

Associations between wildlife observations, human-tick encounters and landscape features in a peri-urban tick hotspot

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Supplementary Information #1

Here we provide a copy of the online survey made available to Northern Beaches residents. This study was conducted under the approval of The University of Sydney Human Research Ethics Committee (protocol number 2018/157). We created the online survey using REDCap (Research Electronic Data Capture).

Ticks and wildlife in the Northern Beaches

The University of Sydney is conducting a study to better understand how residents and their pets are encountering ticks and wildlife in their backyards. We invite all Northern Beaches residents to participate in our survey.

Coastal bushland remnants and other green spaces across the Northern Beaches are home to a variety of native plants and animals. They also provide a place for residents to enjoy their favourite outdoor pastimes. Paralysis ticks (*Ixodes holocyclus*) are common in the Northern Beaches and have a range of animal hosts to support their lifecycle. Understanding the complex relationship between ticks and their host species is an essential part of our research. The information we gain will contribute to our growing knowledge of ticks and will guide future research efforts.

We aim to identify:

Areas where people are encountering ticks more than others (tick 'hotspots'),

Backyard and landscape features that may influence tick presence, and

Wildlife using backyards and how this might influence tick occurrence

To meet these aims, it is important for you to provide a street address. If you would prefer not to, we ask that you provide your street name and nearest cross street. It is important for us to create a map of tick encounters to understand what landscape features might influence tick presence and where to target future research.

All identifying information will be removed from any data presentations.

The survey should only take approximately 10 minutes and is completely voluntary.

If you have any questions about the project, contact PhD candidate Casey Taylor on [REDACTED] or [REDACTED]. This project is being undertaken by the University of Sydney in association with Northern Beaches Council.

Your participation is greatly appreciated.

This research has been approved by the University of Sydney Human Ethics committee. (Approval no: 2018/157)

Before proceeding, please view the Participant Information Statement:

[Attachment: "Participant Information Statement.pdf"]

Your street address

If you would prefer not to provide your full address, please provide a street name and nearest cross street.

Street address

Nearest cross street

Suburb

Postcode

Your residence

How long have you lived in your current residence?

- Less than 6 months
- 6 months to 1 year
- 1 to 2 years
- 2 to 5 years
- 5 to 10 years
- Over 10 years

Do you live in a:

- Free-standing house
- Townhouse or semi-detached house
- Unit or apartment

Is your yard (including front and backyards):

- Mostly hard surfaces (paved/tiled/ concrete/gravel)
- Mostly wooden decking
- Mix of grass/garden and hard surfaces
- Mix of grass/garden and wooden surfaces
- Mostly grass or garden

Does the building block have:

- Mostly hard surfaces surrounding it (concrete, paving or tiles)
- Half lawns and gardens and half hard surfaces surrounding it
- Mostly lawns and gardens surrounding it
- Not applicable
- Other

What size is your yard (including front and backyards)?

- Small (less than 30m²)
- Medium (30m² to 100m²)
- Large (more than 100m²)
- Other

Does your yard back onto bushland?

- Yes
- No
- Not applicable

Yards & Gardens

Approximately how much time do you spend outside in your yard or garden?

- More than 30 minutes a day
- About 30 minutes a day
- Less than 30 minutes a day
- A few times a week
- A few times a month
- Hardly ever
- Not applicable

If you have a lawn, is it:

- Regularly mown (every week or fortnight)
- Mown as required (fortnightly or so in summer and less in winter)
- Hardly ever mown
- Never mown
- I don't know
- Not applicable

Does most of your garden (or the garden around your building) get watered:

- Frequently (more than once a week when weather dry)
- Occasionally (a few times a month when its dry)
- Hardly ever
- Never
- I don't know
- Not applicable

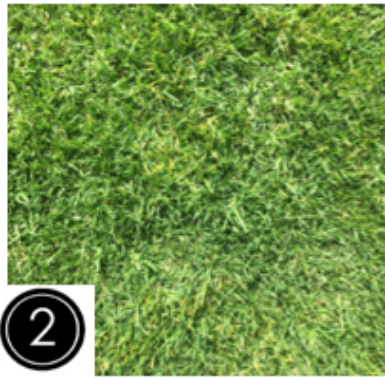
Yard & Gardens - leaf litter

Leaf litter includes fallen leaves, twigs and bark.



