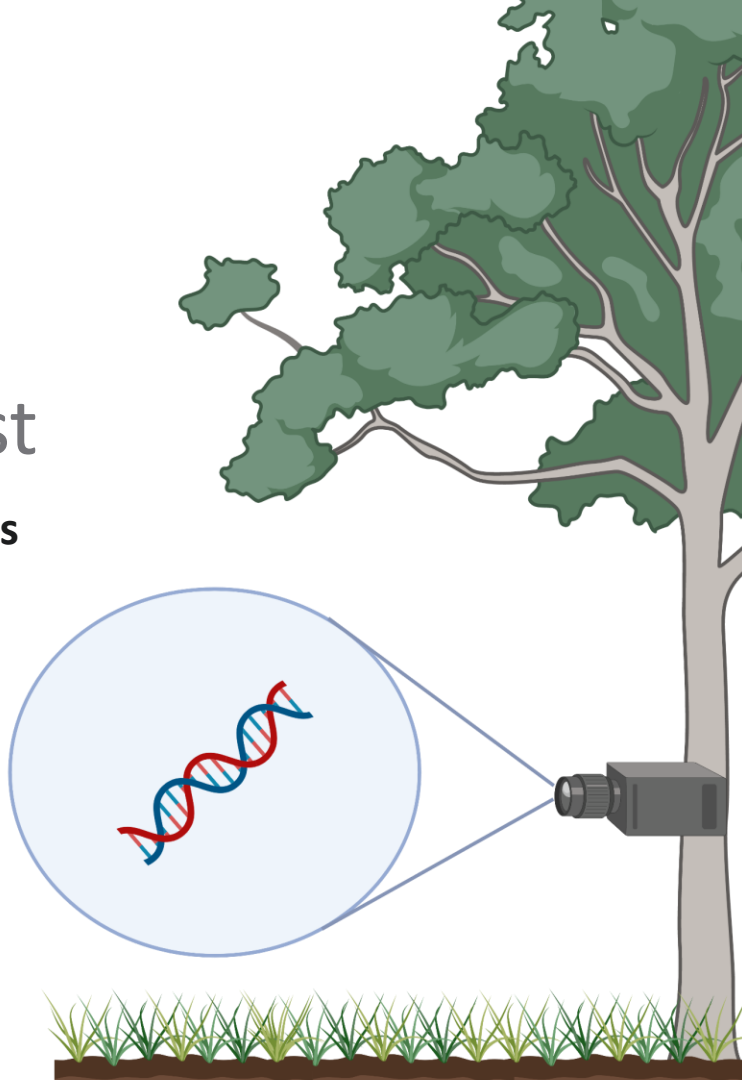
Putting airborne eDNA to the test

Assessing environmental influences and capture methods

Dr Rachel Tulloch & Dr Erin Hahn (she/her)
Australian National Wildlife Collection

Co-authors: Kye Robinson, Mustafa Musameh, Vivek Raj Shrestha, Yen Truong, Nunzio Knerr



This work was performed on the lands of the **Ngunnawal** and **Ngambri** people.

Airborne eDNA: Game-Changer

Or Just Hot Air?

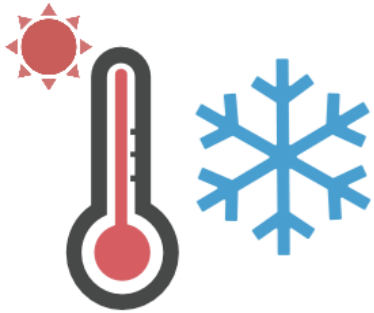
Making airborne eDNA work for species monitoring

Aims:

1. Understand Airborne eDNA Ecology
2. Optimise Airborne eDNA Capture




Environmental influence on degradation



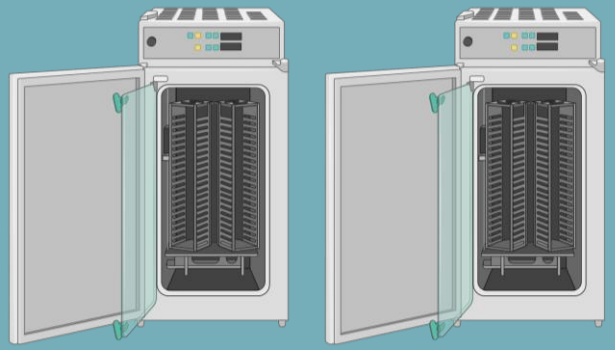
Aim 1: Understand Airborne eDNA Ecology

Airborne eDNA degradation simulation

Exposure Conditions

23°C

40 °C



Duration

0 – 180 Days

UV Exposure

100%

50%

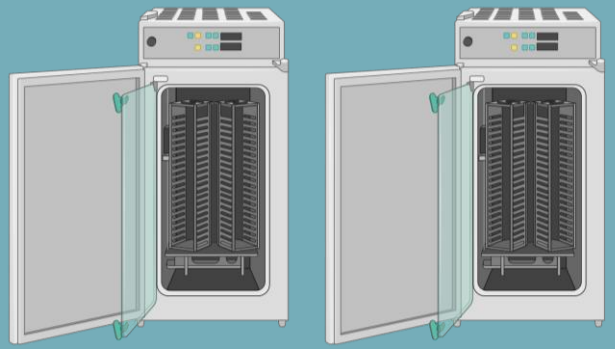
0%

Airborne eDNA degradation simulation

Exposure Conditions

23°C

40 °C



Duration

0 – 180 Days

UV Exposure

100%

50%

0%

Capture Substrates

Liquid

- Lysis buffer
- Polyethylene glycol
- 0.1% formalin

Dry

- 3M Furnace Filter
- Activated-C cloth (w & w/o coating)
- Electrospun nanofiber (w & w/o chitosan)

