

An Australian Abroad – The secret life of the brushtail possum

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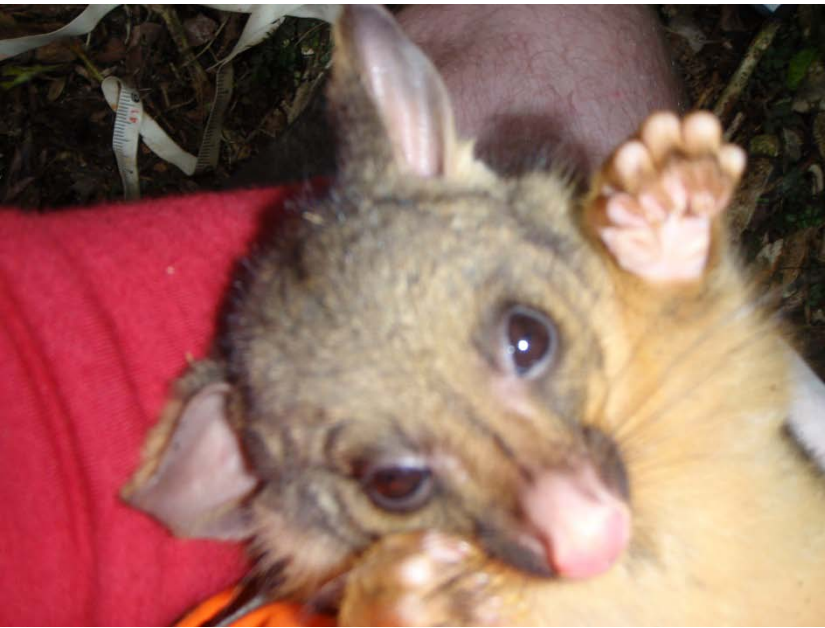




MASSEY UNIVERSITY

Topic of interest

- Possum social contacts
 - Understanding contacts among possums can lead to a better understanding of disease transmission associated with possums
 - Which in turn can lead to better disease management techniques



The brushtail possum

- *Trichosurus vulpecula*
- A cat sized, solitary, nocturnal, arboreal marsupial (Montague 2000)
- Brought to New Zealand in the 1850s to establish an animal fur industry
- Estimated population of 30 million individuals

Bovine tuberculosis (Tb)

- Possum are the main reservoir hosts of *M.bovis* in New Zealand
- Tb is spread by shed bacilli of the causative agent *Mycobacterium bovis*
 - (Caley *et al.* 1999; Corner *et al.* 2002; Kao *et al.* 2007)



Tb transmission in possums

- A strong, positive correlation between the *M. bovis* infection in ferrets and possum abundance has been observed
 - (Caley and Hone 2004)
- They show prevalence of *M. bovis* in ferrets declines with declining possum populations
 - Supported by (Caley 1998)
- Possums are the key wildlife reservoir of TB transmission to cattle

Supershedders and superspreaders

- The “supershedder, superspreader” hypotheses assumes disease transmission is driven by frequency, type and distribution of social contacts among infected and susceptible individuals
- The presence of superspreaders in possums has been clearly demonstrated in a social network analysis of captive possums

- (Corner *et al.* 2003).



Possum social behavior

- (Ji et al. 2005) used proximity data loggers to record individual possum contacts within a distance of 40cm.
- The majority of contacts between male and female possums were deemed to be sexual in nature and occurred during peak breeding season
 - Average of one contact every two days
 - 22% of 414 contacts lasted more than one minute
 - Most contacts lasted 18-26 seconds.
 - Only 2-3% of recorded interactions lasted more than five minutes.
- This study indicates that possums are very anti-social animals

