

# Norway rats don't come from Norway

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Braided Rivers Seminar 2023  
Lincoln University  
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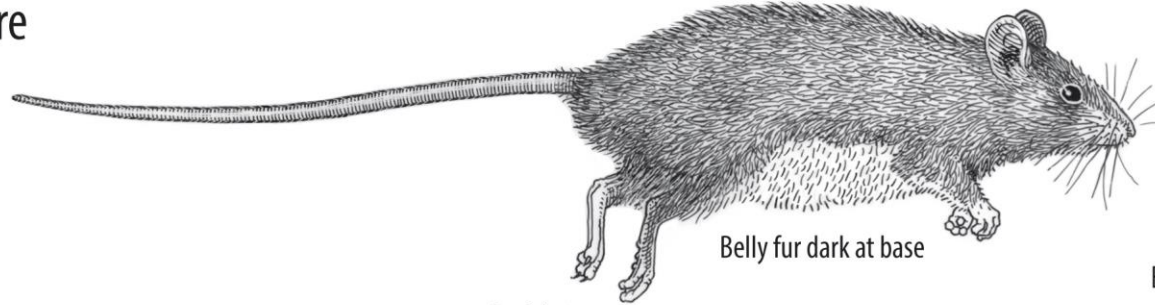


# **They came from China**

Thanks to Anne Schlesselmann, Nick Ledgard for help with this talk



Kiore



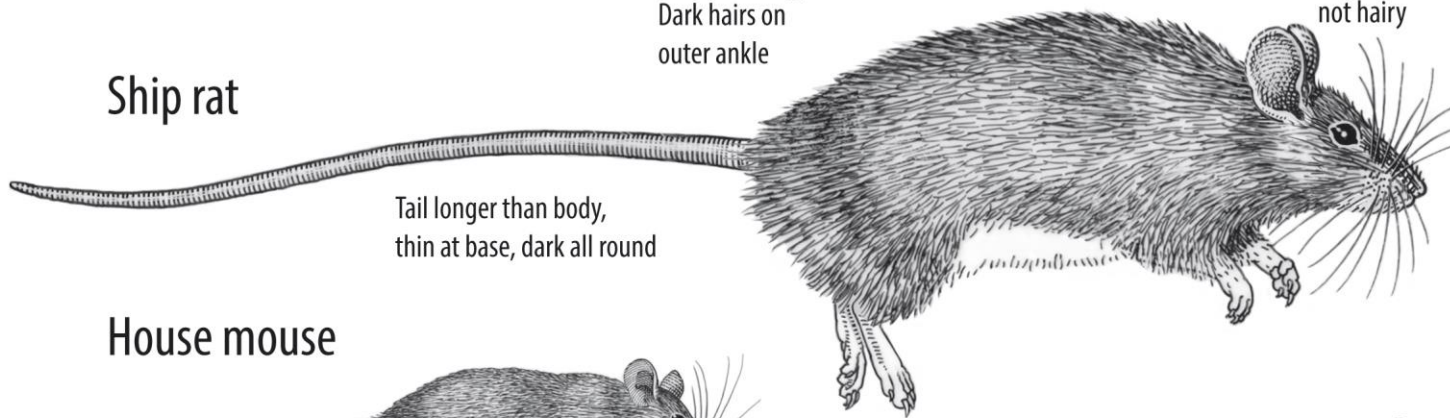
*Rattus exulans*

Belly fur dark at base

Dark hairs on  
outer ankle

Ears large,  
not hairy

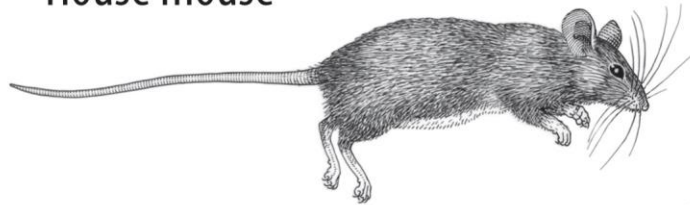
Ship rat



*Rattus rattus*

Tail longer than body,  
thin at base, dark all round

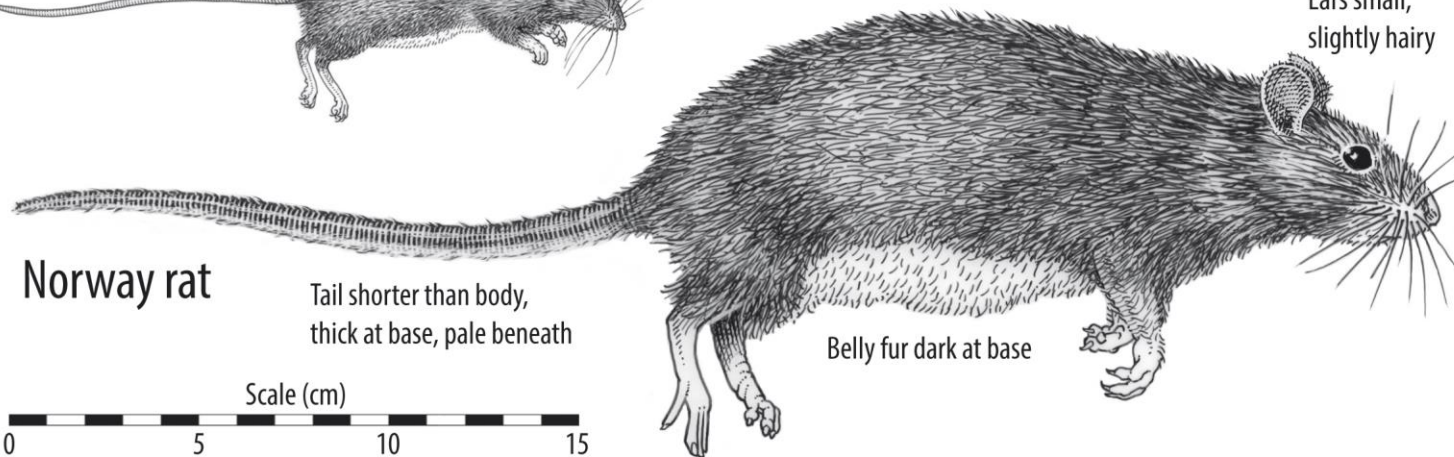
House mouse



*Mus musculus*

Ears small,  
slightly hairy

Norway rat



*Rattus norvegicus*

Tail shorter than body,  
thick at base, pale beneath

Belly fur dark at base

Scale (cm)