Simulated airborne particulate

Porcine meat meal

Australian Government
Department of Industry, Innovation and Science

Species specific assay

Confidence in assay specificity

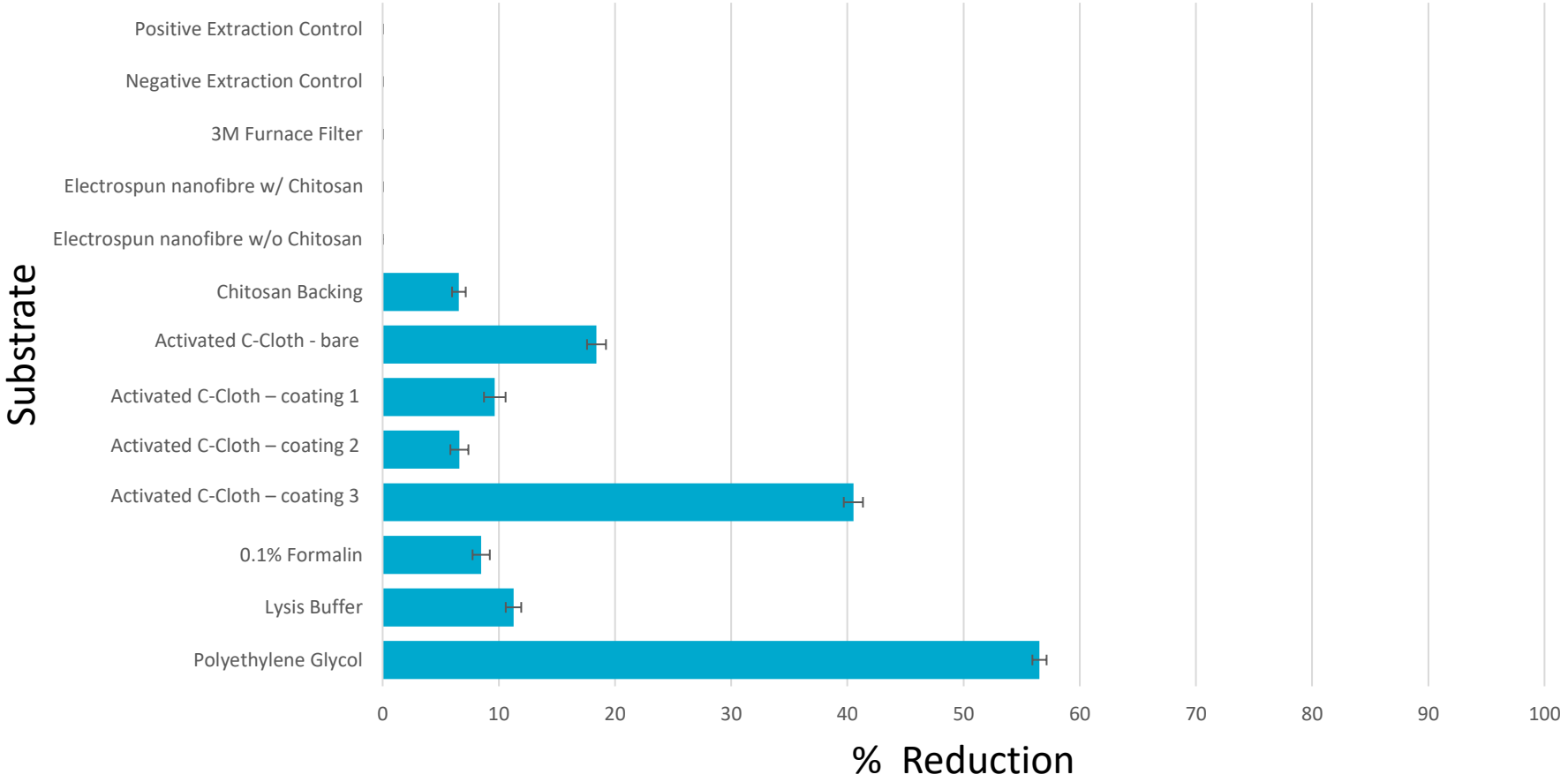
Certified reference material

Allows for absolute quantification and LoD