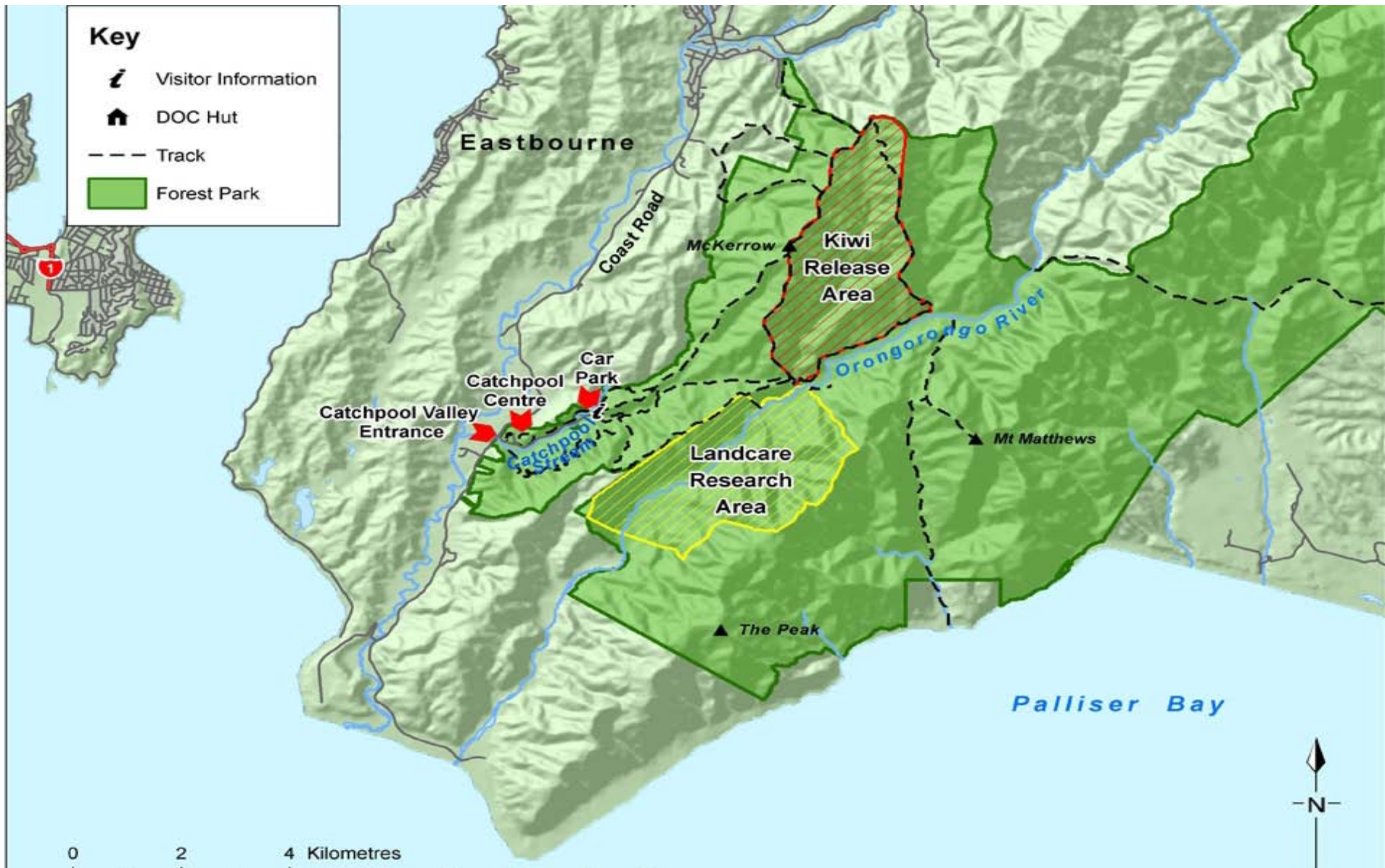


Data collection methods

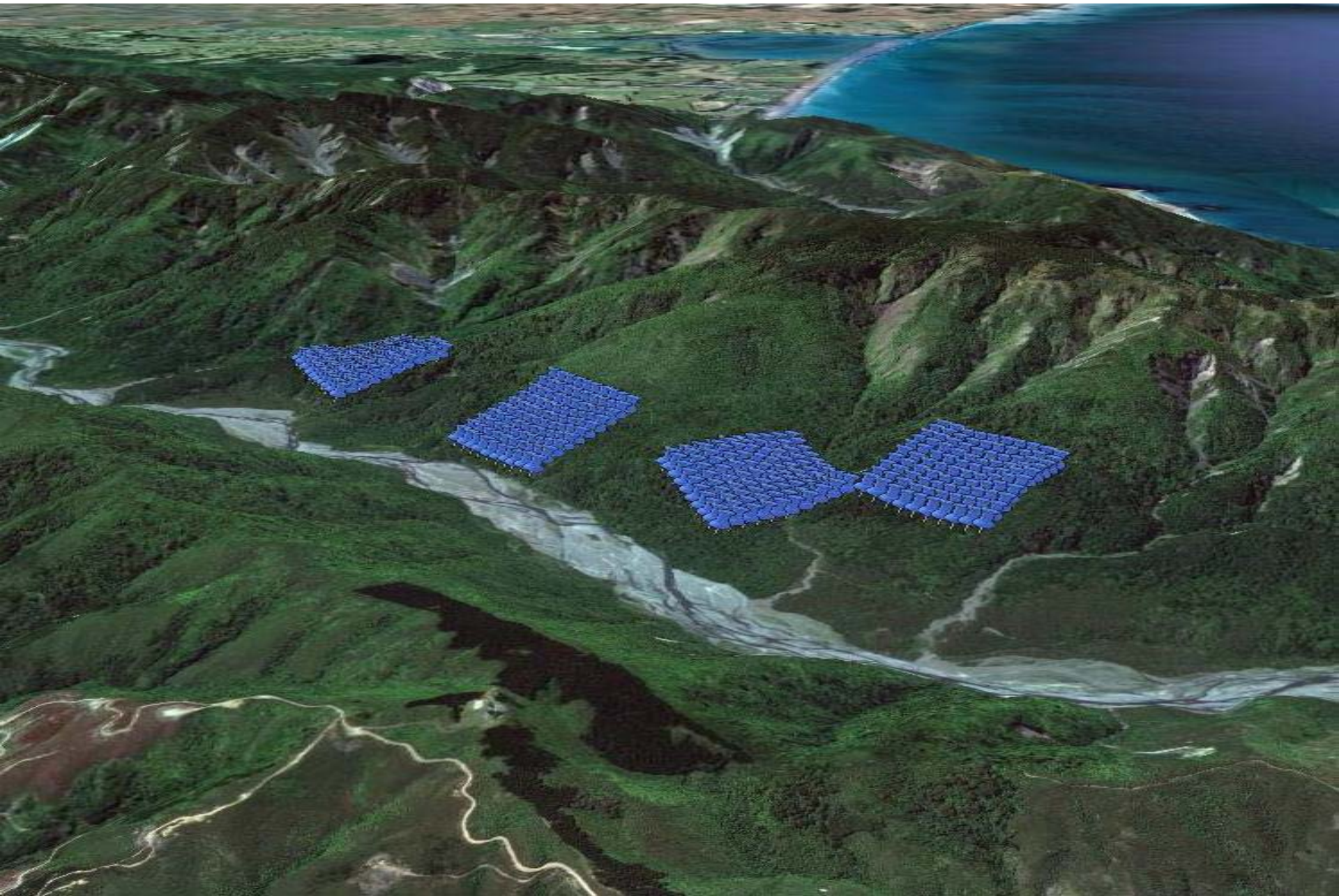
- 40 possums were randomly selected and fitted with SirTrack proximity contact collars from a live capture grid during the months of March and April in the Orongorongo Valley
 - Collars collect:
 - Contact date, time, duration and opposing collar ID
 - Data collection distance is one metre
- Collars were opportunistically downloaded at the grid trap locations over the next six months



