impacts of cats on native species?
   - Which native species are most vulnerable to cat impacts?
   - How can we protect the species most susceptible to cat impacts?

3. Use this robust evidence to inform society about the issue

1.Trial options for cat management

Field studies in key knowledge gap areas identified during a 2015 workshop:

Improving poison-baiting approaches

Integrated management of cats, foxes and rabbits, rats

Novel control trials (eg. dingoes, guardian dogs, cat profiling)

Habitat manipulation (via fire/grazing) to reduce impacts of cats

Many researchers shared >90 site-based density data to estimate the size and distribution of Australia's feral cat population (bush and urban)
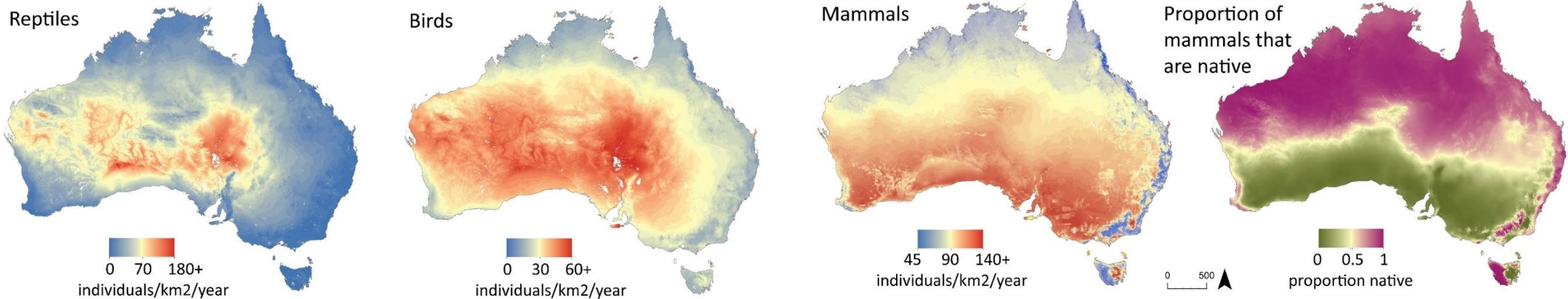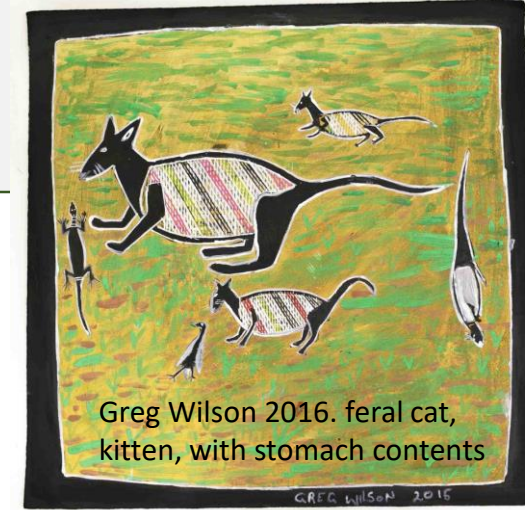

Average-dry conditions

Wet conditions

0   250 500   1,000 Km

0   1   2   >2
cats/km2

higher cat density on islands than mainlands

Cat density (cats/km^2)

Mainland   Tasmania   Islands

Land area type

- Feral cat population fluctuates 2.1-6.3 million depending on conditions
- Pet cat population is 4.9 million