Robustness Testing

Power analysis and inhibition Analysis

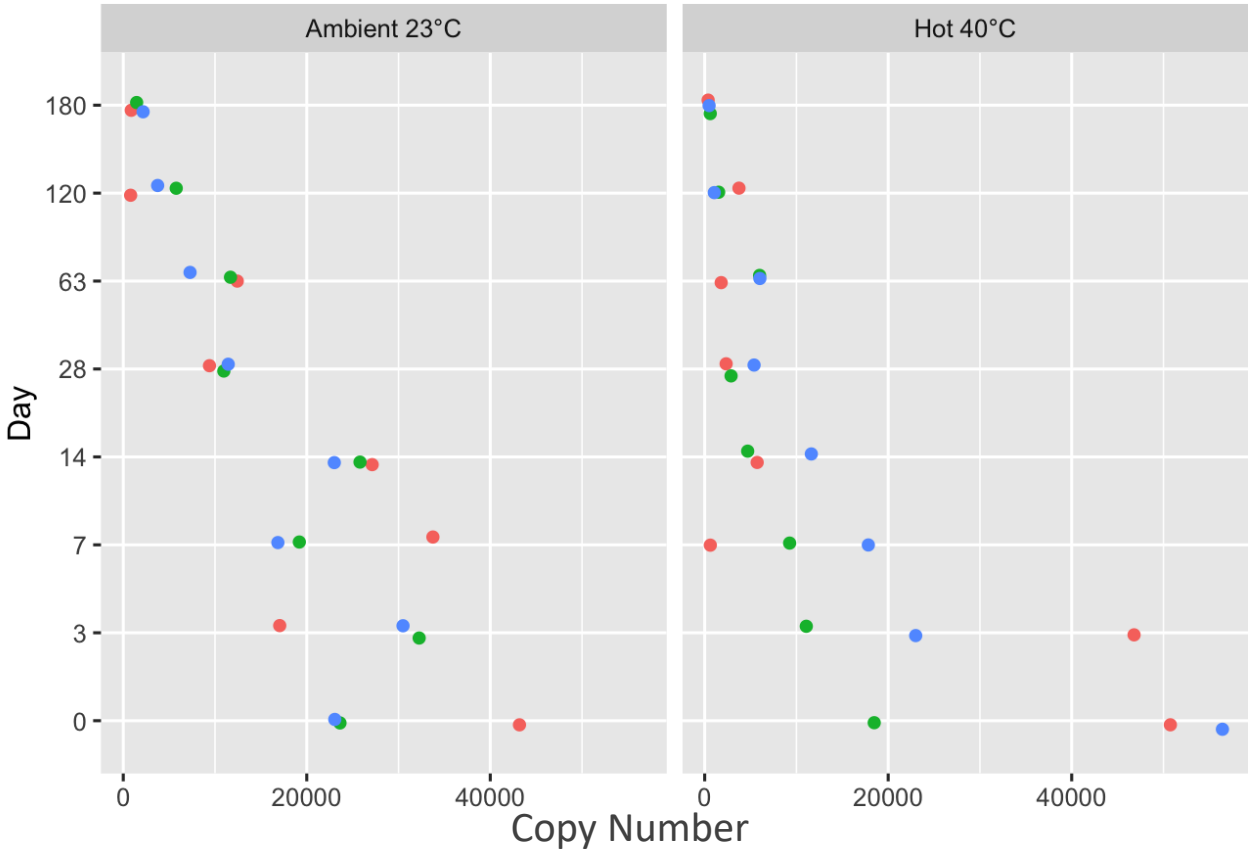
Capture Substrate qPCR inhibition



Time, Temperature & UV

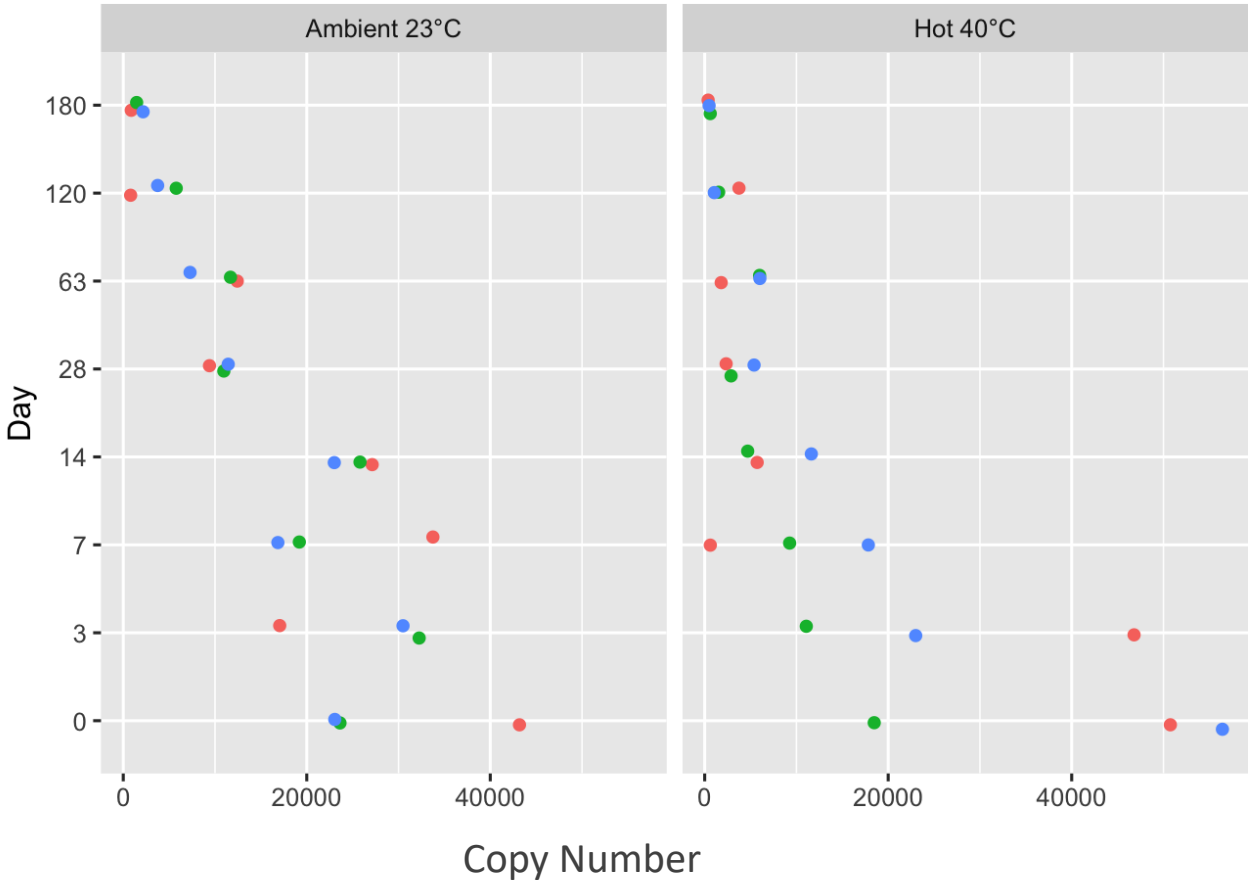
Positive Extraction Control

Time, Temperature & UV



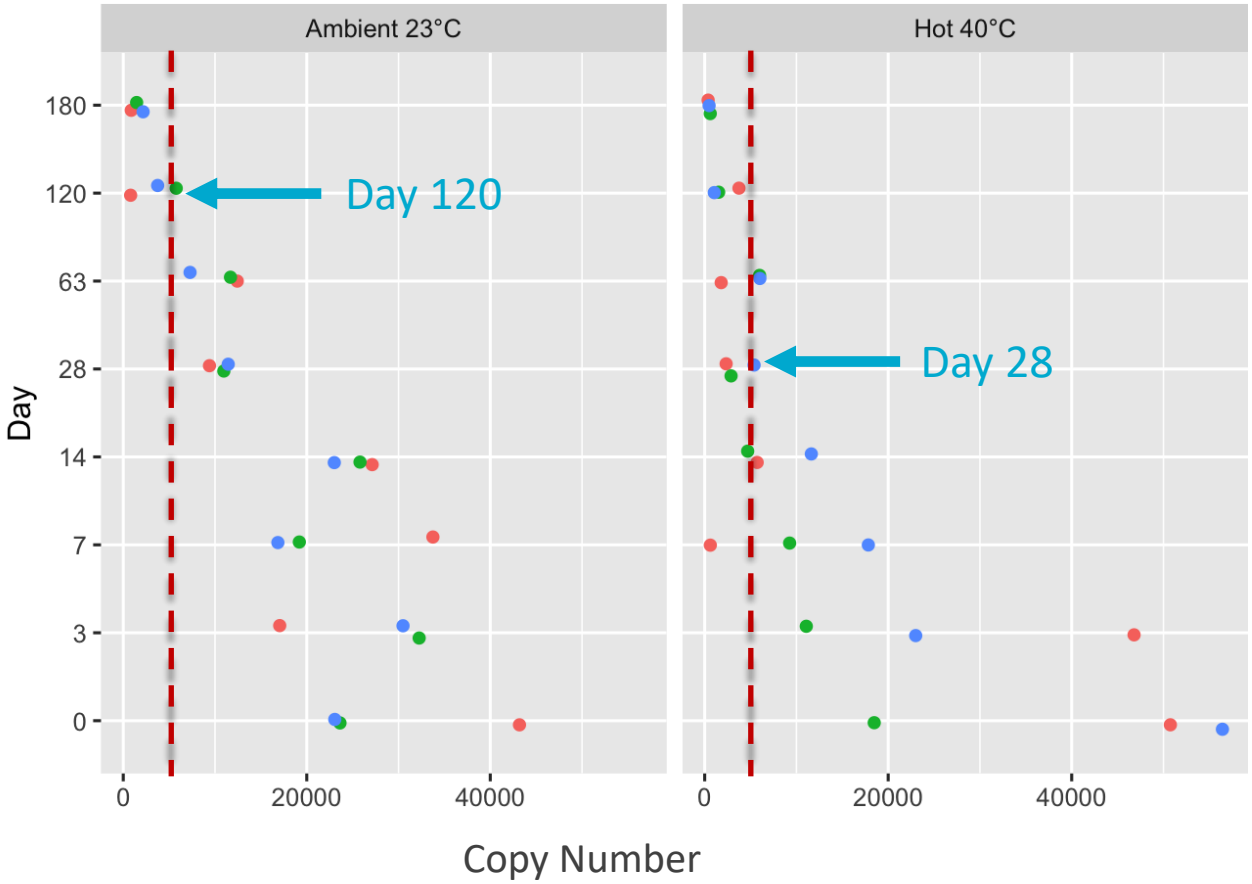