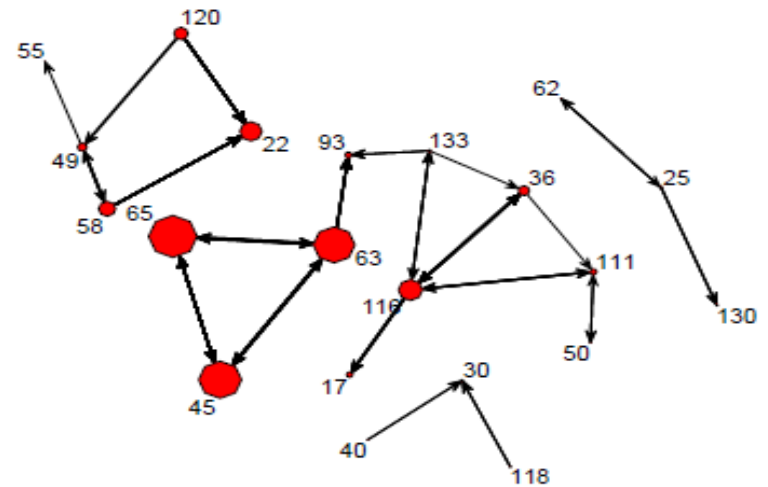
Orongorongo Valley



Orongorongo Valley

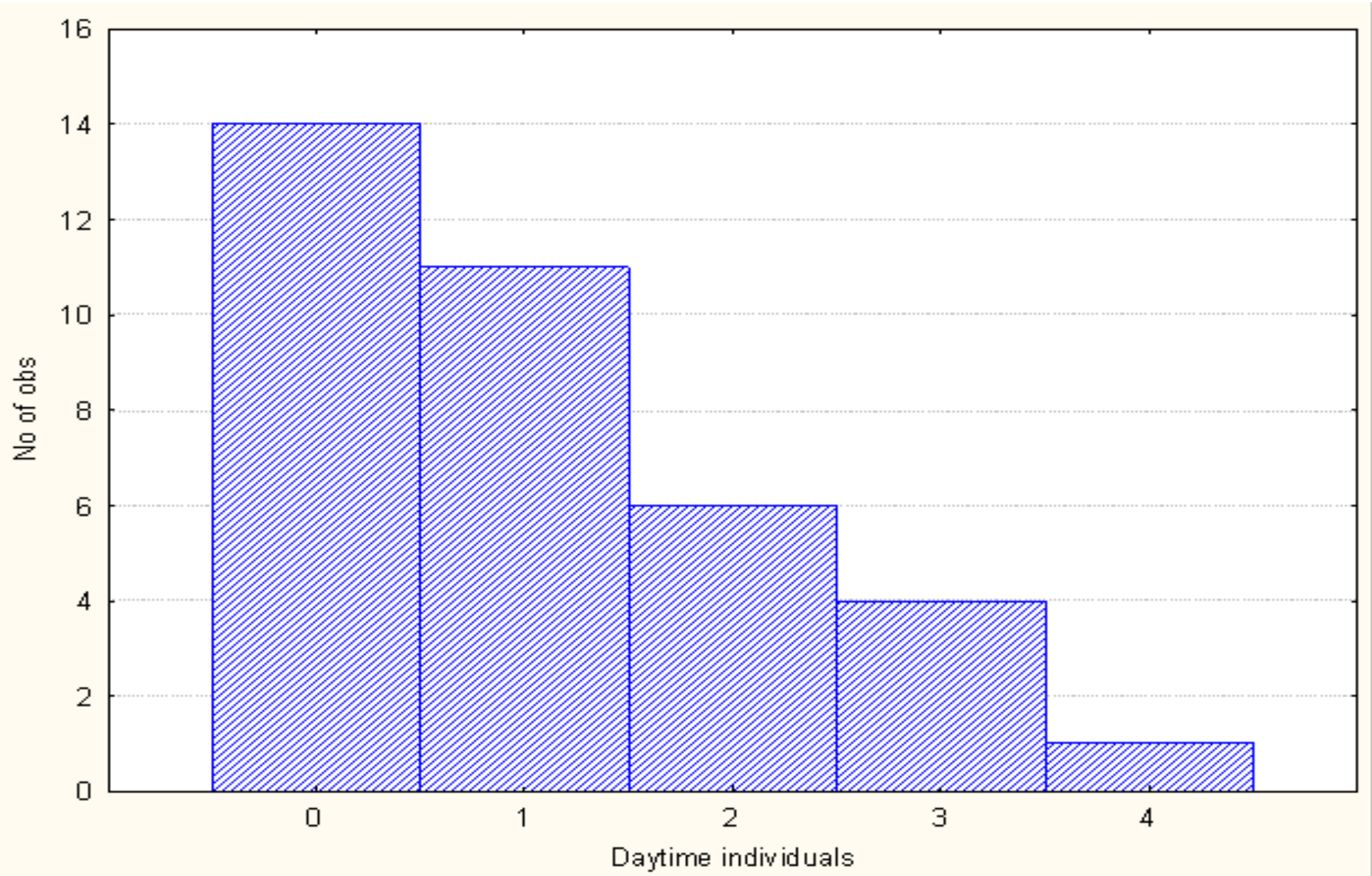


Collection of contact data