Again with many collaborators, combined the cat density information with cat diet data (from ~ 100 studies across country) to estimate the predation toll of cats on native species
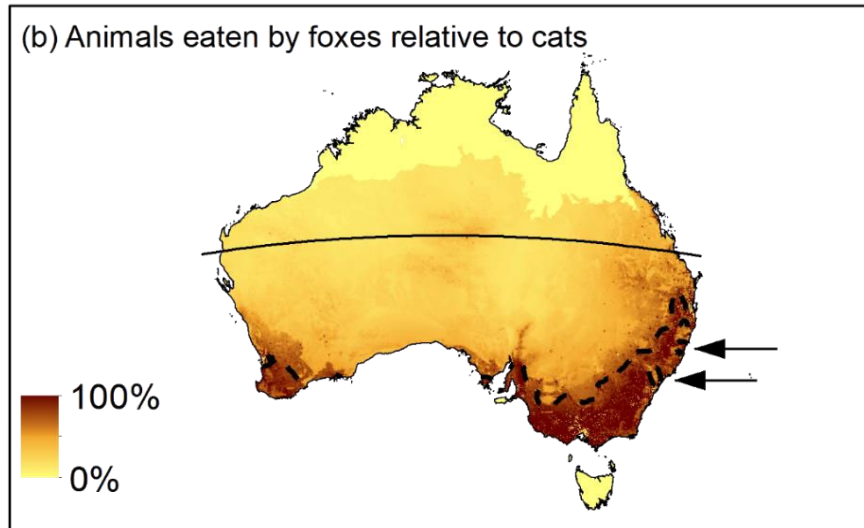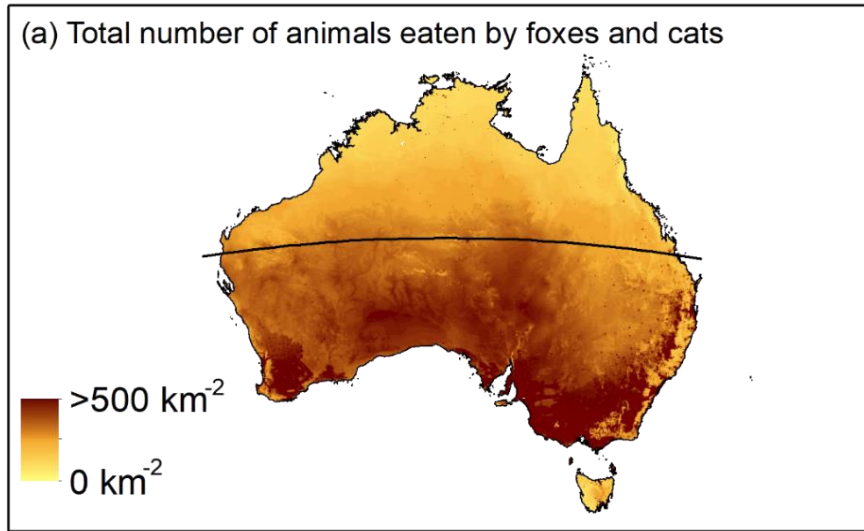
Greg Wilson 2016. feral cat, kitten, with stomach contents

Reptiles

0   70   180+
individuals/km2/year

Birds

0   30   60+
individuals/km2/year

Mammals

45   90   140+
individuals/km2/year

Proportion of mammals that are native

0   0.5   1
proportion native

0   500

Over 3 billion Australian mammals, birds, reptiles, frogs and invertebrates killed by cats per year

Sites of ~100 cat diet studies

Mean annual rainfall
≥2500 mm
100 mm

Murphy et al 2019; Woinarski et al 2017; Woinarski et al 2018; Woinarski et al 2020; Woolley et al 2020
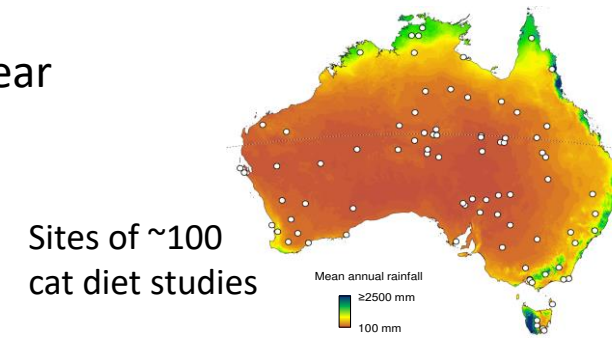
Took this a step further, by repeating the analyses for foxes, and comparing their tolls across species groups and space…

(a) Total number of animals eaten by foxes and cats

>500 km⁻² to 0 km⁻²

(b) Animals eaten by foxes relative to cats

100% to 0%

Number of prey items per year	🦊	🐈
Reptiles	88 (49–170)	466
Birds	111 (51–176)	265
Native mammals	104 (54–344)	452
Introduced mammals (including stock)	264 (109–486)	350

*numbers given in millions

Stobo-Wilson et al (2021) Wildlife Research 48, 470-480; Stobo-Wilson et al (2021) Biological Conservation 261, 109284; Stobo-Wilson et al (2022) Diversity and Distributions 28: 976-991.