# Norway rat

Arrived: ca 1770 CE

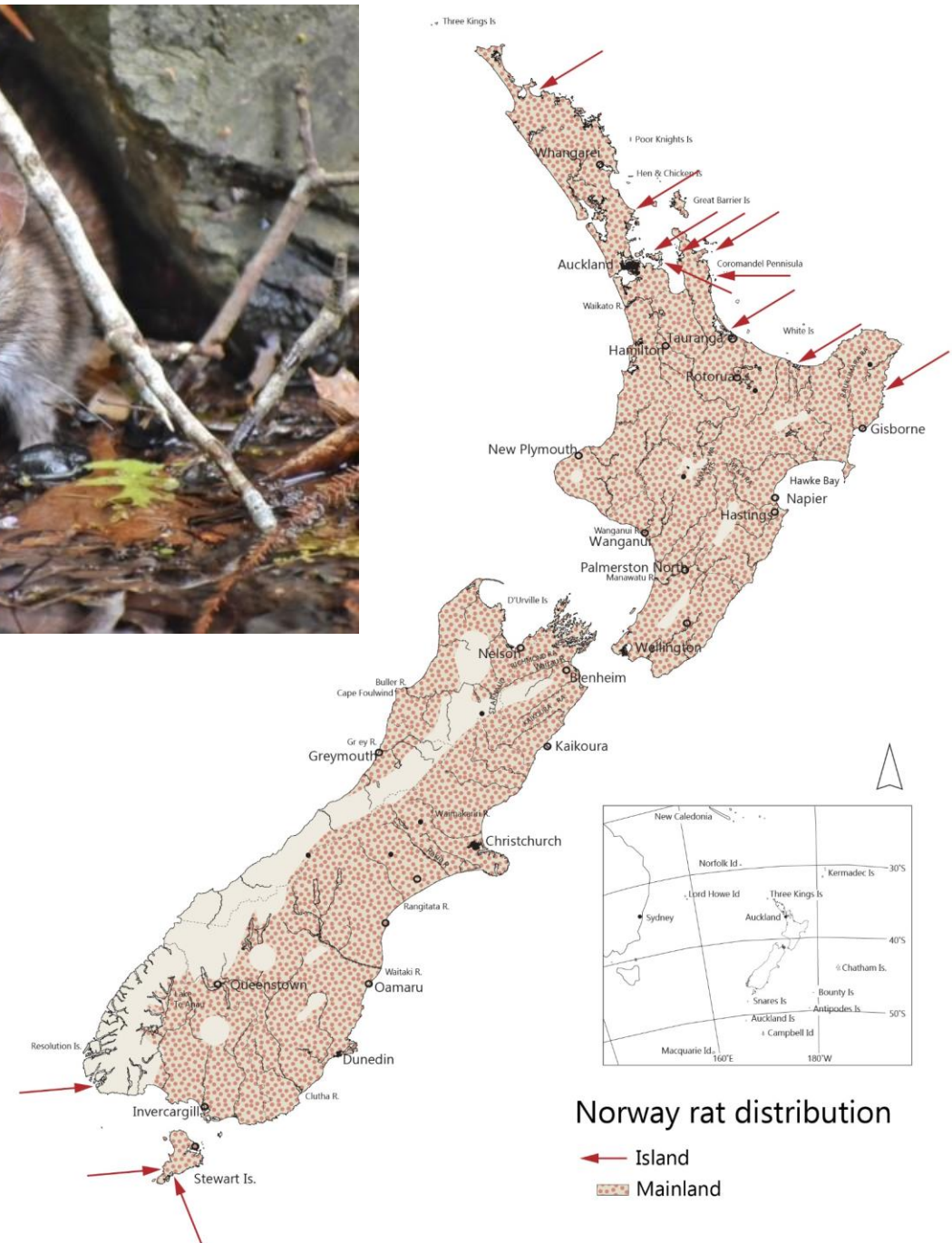
Eradicated from 41 islands, still on 18\*