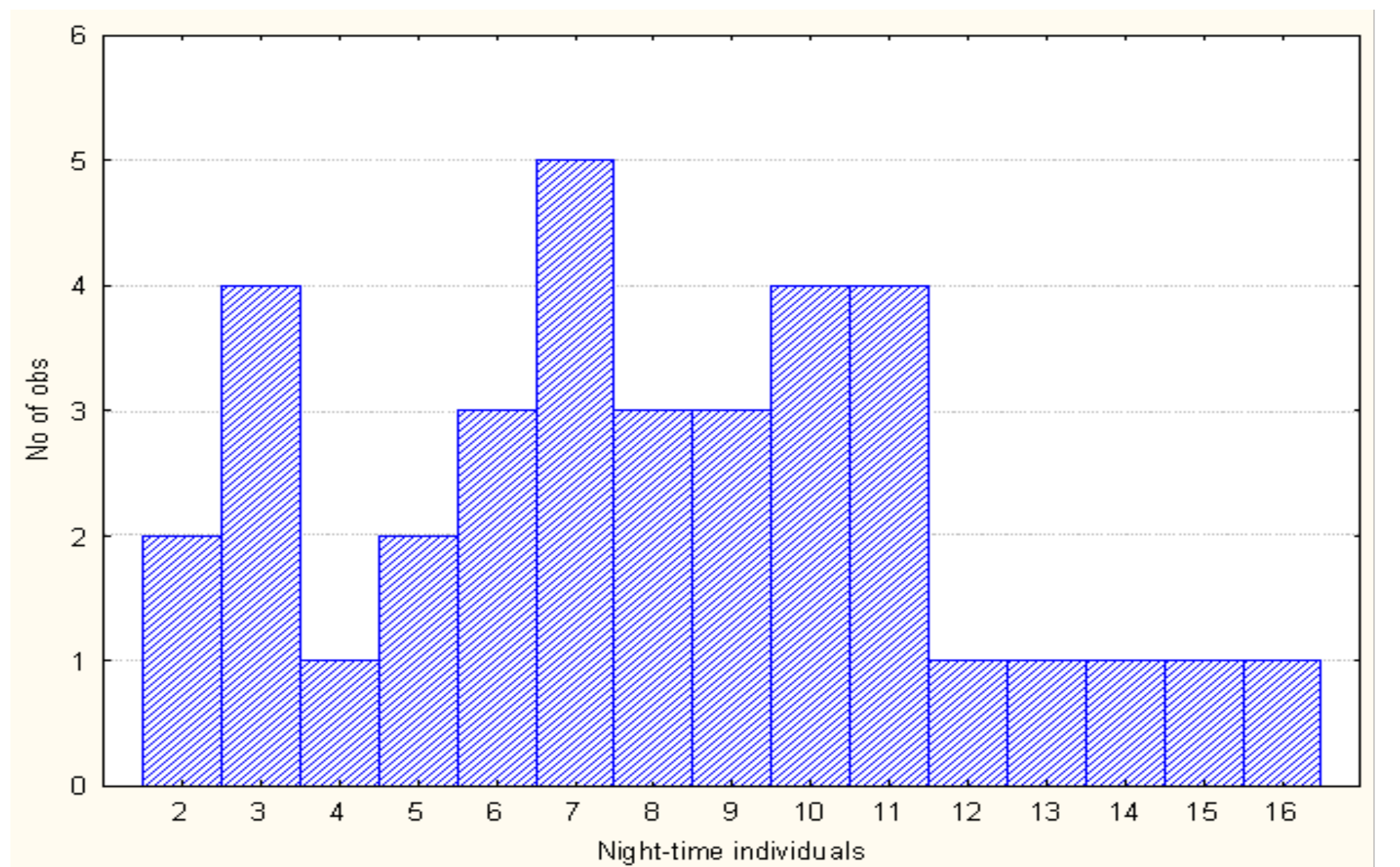


Landcare Research
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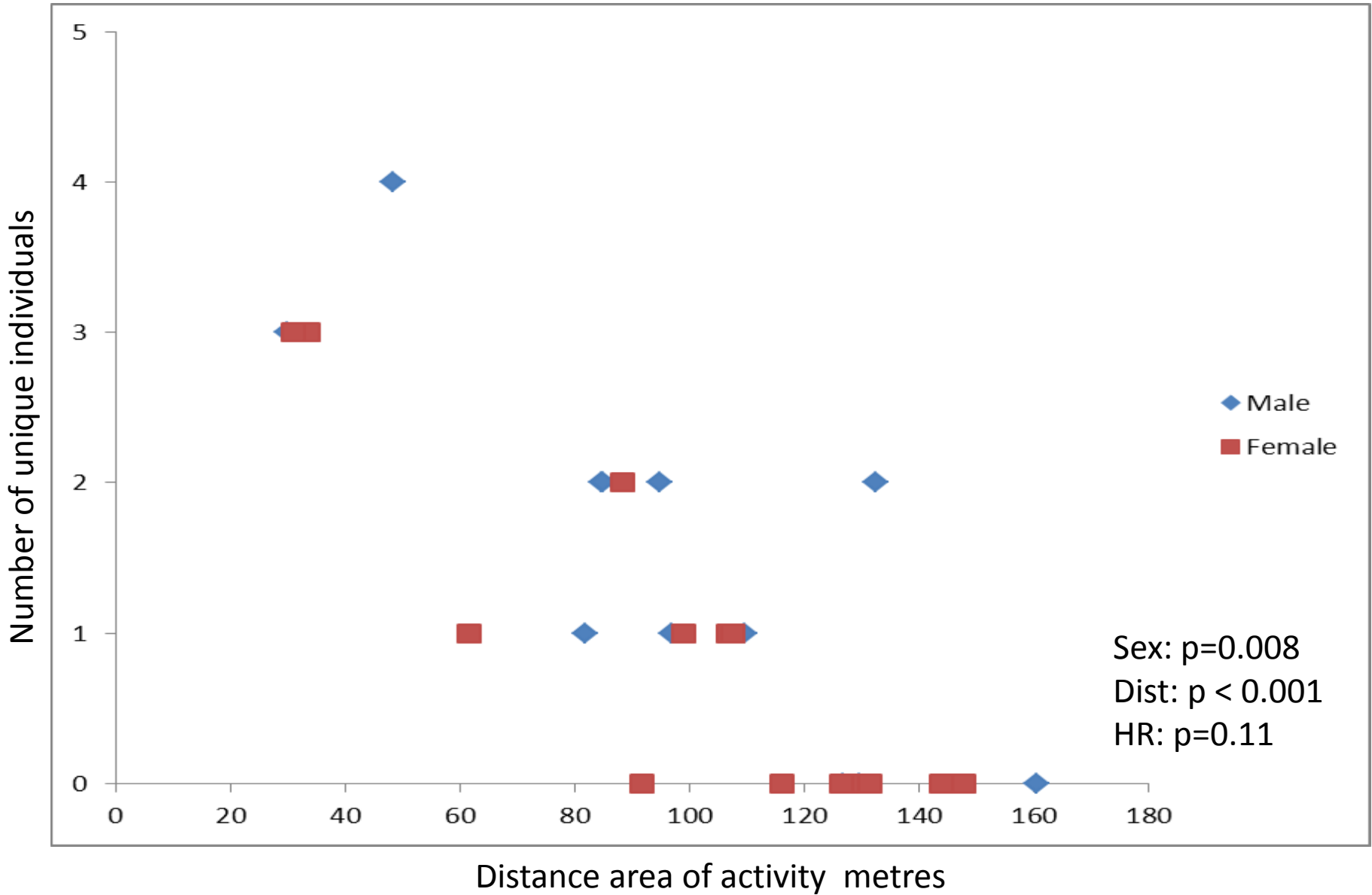