What are the impacts of cats on native species? Which native species are most susceptible?

Combined the toll data with species trait information and environmental factors to work out which type of species are most susceptible to cat predation, accounting for their abundance

Mulgaras

Kowari

Hopping mice

MAMMALS
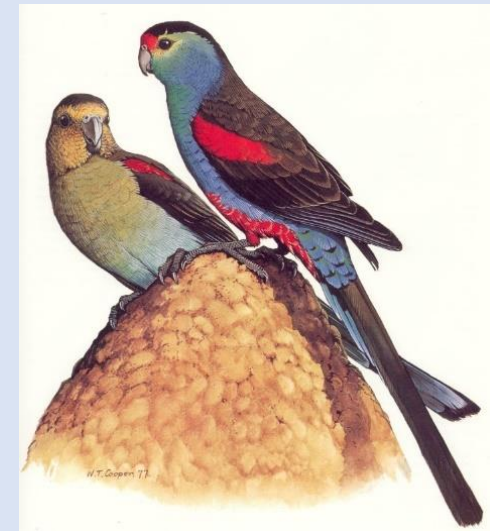- Mid-sized
- Arid habitats
- Not in rocks

BIRDS
- Mid-sized (60-300g)
- Ground-nesting
- Ground-foraging
- Island birds

J. Young; Wiki CC; C. Watson; W. Cooper

Woinarski et al (2017). Biological Conservation 216, 1-9;   Woolley et al (2019) Mammal Review 49, 354-368.

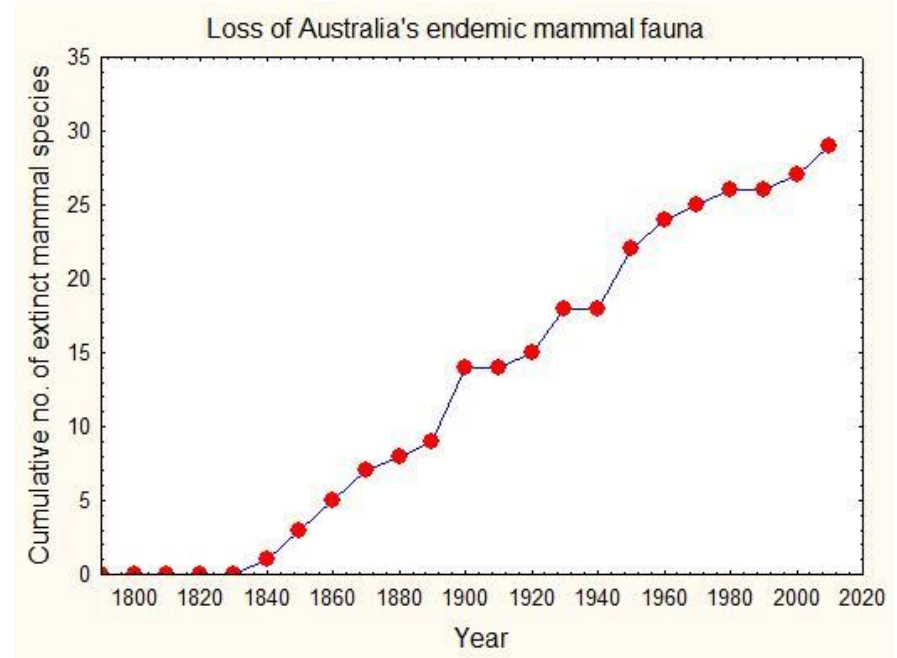# 2. Improve the evidence base that underpins management

What are the impacts of cats on native species? Which native species are most susceptible?

Past impacts: extirpations of seabird colonies, island taxa, and extinctions of mammal species

> 33 taxa extinct in 250 years

> 35% of modern global mammal extinctions

Cats main driver for ~two-thirds

Loss of Australia's endemic mammal fauna

Pig-footed bandicoot

Central hare-wallaby

White-footed tree-rat

Lesser bilby

Woinarski (2019) Biological Conservation 239: 108261

2. Improve the evidence base that underpins management

What are the impacts of cats on native species? Which native species are most susceptible?