Max. swim ca 2 km

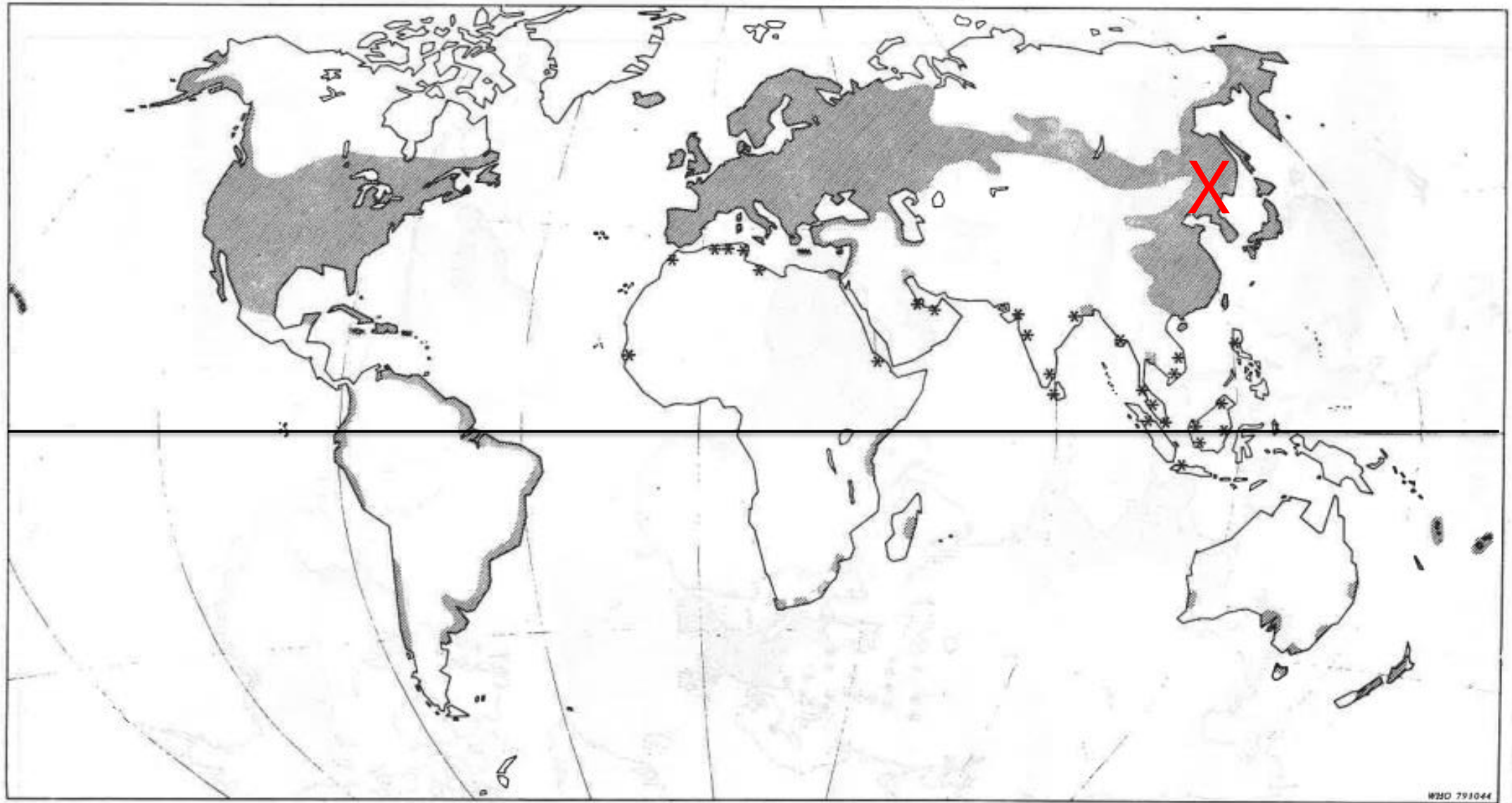
Mean weight:  
159-332 g

\* > 5ha, Carter/Russell

Gary Harrison



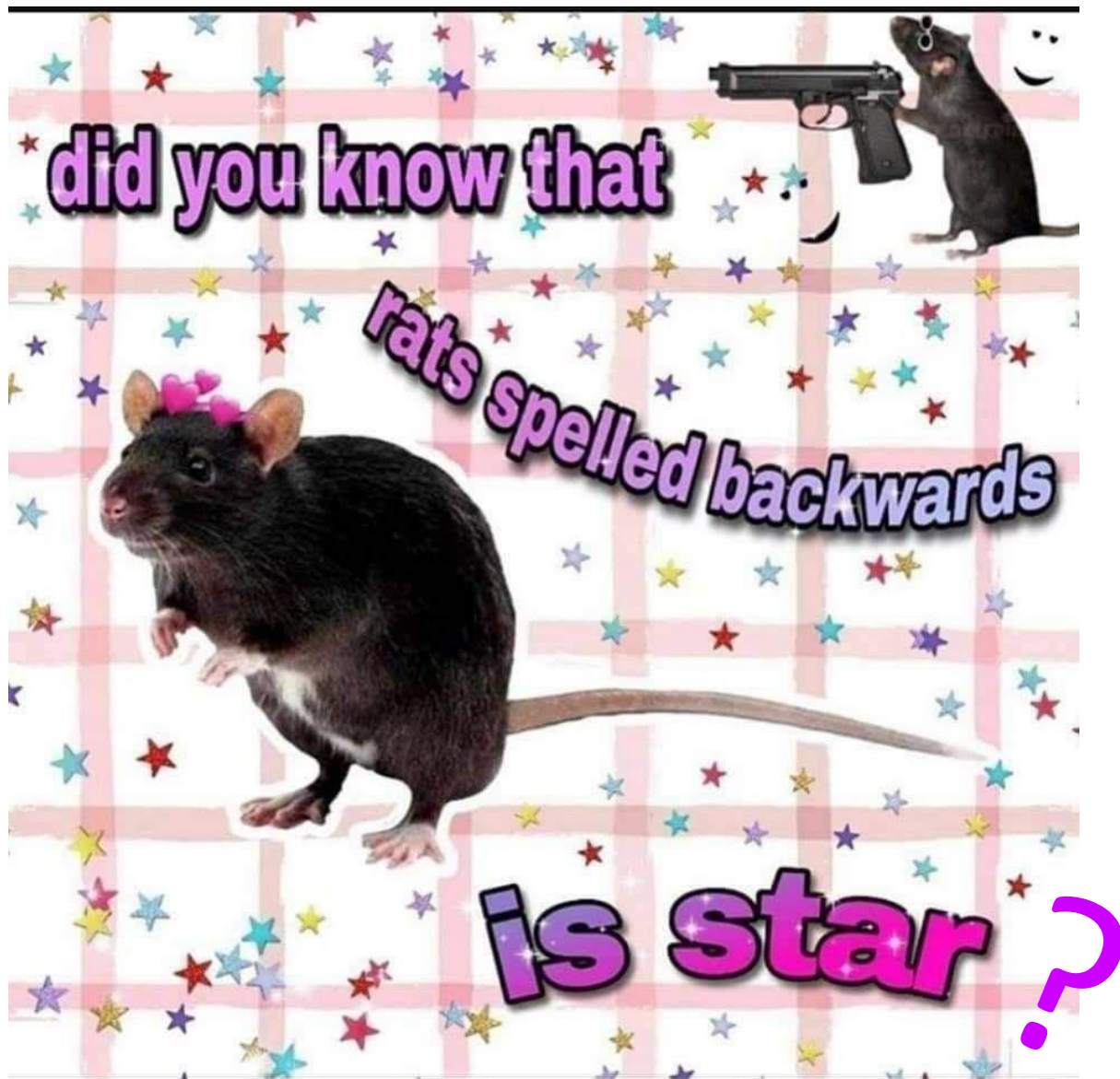
DISTRIBUTION OF RATTUS NORVEGICUS



Norway rat, brown rat, common rat, sewer rat, city rat, water rat...