Individuals contacted per individual during daytime activities (denning)



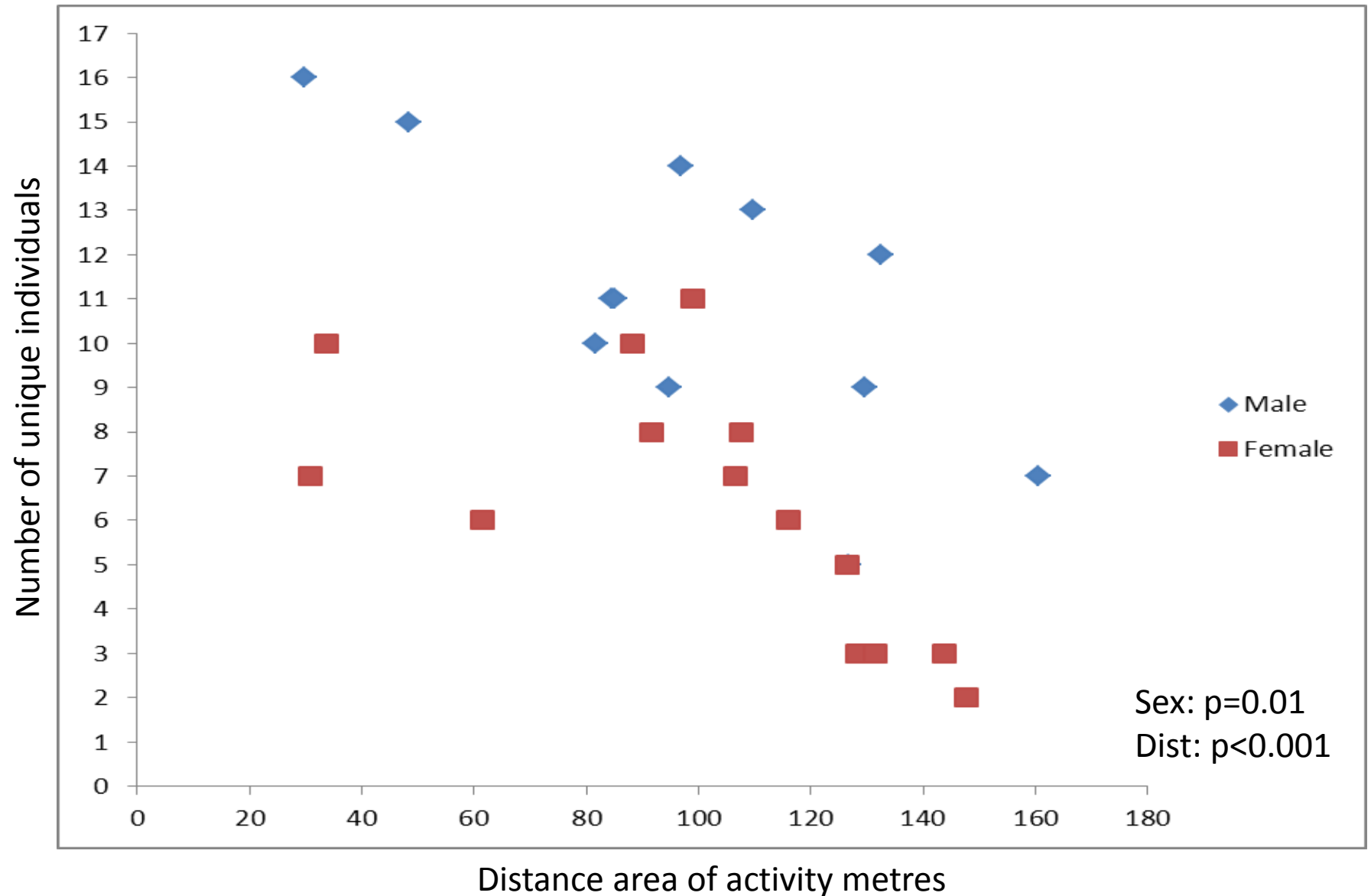
Individuals contacted per individual during night-time activities