Positive Extraction Control

Time, Temperature & UV



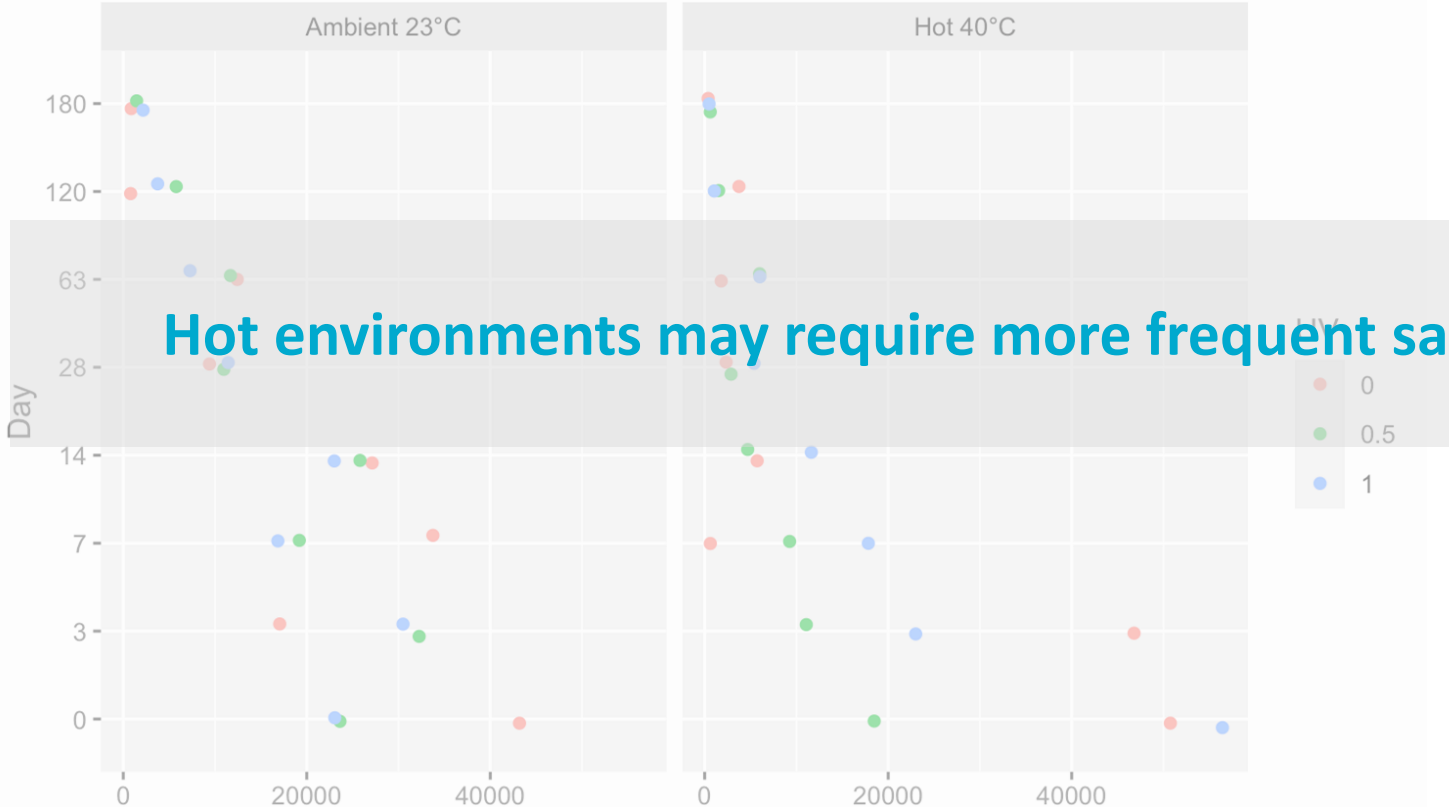
Target signal decreases with time

Time, Temperature & UV



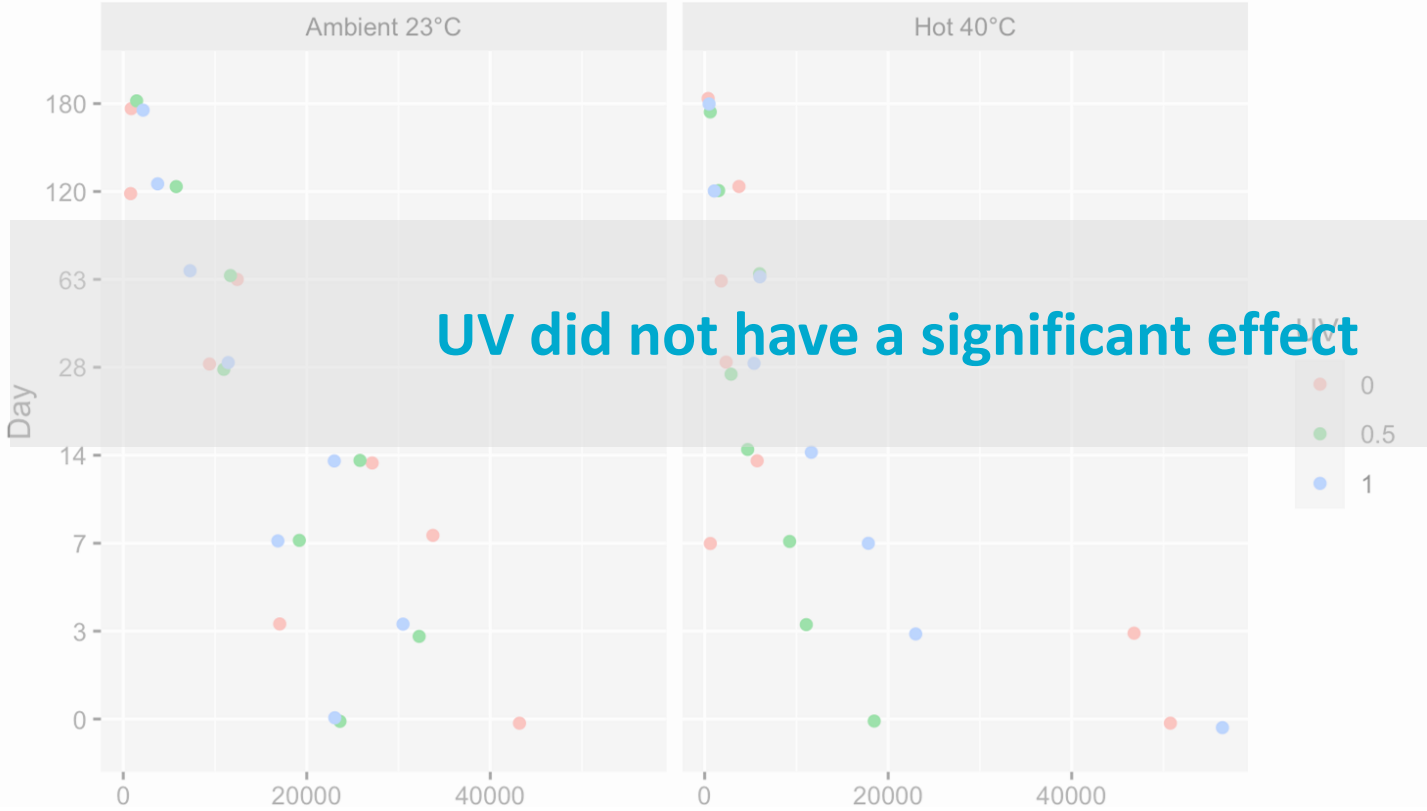
Target signal falls below **Limit of Detection (LOD)** earlier at higher temperature