With many collaborators, assessed mammals for their susceptibility to cats, and identified those that need complete, or very high levels of protection from cats
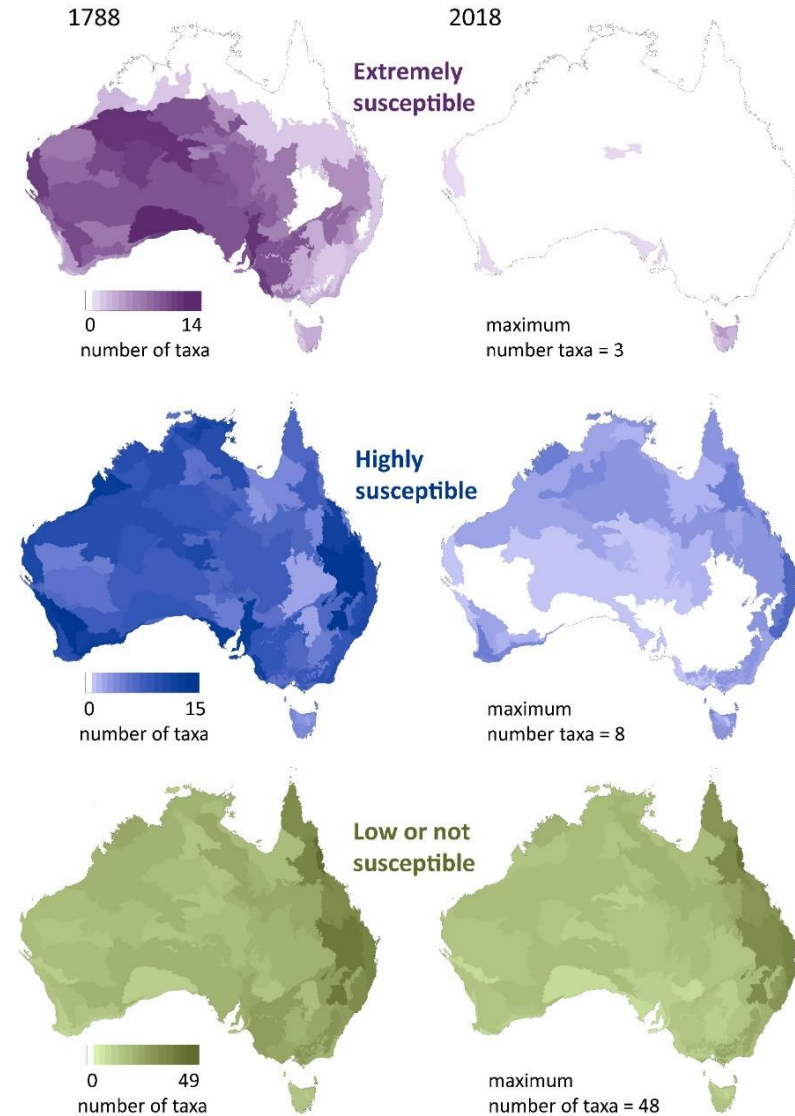
Extreme
33 species

High
51 species

Low/Not
154 species

Burrowing Bettong H. McGregor

Bilby – Wiki CC

Great Frankham

1788   2018

Extremely susceptible
0 — 14 number of taxa
maximum number taxa = 3

Highly susceptible
0 — 15 number of taxa
maximum number taxa = 8

Low or not susceptible
0 — 49 number of taxa
maximum number of taxa = 48

Ranges of the more cat-susceptible species have collapsed

Radford et al. (2018) Wildlife Research 45, 645-657
Legge et al (2018) Wildlife Research 45, 627-644