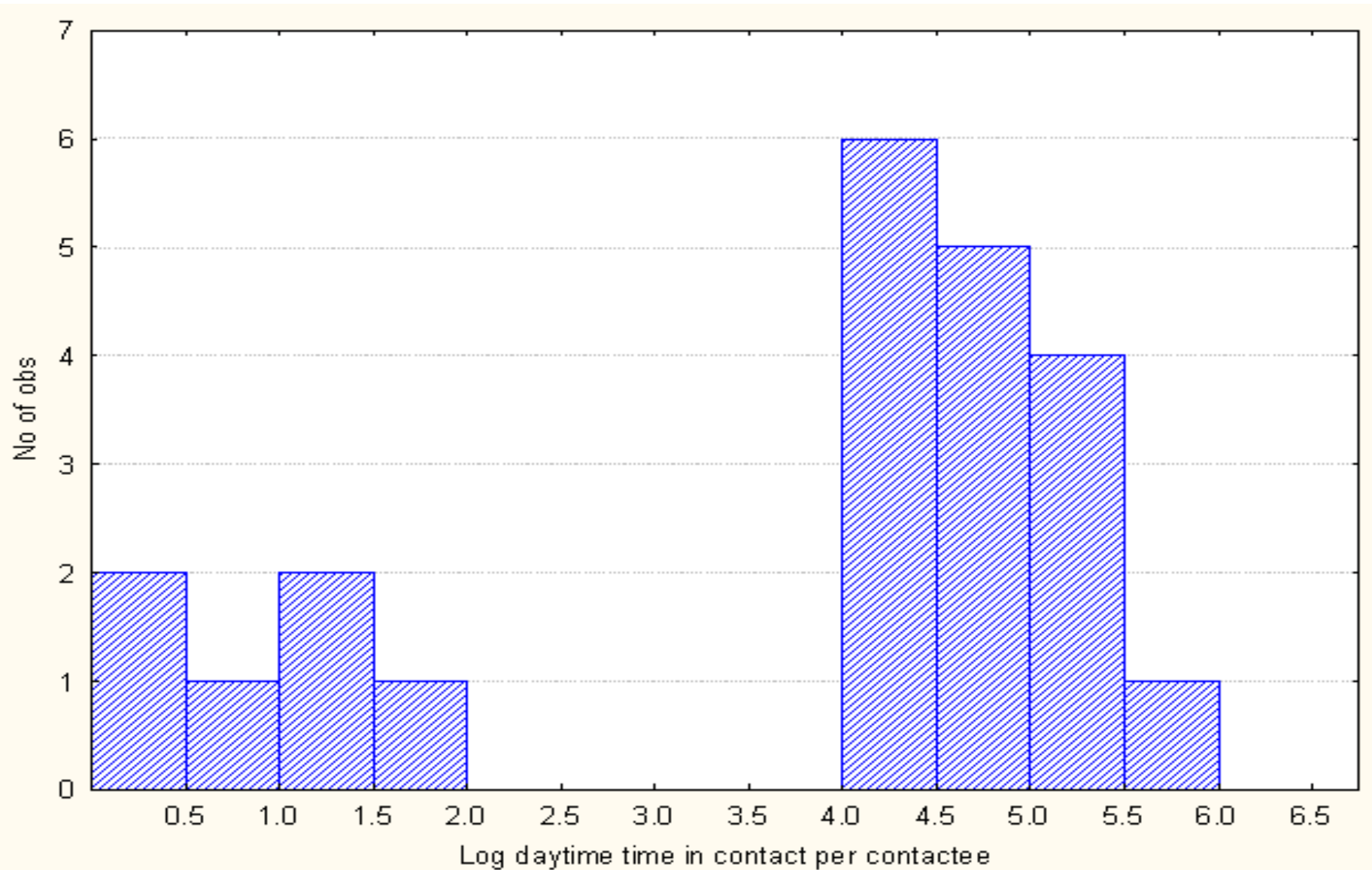
Daytime number of unique individuals contacted