Time, Temperature & UV



Hot environments may require more frequent sampling

Time, Temperature & UV

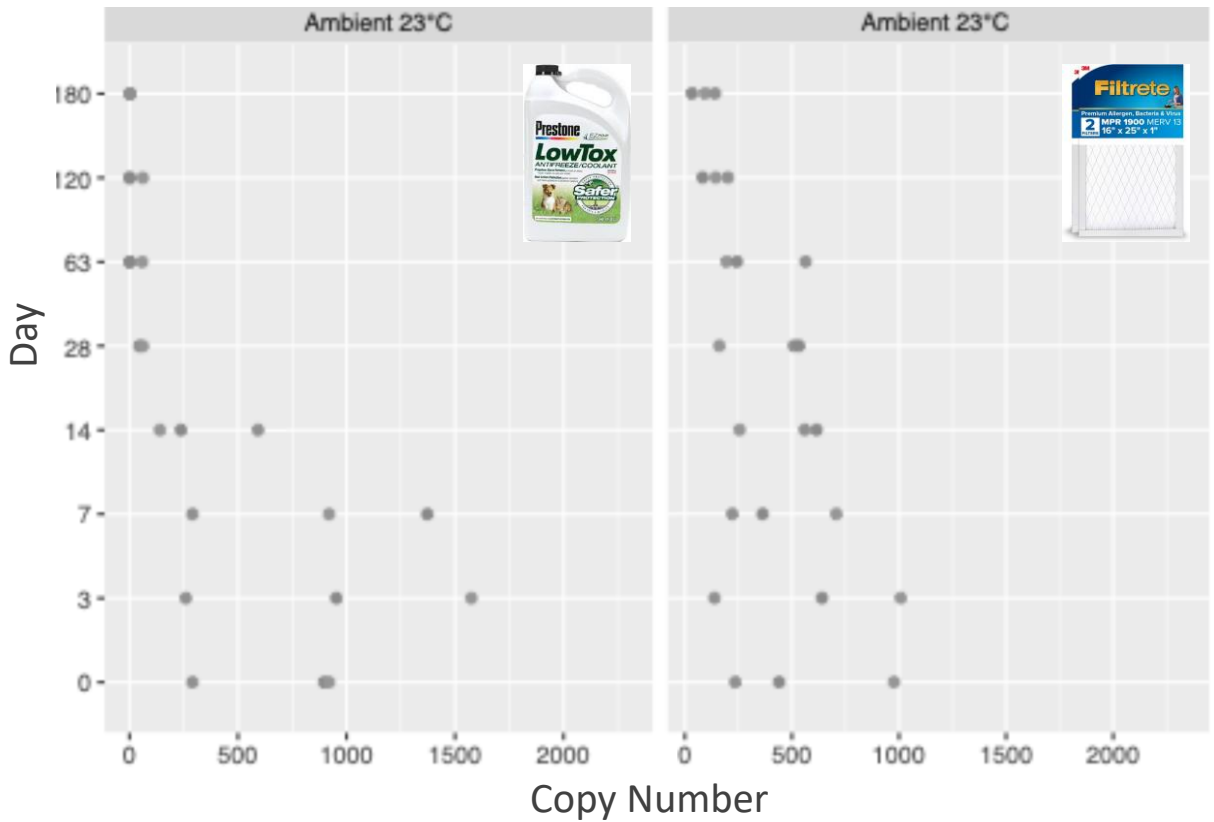


UV did not have a significant effect

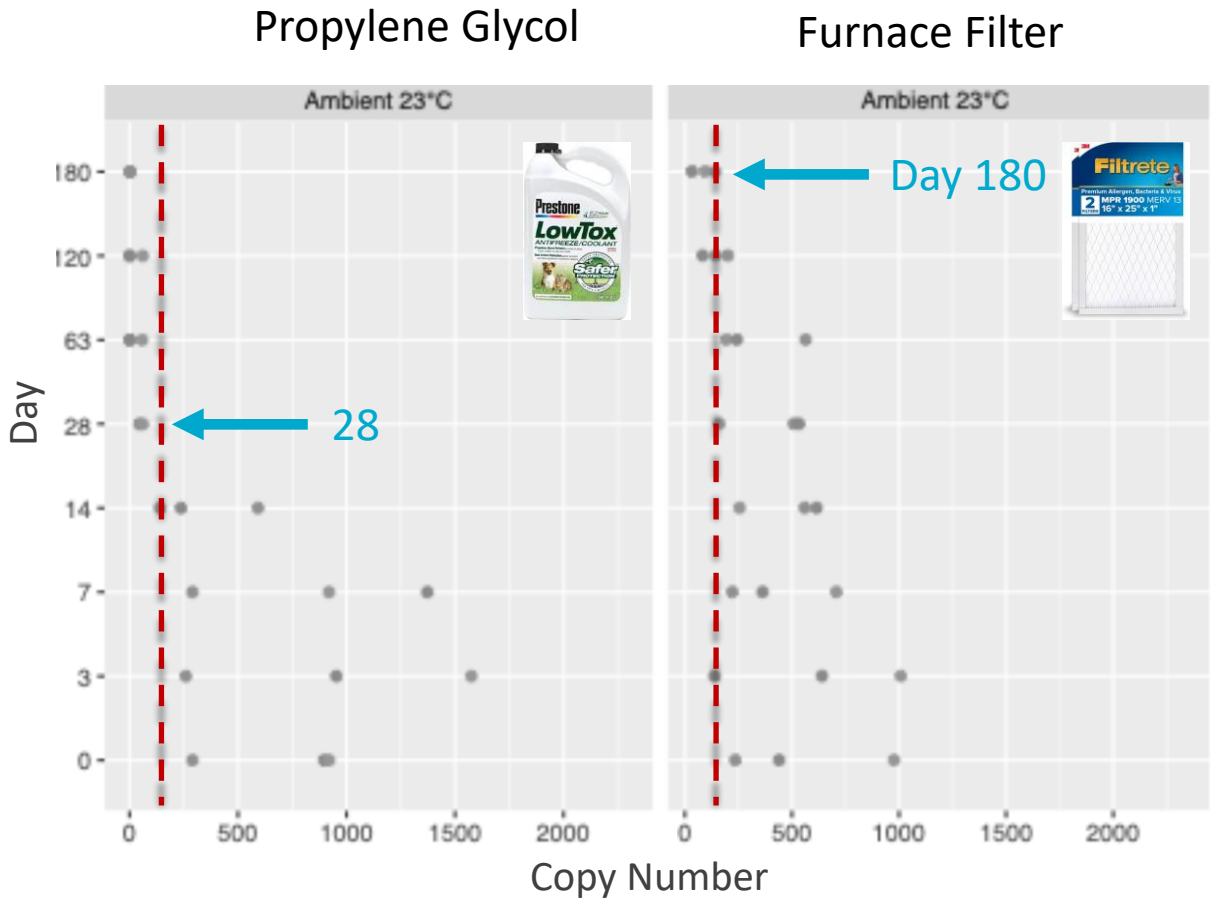
Capture substrate

Propylene Glycol

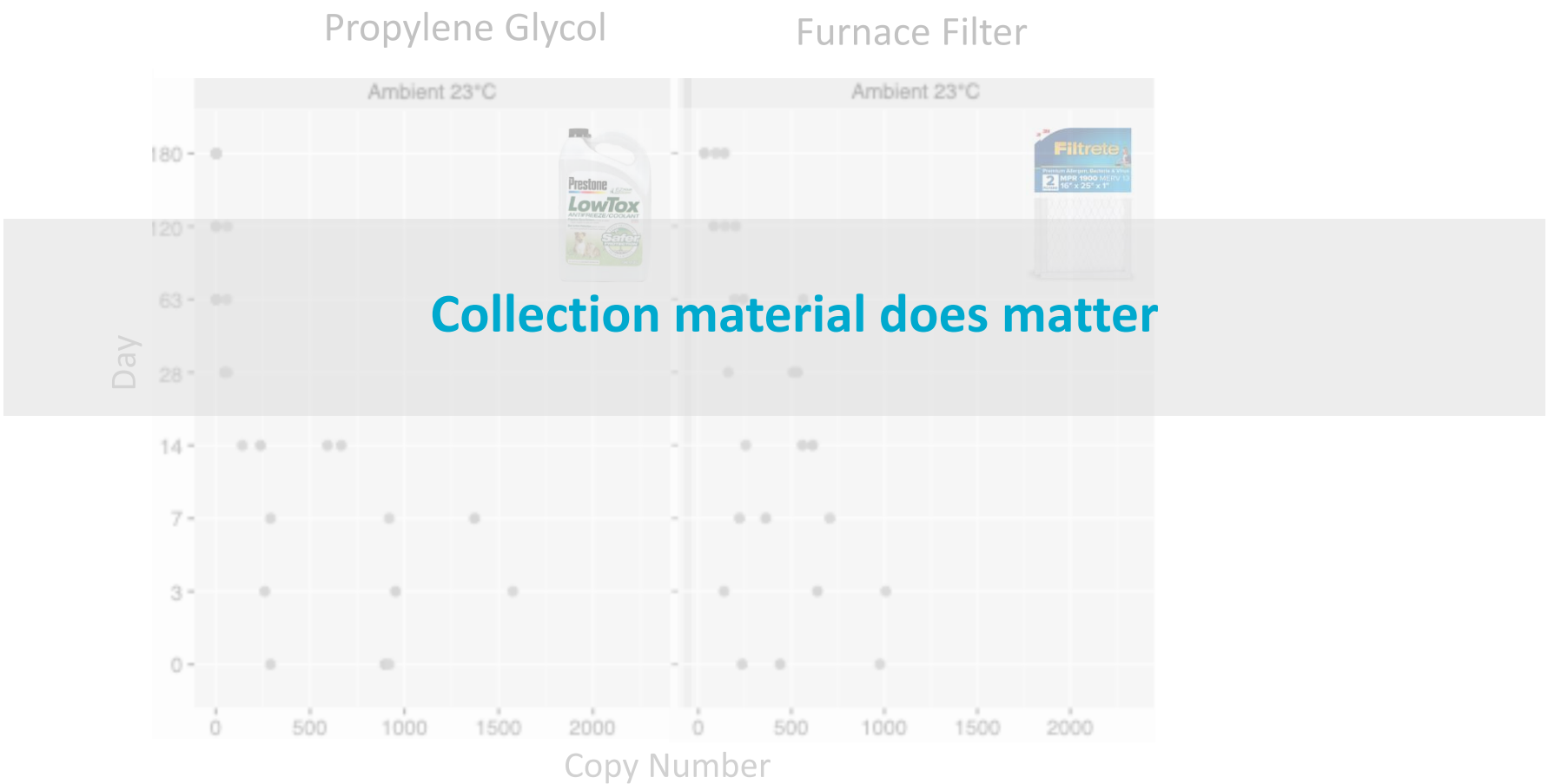
Furnace Filter



Capture substrate

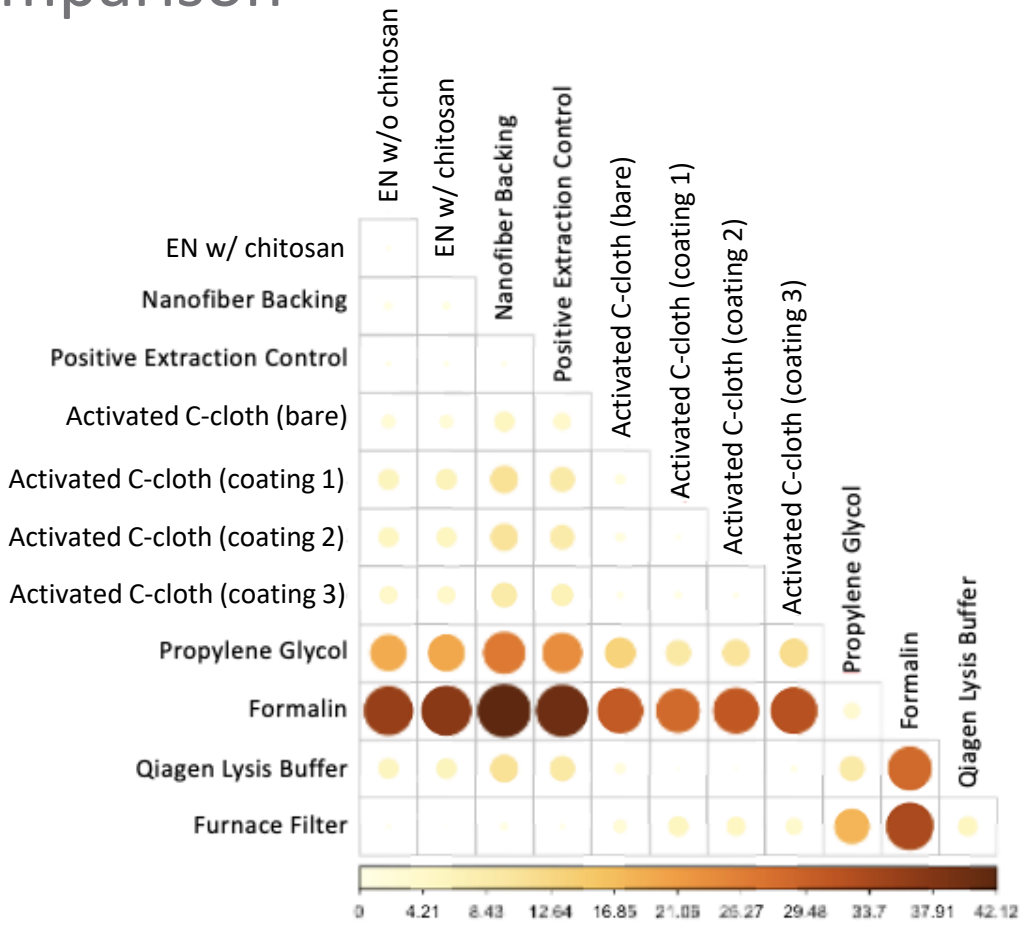


Capture substrate

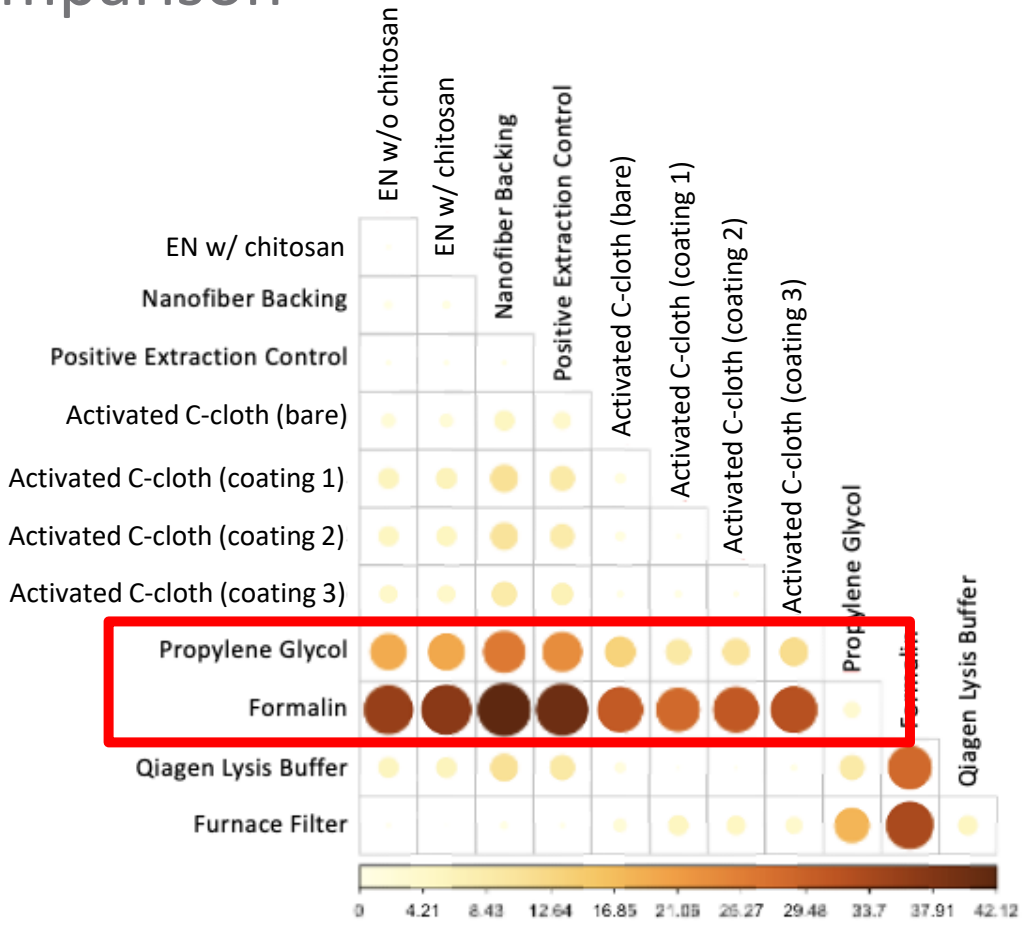