Brooks & Rowe WHO 1979





# Ship rat

Spread: 1860-90 CE

Eradicated from 20 islands, still on 55\*

Max. swim ca 750 m

Mean weight:  
119-212 g

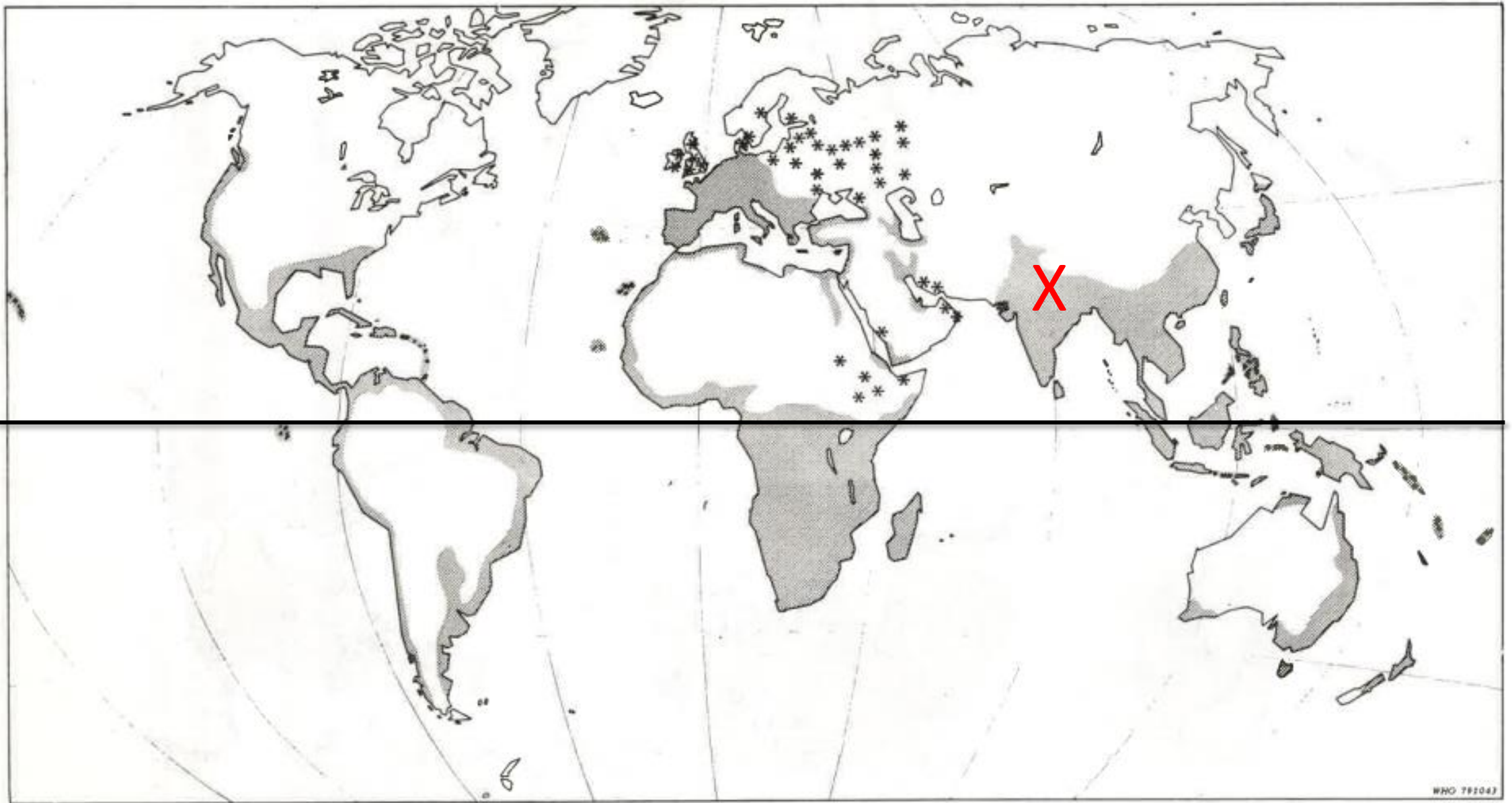
\* > 5ha, Carter/Russell

David Mudge Nga Manu Images





DISTRIBUTION OF RATTUS RATTUS

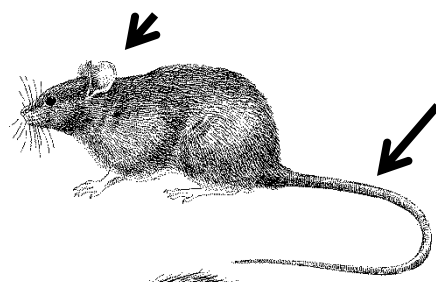


Ship rat, black rat, roof rat, house rat, [plague rat]