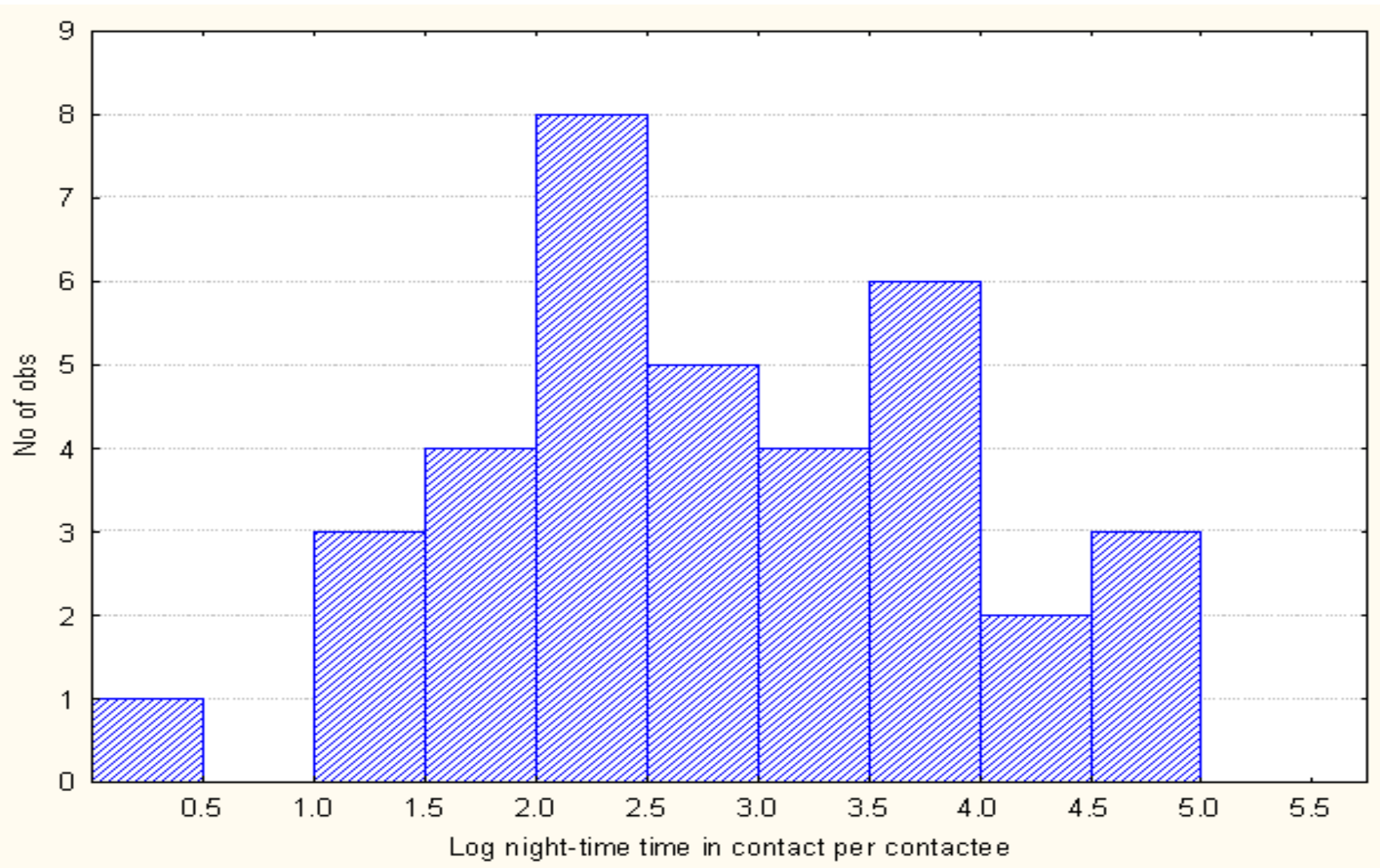
Night-time number of unique individuals contacted



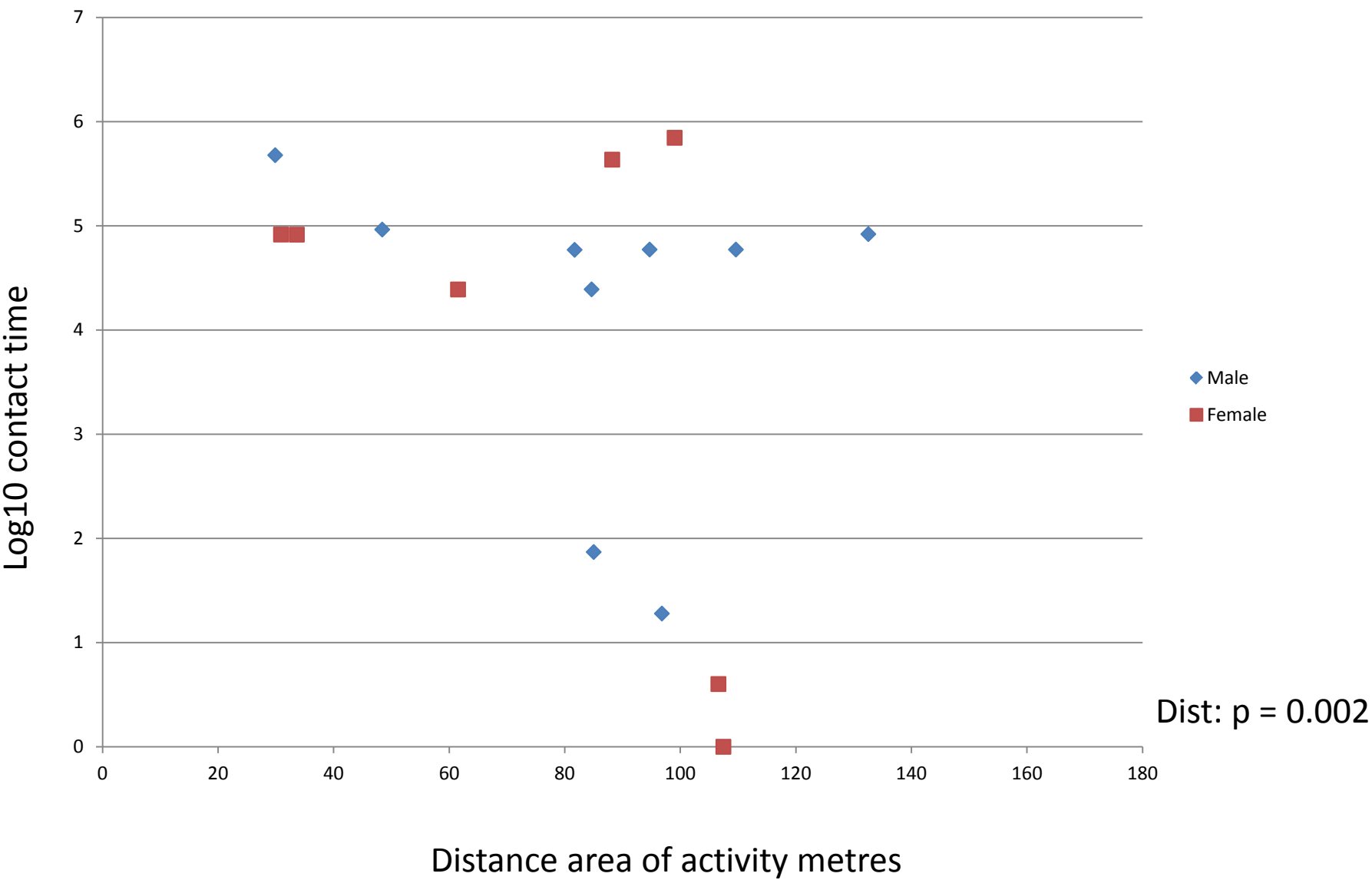
Total length of time in contact per contactee during daytime (denning)