Collection material does matter

Substrate comparison

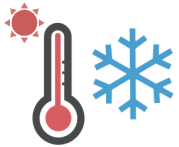


Substrate comparison



Putting airborne eDNA through its paces

Airborne eDNA is persistent



Temperature matters

UV doesn't seem to matter

Capture substrate matters

Aim 1: Understand Airborne eDNA Ecology

Passive field capture methods

Aim 2: Optimise Airborne eDNA Capture

Passive field capture methods

Filter size

Deployment length

Aim 2: Optimise Airborne eDNA Capture

Passive field capture methods

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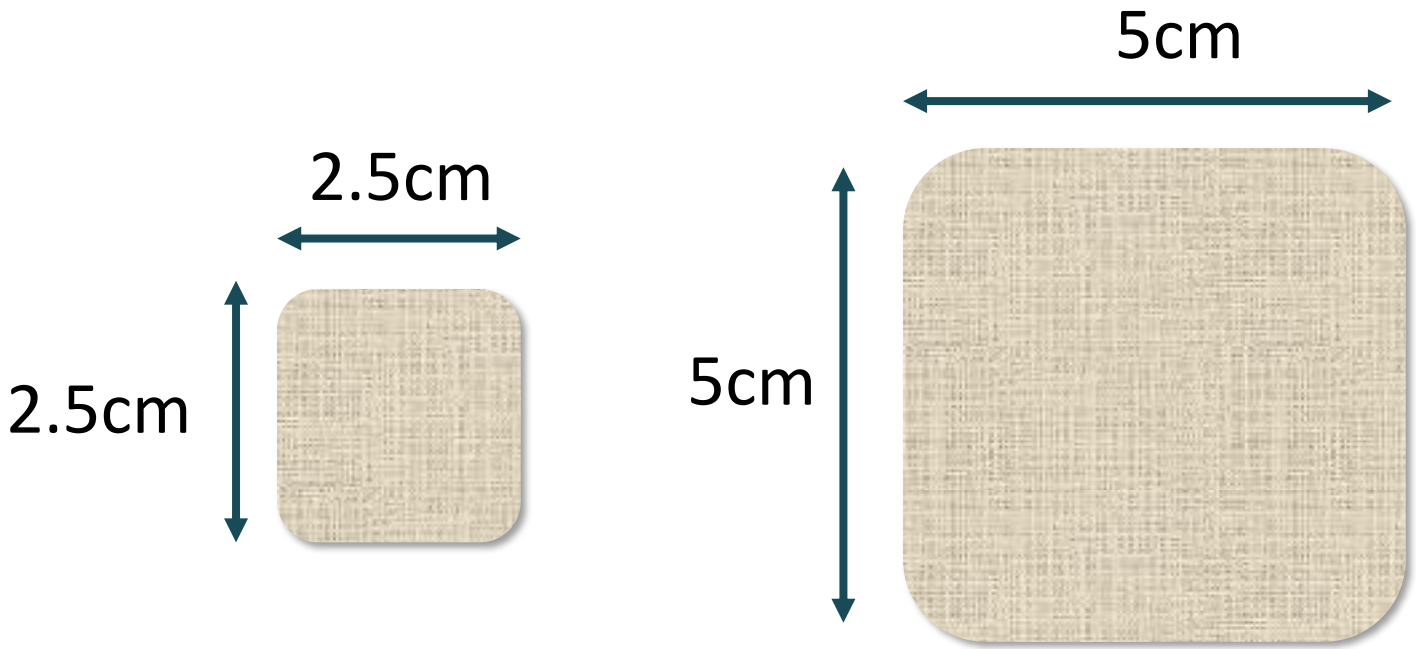
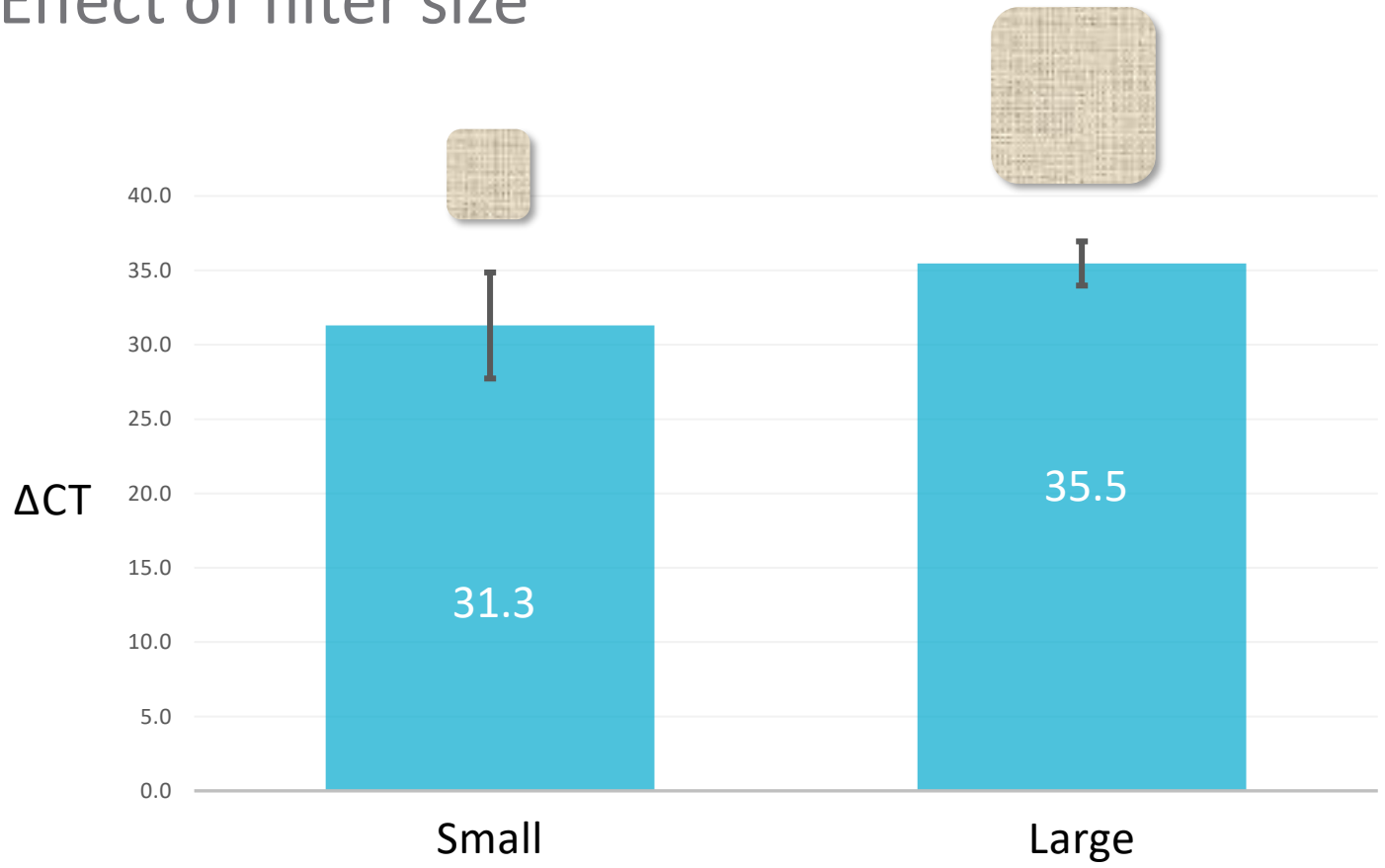
Aim 2: Optimise Airborne eDNA Capture

Effect of filter size



Effect of filter size



Effect of filter size

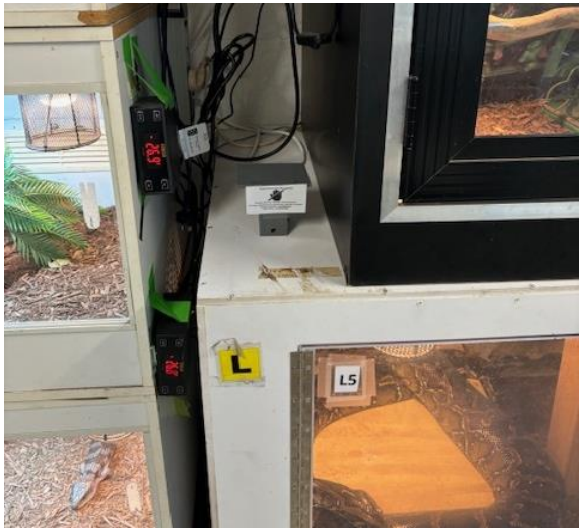
Smaller size is fine

(or at least it isn't worse)