2. Improve the evidence base that underpins management

Protecting native species most susceptible to cats

Where should new cat-free islands/fenced areas be for these species?
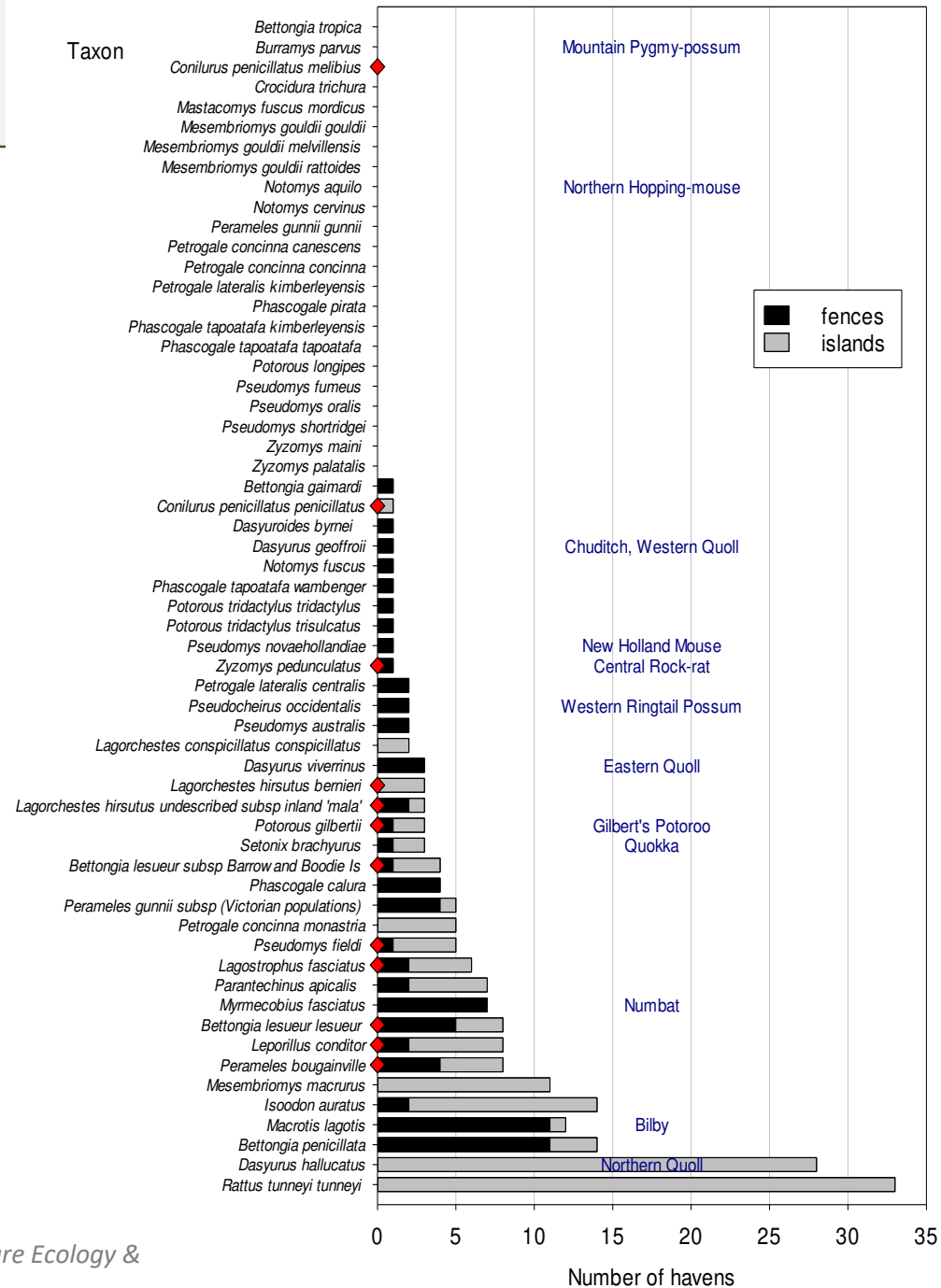