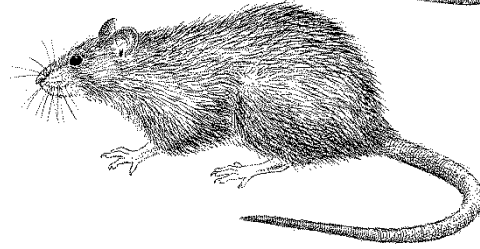
Brooks & Rowe WHO 1979



Ship rat



Norway rat



Bruce Petty

Norway



G. McBride



Ship

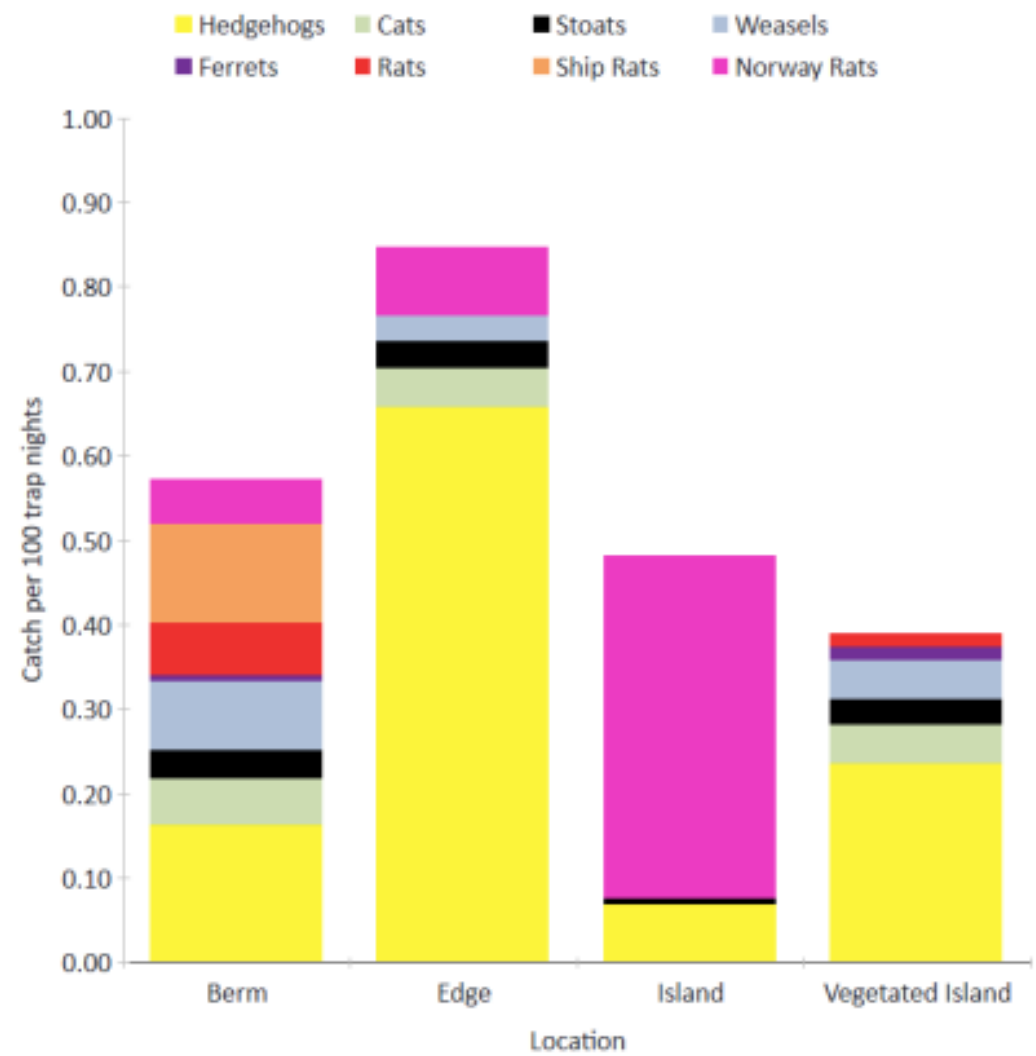


Norway : ship  
rat ratio  
outside large  
forests, NZ

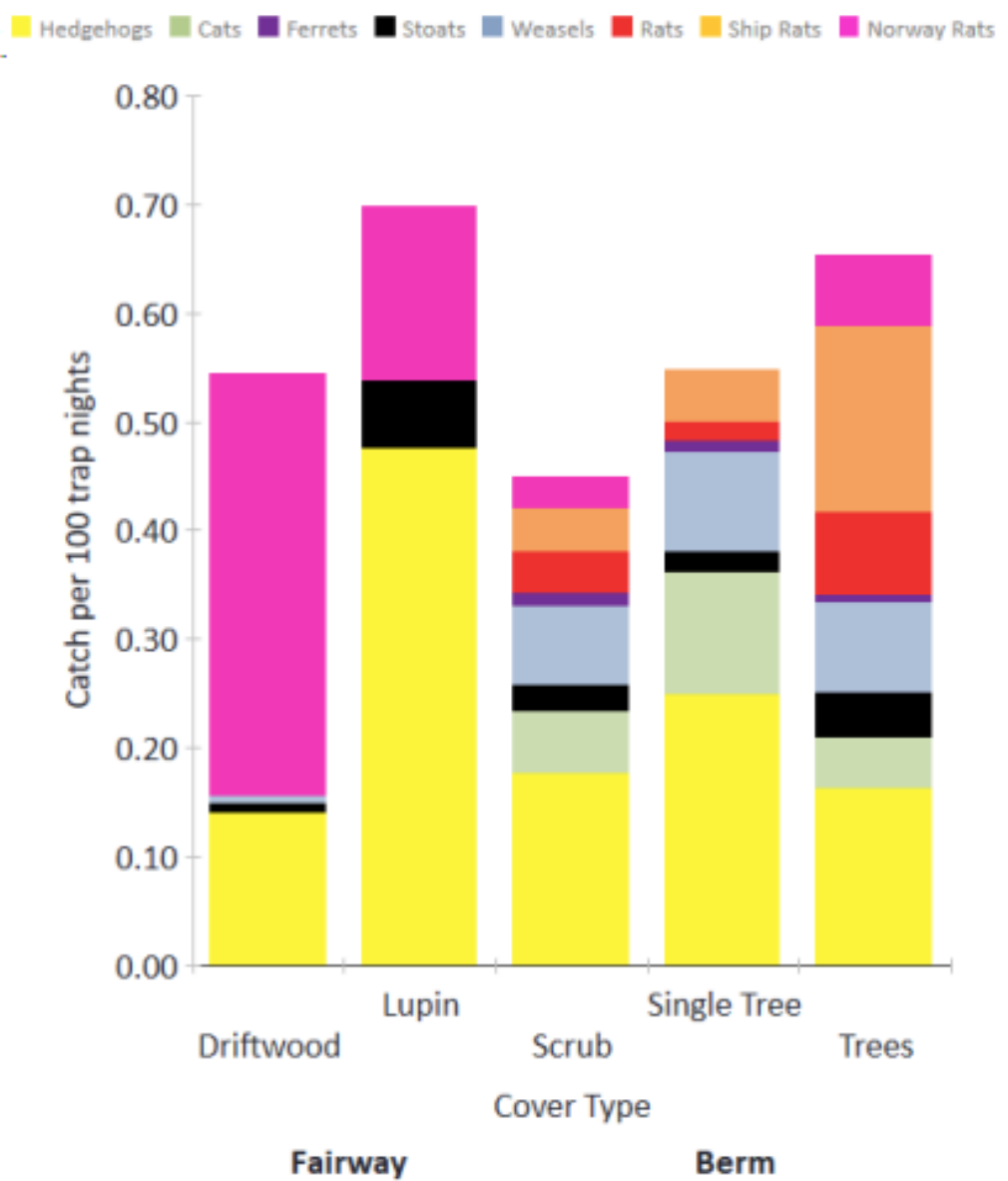
Location	Habitat	% Norway	# rats	Year	Reference
Waitaki Basin	Braided river	100	50	2001	Keedwell & Brown 2003
Whananaki Northland	Pasture, wetlands	92	687	2006-2009	DOC; O'Donnell <i>et al.</i> 2015; Nigel Miller
Mimiwhangata Northland	Pasture, wetlands	92	1103	2006-2009	DOC; O'Donnell <i>et al.</i> 2015; Nigel Miller
Hamilton	Urban gully	53	17	2016	Our unpub. data
Whangamarino Waikato	Wetland	42	133	2010-2014	Craig Gillies, unpub. data
Auckland	Motorway	32	56	2008	Cheryl Krull, unpub. data
Whangamarino Waikato	Wetland	19	197	2008-2009	M. Brady; O'Donnell <i>et al.</i> 2015
Hawkes Bay	Pasture	10	1250 photos	2014	Patrick Garvey, Akld Univ
Hamilton	Urban parks	10	21	2007	Morgan <i>et al.</i> 2009
New Plymouth	Urban parks	10	21	2012	Our unpub. data
Auckland	Urban forest	4	245	2015	S. Lincoln, unpub. MSc Akld
Waikato	Forest frags	2	528	2007-2008	King <i>et al.</i> 2011



# C/100TN Ashley Rakahuri 2019–2022



# C/100TN by cover type



Davey G, Ledgard N, Mardon S, Hughey J 2022.  
Ashley Rakahuri Rivercare Group annual report 2021–22