1

Lawn dry with minimal leaf litter



2

Lawn lush no leaf litter



3

Minimal leaf litter cover



4

Moderate leaf litter cover



5

Dense leaf litter cover

If you have a lawn, which of the above images best represents MOST of your lawn, most of the year.

- 1
- 2
- 3
- 4
- 5
- Not applicable

Mulch

Are mulch or wood chips used on your garden?

- Yes
- No
- I don't know
- Not applicable

If you answered 'Yes' to the previous question, could you tell us what type of mulch?

E.G. wood chips, pine bark mulch, shredded leaves, sugar cane mulch.

What is the approximate area in your garden under mulch and/or woodchips?

- Less than 5m²
- 5 - 10m²
- 10 - 20m²
- Over 20m²
- I don't know

Please answer the following questions considering your current residence within the past two years only (or less depending on how long you have lived there).

Pest control

Have you sprayed or had your yard or garden sprayed with insecticide? Yes
 No
 I don't know
 Not applicable

Have you had your yard or garden professionally sprayed with insecticide targeted at tick control? Yes
 No
 I don't know
 Not applicable

Have you had any rodent control on your property within the past two years? Yes
 No
 I don't know
 Not applicable

E.G. rat poison, trapping.

What kind of rodent control was used and how frequently? _____

Ticks

Have you (or any other residents of your home) found a tick on yourself after being in your yard or garden?

- Yes
 No

How often have you (or any other residents of your home) found ticks on yourself after being in your yard or garden?

- Daily
 Consistently (once a week)
 Regularly (monthly)
 Occasionally (a few times a year)
 Just once
 Not applicable

Tick Bite

Have you (or any other residents of your home) suffered from a tick bite?

- Yes
- No
- I don't know

Did you seek medical attention following the tick bite?

- Yes, I went to my general practitioner (GP)
- Yes, I went to the hospital
- No, I never sought medical attention following a tick bite
- I can't remember

Did you experience any symptoms following the tick bite?

If so, please select the answer which best describes your experience.

- Mild local reaction confined to the skin: redness/swelling/itching around the bite
- Large local reaction confined to the skin: large swelling and inflammation/a rash around the bite lasting several days
- Systemic illness: fever, headache, nausea within 48 hours of tick bite
- No noticeable symptoms

For each of the following animals, please indicate how often (if at all) you have observed them in your yard in the past two years?

Please select an answer for each animal (one answer per row).

	Daily	Consistently (once a week)	Regularly (monthly)	Occasionally (a few times a year)	Just once	Never
Possum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bandicoot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wallaby	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blue-tongued lizard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rabbit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fox	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brush-turkey	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In your opinion, is any part of your yard accessible to the following types of animals?**You can select multiple answers per row, if it applies to your yard.**

	Animals that can climb (e.g. possum/rat)	Ground-dwelling animals that can fit through/under gaps (e.g. bandicoot/rabbit)	Animals that can jump over small fences/hedges (e.g. wallaby/fox)
Front yard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Back yard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Pets

Do you own a cat or a dog?

- Cat
- Dog
- Both
- Neither

Cats

Is your cat/s outside in your yard:

- Most of the time (day and night)
- Only during the day (inside at night)
- Only at night (inside during the day)
- Hardly ever

Have you ever found a tick on your cat?

- Yes
- No

How often do you find ticks on your cat?

- Daily
- Consistently (once a week)
- Regularly (monthly)
- Occasionally (a few times a year)
- Just once

Dogs

Is your dog/s outside in your yard:

- Most of the time (day and night)
- Only during the day (inside at night)
- Only at night (inside during the day)
- Hardly ever

Have you ever found a tick on your dog?

- Yes
- No

How often do you find ticks on your dog?

- Daily
- Consistently (once a week)
- Regularly (monthly)
- Occasionally (a few times a year)
- Just once

Pets - continued

Do you use any tick repellent or treatment on your pet?

- Yes
- No
- I don't know

E.G. tick collar, chewable tablets, spray or topical spot treatment.

Do you leave any pet food out at night?

- Always
- Sometimes
- Never
- I don't know

Contact details and future involvement

If you would like to be contacted about the outcomes of the survey please provide an email address and/or phone number.

Name _____

Email address _____

Phone number _____

Future field research will be conducted in backyards and adjacent bushland to further understand wildlife and tick activity in backyards.

If you would like your backyard involved in our research please provide your name and contact details.

Name _____

Email address _____

Phone number _____