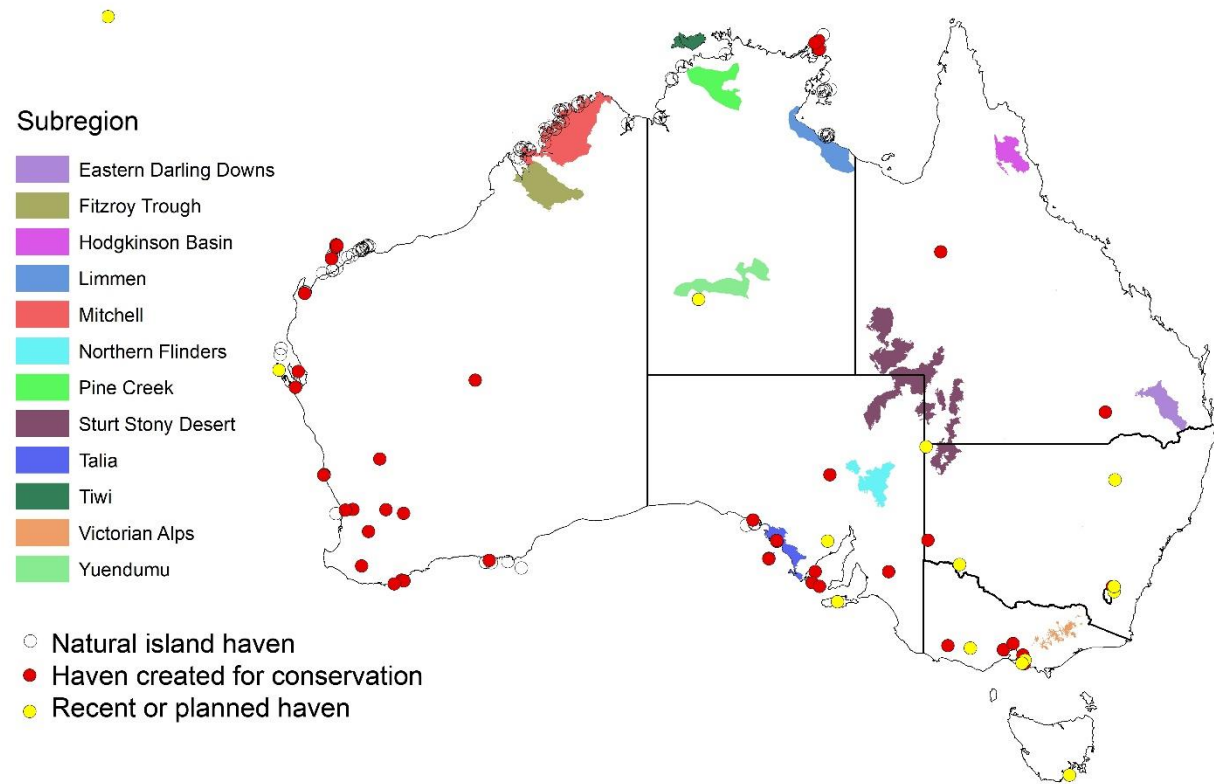
Subregion
- Eastern Darling Downs
- Fitzroy Trough
- Hodgkinson Basin
- Limmen
- Mitchell
- Northern Flinders
- Pine Creek
- Sturt Stony Desert
- Talia
- Tiwi
- Victorian Alps
- Yuendumu