Figure 50. Catch per hundred trap nights by cover type

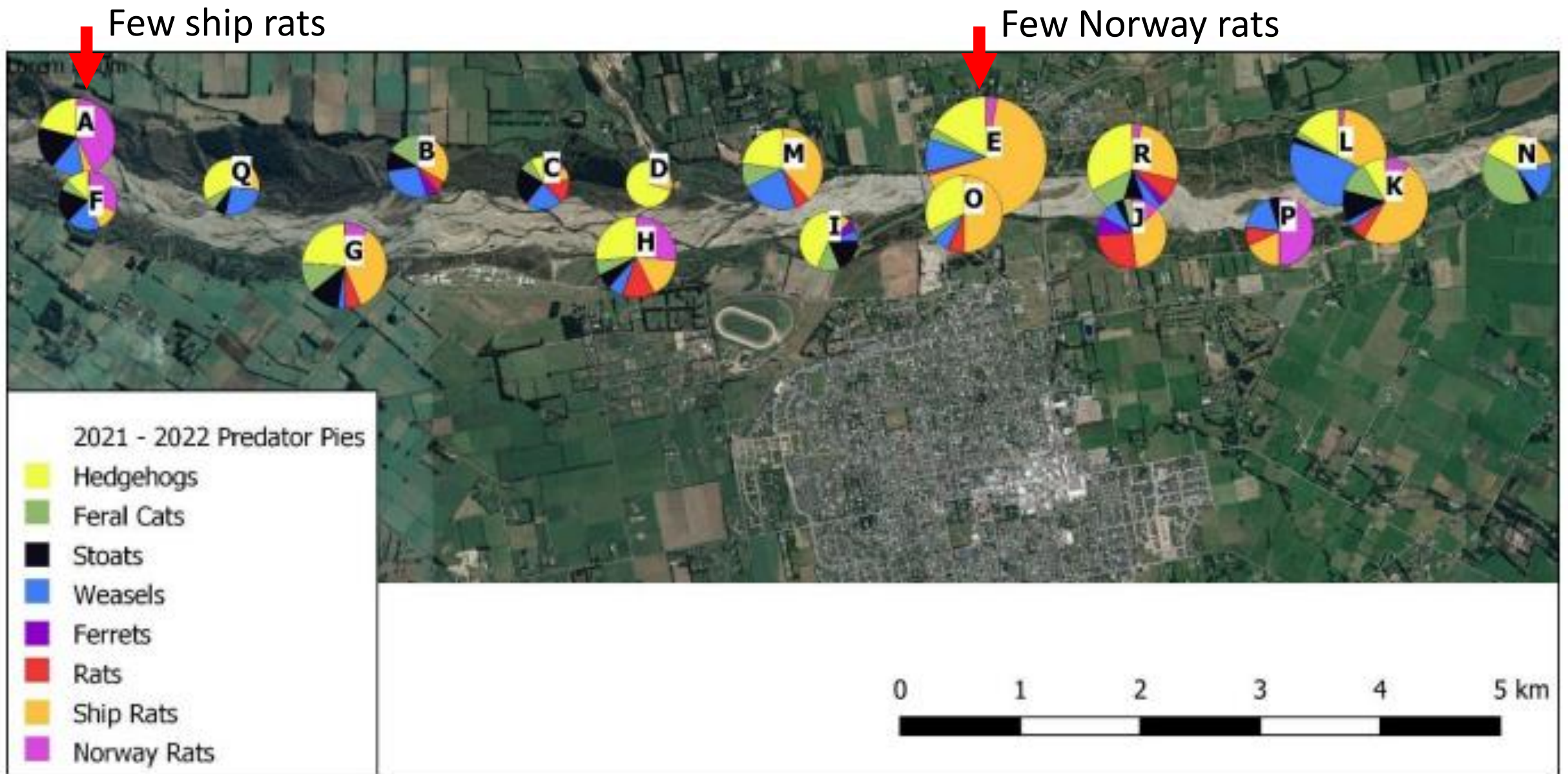


Figure 52, Catch per trap line, 2021-2022



# Size and behaviour

	Ship rat	Norway rat
Weight (g) <sup>1</sup>	Av. 145, max. 266	Av. 232, max. 455
Climb <sup>2</sup>	Extraordinary	Poor
Swim <sup>3</sup>	750 m	2000 m
Burrow	No	Yes
Colonial	No	Yes
Habitat	Forest, shrub, commensal	Near water, commensal
Runways <sup>4</sup>	No	Yes
Activity	Nocturnal	Nocturnal + diurnal

<sup>1</sup>King & Forsyth (eds) 2021 Handbook NZ Mammals

<sup>2</sup>Foster et al. 2011 NZ Jnl Zoo 38

<sup>3</sup>Russell & Clout 2005 Proc 13th AVPC

<sup>4</sup>Telle H-J 1972 Zeit für Angew Zoo 53



Stoat vs rat

Waikato?





# Norway rat behaviour on braided rivers:



- Not abundant (only 67 caught in 14 years in Te Manahuna Aoraki<sup>1</sup>)
- Live in small colonies here and there
- Highly exploratory but cautious (not neophobic<sup>1</sup>)
- Nocturnal; use scent to learn about other rats and their food
- Use trails between colony and feeding sites
- Home range lengths of 4 Mackenzie Basin rats 369–615 m<sup>2</sup>
- SO EACH YEAR one exploring rat finds a new colony
- Others learn!

<sup>1</sup> Lister H 2021. Invasive rats and where to find them: evaluating detection techniques and resource selection by Norway rats (*Rattus norvegicus*). Unpub. MSc Wildlife Mgmt, University of Otago.