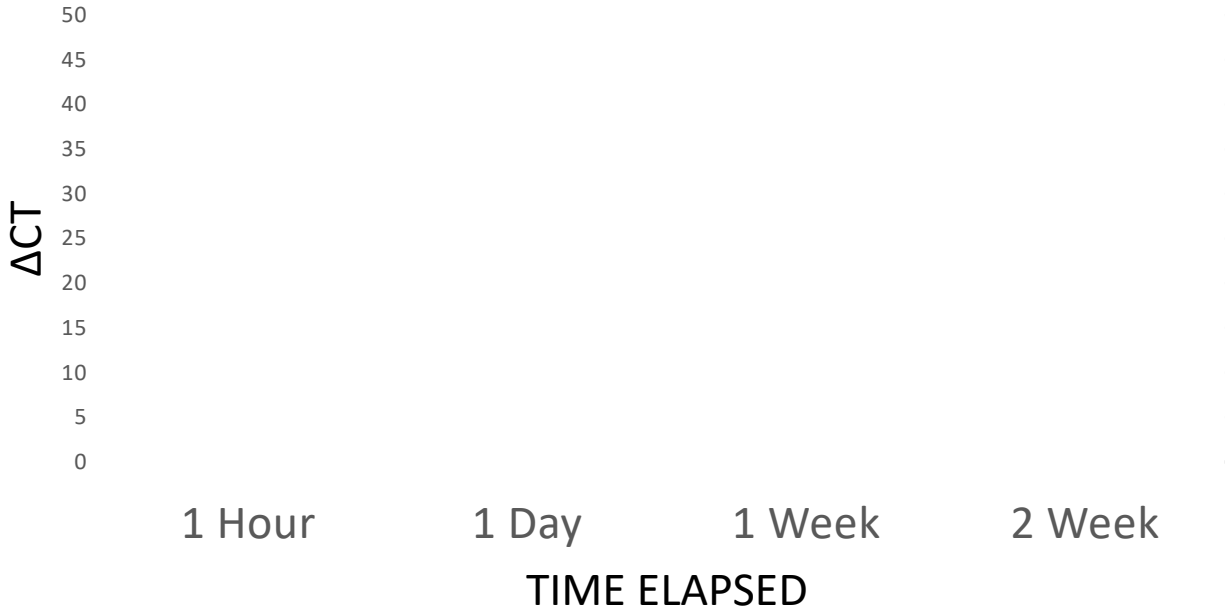
Airborne eDNA Trail Cam

Download 3D printing files!

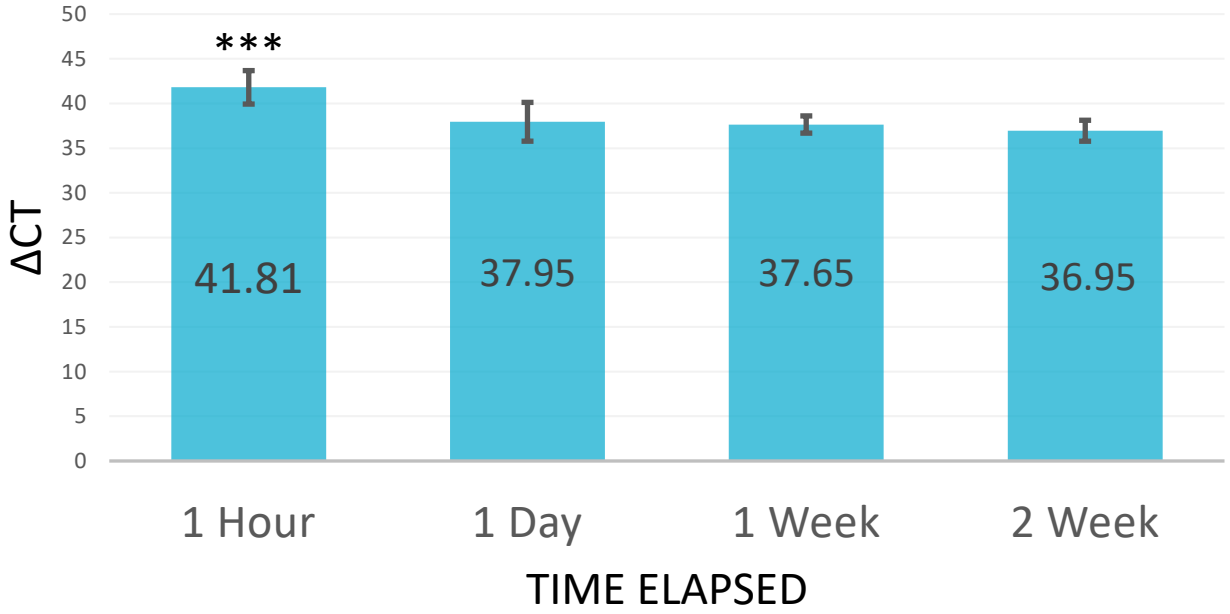
“Field” testing



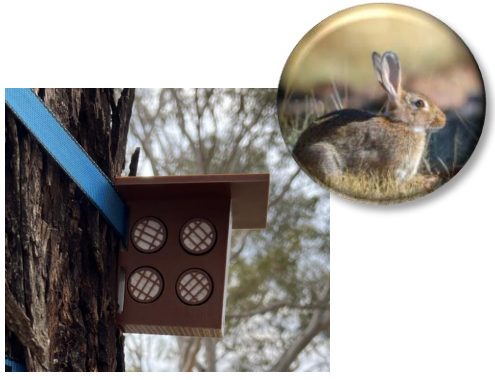
Effect of Deployment Length

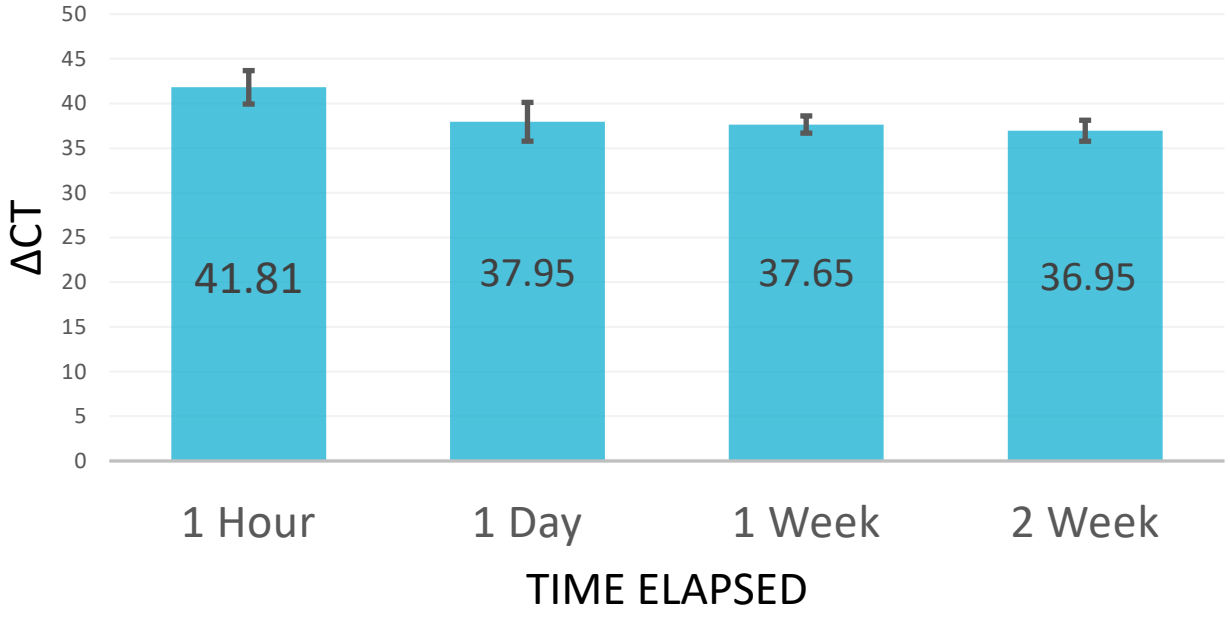


Effect of Deployment Length



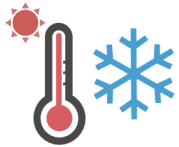
Effect of Deployment Length





Diminishing returns after 24 hours

Putting airborne eDNA through its paces

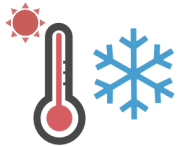


Temperature matters

UV doesn’t seem to matter

Capture substrate matters

Putting airborne eDNA through its paces



Temperature matters

UV doesn't seem to matter

Capture substrate matters

Size matters less than you might think

Sampling time matters (somewhat)

Try our eDNA Trail Cam!

Erin Hahn
Project Leader

Rachel Tulloch
Research Tech
qPCR Whisperer

CSIRO
Roshan Dodanwela
Nunzio Knerr
Mustafa Musameh
Vivek Raj Shrestha
David Renshaw
Kye Robinson
Heng Taing
Yen Truong

National Zoo
Sophie Dentrinos

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erin.hahn@csiro.au
@erinhahn.bsky.social