- ○ Natural island haven
- ● Haven created for conservation
- ● Recent or planned haven

Radford et al. (2018) Wildlife Research 45, 645-657; Legge et al (2018) Wildlife Research 45, 627-644; Ringma et al (2018) Nature Ecology & Evolution 2, 410-411; Ringma et al (2019) Conservation Letters 12., e12611

Burden on local government

Vexing and costly, poorly supported by state legislation

Wildlife impacts

Predation toll: lower per cat, but higher per km² because pet cat density is high

Economic impacts

Costs of disease transmission to people and livestock >$6 billion/year

The management of cats by local governments of Australia

Tida Nou, Sarah Legge, John Woinarski, Jaana Dielenberg, Georgia Garrard

November 2021

Legge et al (2020) Wildlife Research 47, 523-539
Legge et al (2020) Wildlife Research 27, 731-746
*Nou et al (2021) TSR Hub report*
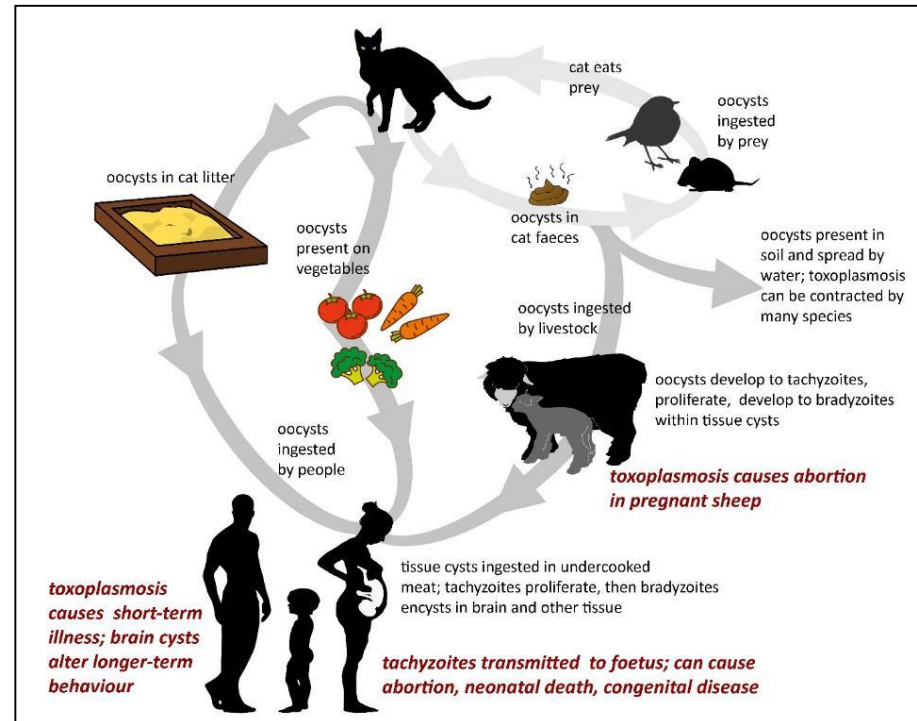
3. Use the evidence to inform the public

There is a large appetite for cat stories!

- >60 journal articles, with > 130 co-authors, including 3 ranger groups.
- Over 2010 media stories with a combined audience of more than 40.1 million people online and print media, radio and tv (advertising value $27.8 million).
- Extensive engagement with vet associations, sporting shooter groups, local governments, community groups, interest groups, NRM groups, welfare groups
- Information leveraged on by many advocacy, community, and management groups
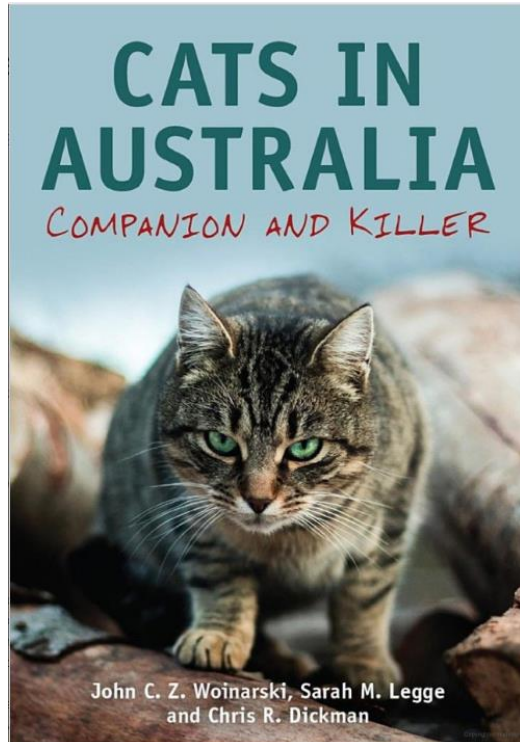
Book to summarise current knowledge on cat ecology, impacts, management