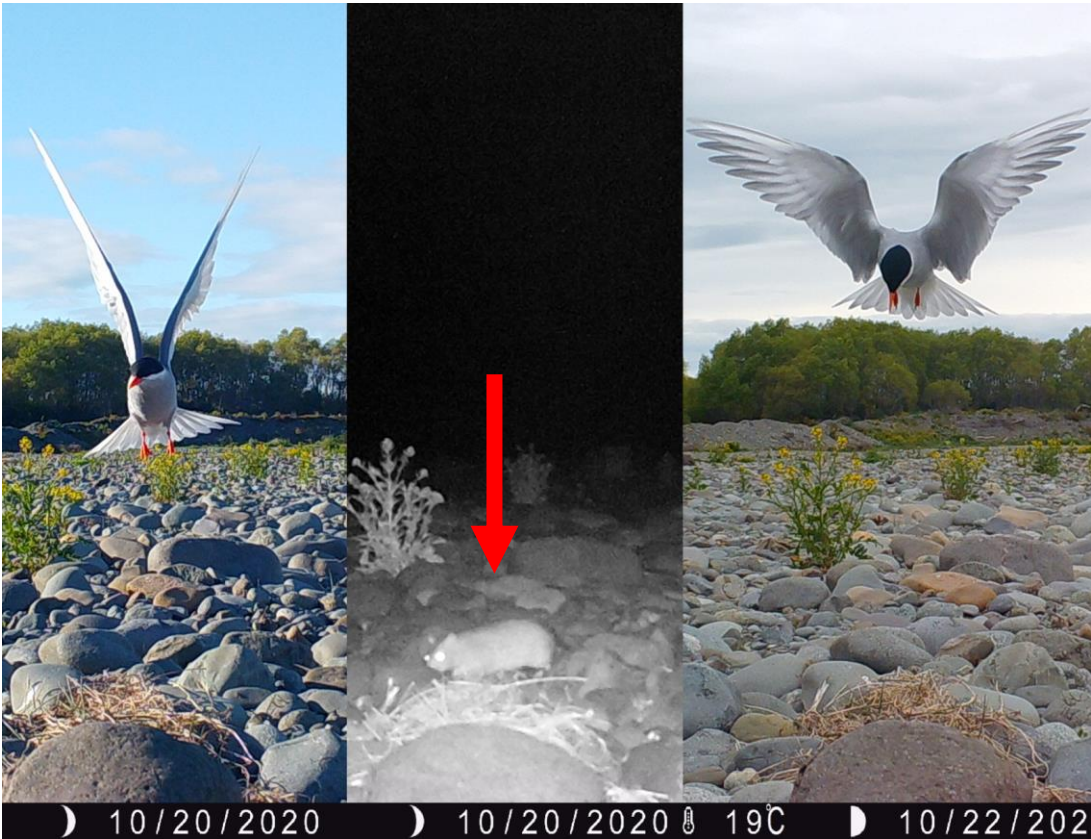
<sup>2</sup> Doyle PJ 2021. The spatial ecology, population structure, & habitat use of *Rattus* spp. in the South Island, New Zealand. Unpub. MSc zoology, University of Otago.



Norway rats prey on black-fronted tern eggs and chicks

Aparima River, Southland

Clement Lagrue, DOC



Ashley River, Canterbury

Ashley-Rakahuri Rivercare Group/Grant Davey







Tern Island, upper Ohau  
River, Dec. 2019

353 traps plus pindone in  
158 stations in 500 m radius

6% (of 66) nests hatched

Gale S, Welch J,  
Nelson D 2020.  
Project River  
Recovery Annual  
Report 1<sup>st</sup> July 2019  
to 30<sup>th</sup> June 2020.  
PRR Internal Report  
2020/02.