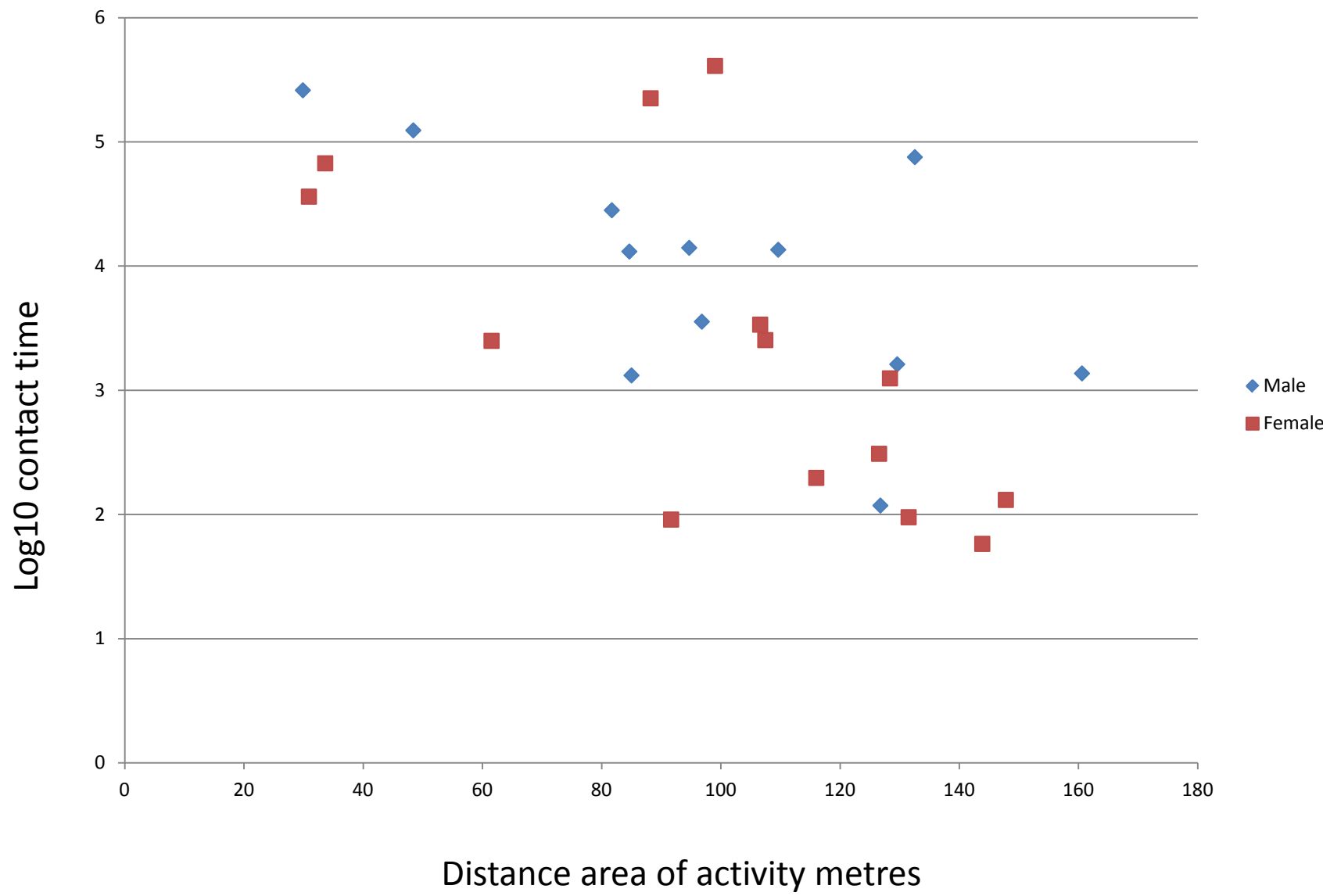
Total length of time in contact per contactee during night-time activities



Daytime log10 duration of contact per contactee



Night-time log10 duration of contact per contactee



Bovine Tuberculosis

- Tb prevalence among possums could have a positive correlation with possum contacts rates
- Mating interactions are the most important mechanism of Tb transmission in possums?

» (Ramsey et al. 2000)



Implications on management

- The cost to the country for host control and disease control alone reaches up wards of \$100m
- Males may be more important drivers of disease spread since they contact more individuals
- Home range overlap appears an important driver for contacts



Next steps

- Our next step will be analysing the contacts at an individual level
- Running the same analysis on the other three grids
- TB incidence and transmission on the grids will be related to the contacts and home ranges



Acknowledgements

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Landcare Research
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