Articles in The Conversation > 1 million reads

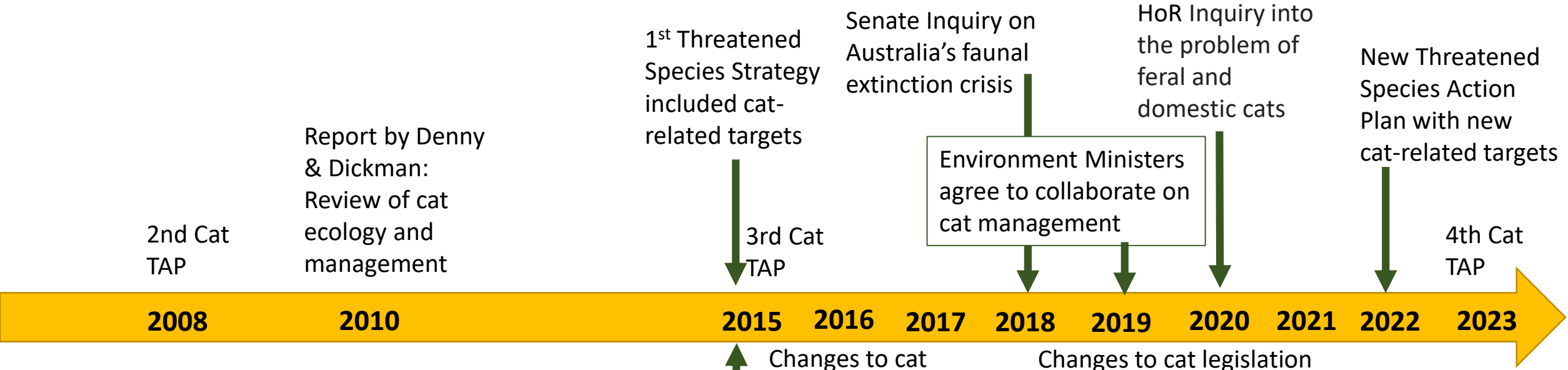One cat, one year, 110 native animals: lock up your pet, it's a killing machine

Cats carry diseases that can be deadly to humans, and it's costing Australia $6 billion every year

For whom the bell tolls: cats kill more than a million Australian birds every day

Summary: what did the TSR Hub cat research achieve?

- Improved the evidence base underpinning management, including via field trials

- Supported a consistent message about cat impacts that is being used by diverse stakeholder groups (vets, local govs, conservation advocacy groups)

- Increased understanding about cat impacts and management in the wider community, helping to build support

- Supported Aust Gov policy (eg investment in new havens; Threatened Species Action Plan; 2023 feral cat TAP)

The heat on cats has increased in the last decade

2nd Cat TAP

Report by Denny & Dickman: Review of cat ecology and management

1st Threatened Species Strategy included cat-related targets

3rd Cat TAP

Senate Inquiry on Australia's faunal extinction crisis

Environment Ministers agree to collaborate on cat management

HoR Inquiry into the problem of feral and domestic cats

New Threatened Species Action Plan with new cat-related targets

4th Cat TAP

2008   2010   2015   2016   2017   2018   2019   2020   2021   2022   2023

Changes to cat legislation in NSW

Changes to cat legislation in WA, Tas, SA, ACT

NESP begins Including TSR Hub

WA Feral Cat Symp

WA Feral Cat WG launched

Cat-related research in Australia

number of papers on cats / % of all papers that are on cats

papers on cats
% of all papers that are on cats

1995   2000   2005   2010   2015   2020

year
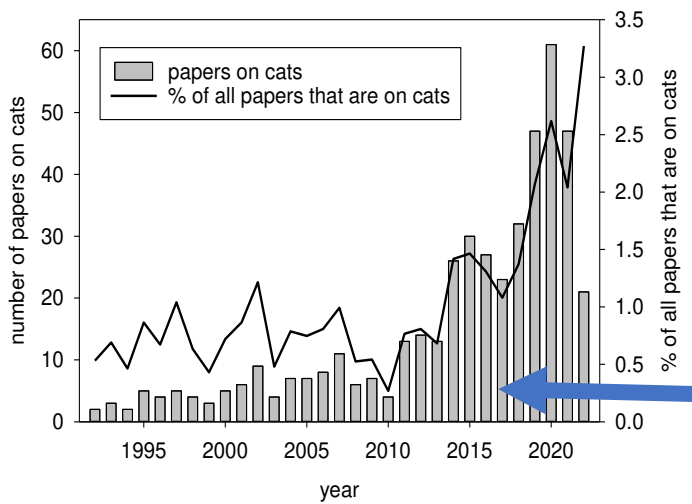
Research outputs start to increase from c 2014

SWEET SPOT: Activity in research, management and policy must align, interact and grow together, with strong public engagement

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Picasso, 1939 Cat catching a bird