Figure 9: Rat captured on trail camera eating tern eggs

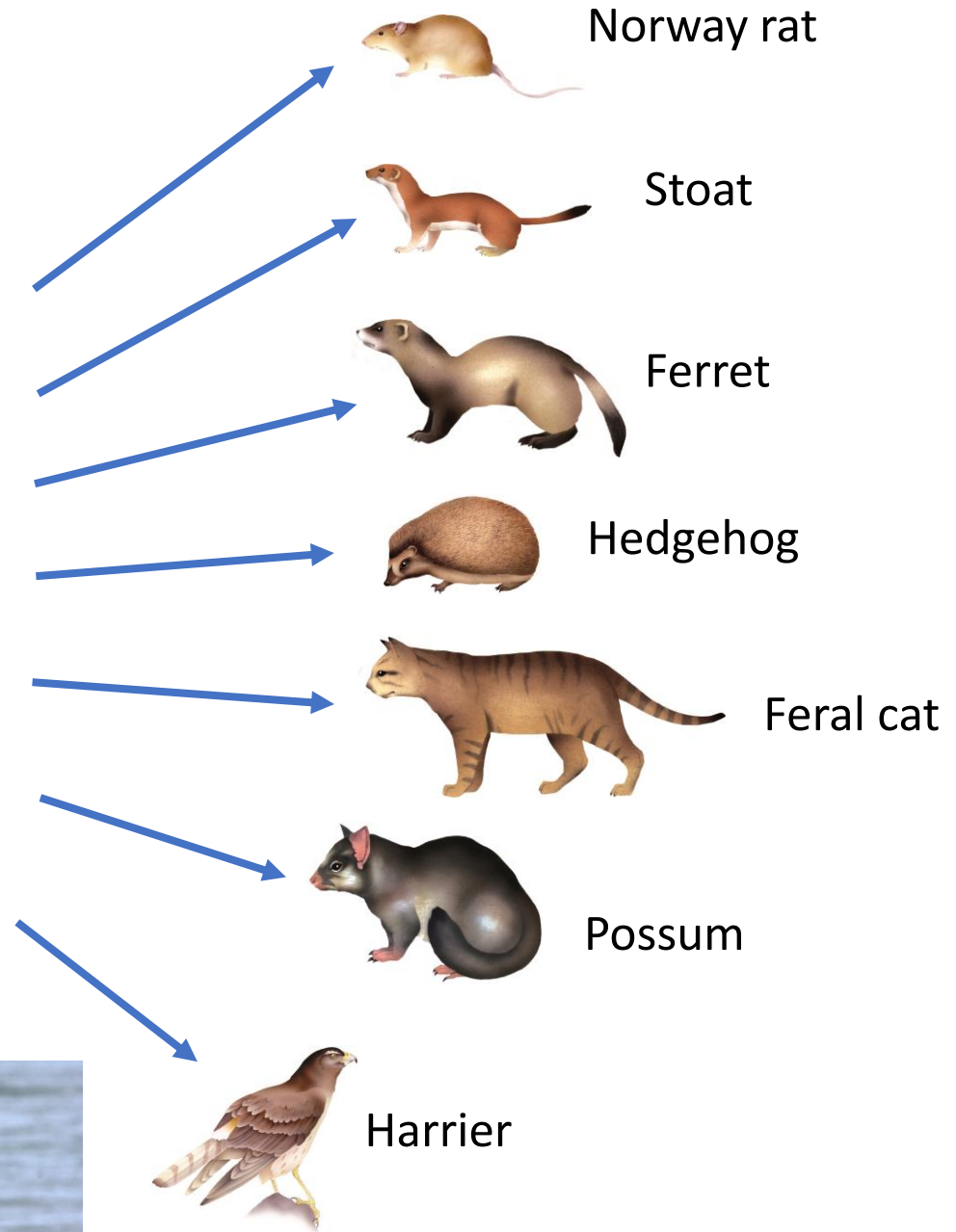
# Black fronted tern



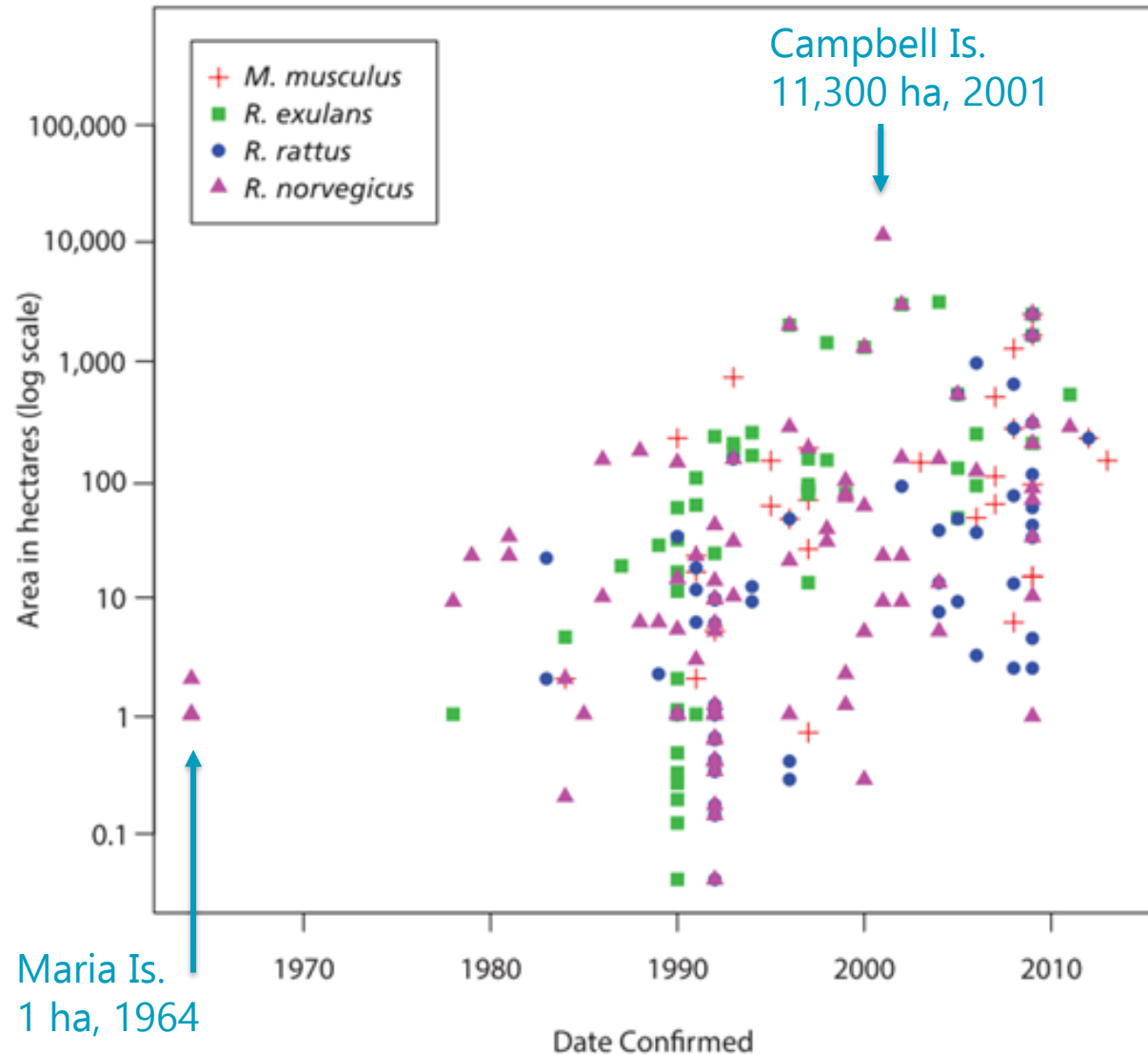
Anne Schlesselmann

Black-backed gull

Rebecca  
Bowater



# New Zealand rodent eradications 1964 to 2014



Also  
South Georgia Is., UK  
Norways + mice eradicated  
107 000 ha  
2015



**Figure 1.** Fifty years of rodent eradications in New Zealand 1964-2014 (updated from Clout & Russell 2006).





1. Trap (spitfire?) and poison (norbormide?)
  2. Shoot rats at night with airgun and thermal or IR scope?
  3. Provide alternative food ('compost heap') away from nesting colonies?
- 

#### 4. Rat dogs might:

- Locate Norway rat colonies before birds nest
- Locate movement trails
- Catch and kill rats out feeding at night
- Enable subsequent humane killing eg carbon monoxide



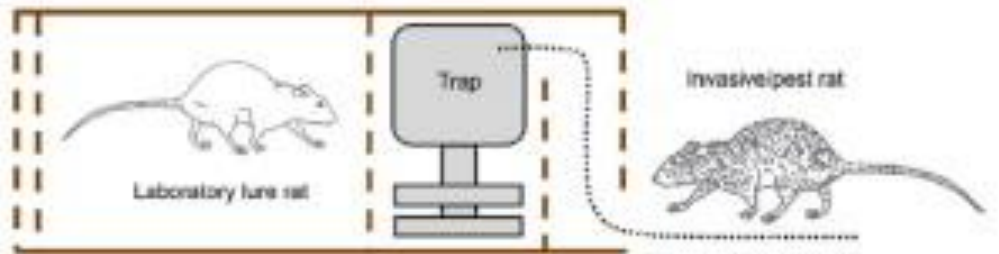




- Dogs located 87% of rats
- Few false positive detections
- Dogs covered 30-40 ha in 6 hours



Gsell A, Innes J, de Monchy P, Brunton D 2010. The success of trained dogs in locating sparse rodents in pest-free sanctuaries. *Wildlife Research* 37: 39-46.



## 5. Live (lab) rats as lures?

LURE

Sites	Live female Norway rat	Live male Norway rat	Eggs/peanut butter
Low rat density, ongoing control (four reserves)	11 caught	4	2
High food abundance, low control (three zoos)	11	14	7

Shapira I, Shanas U, Raubenhiemer D, Knapp C, Alberts S, Brunton D. 2013. Laboratory rats as conspecific biocontrol agents for invasive Norway rats. *Biological Control* 66: 83–91.



THE END