



The Biodiversity Value of Urban Hedges: and other stories of Green Infrastructure in Stoke-on-Trent

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Dr Paul Mitchell & Graham Smith

“The Biodiversity Value of Urban Hedges”

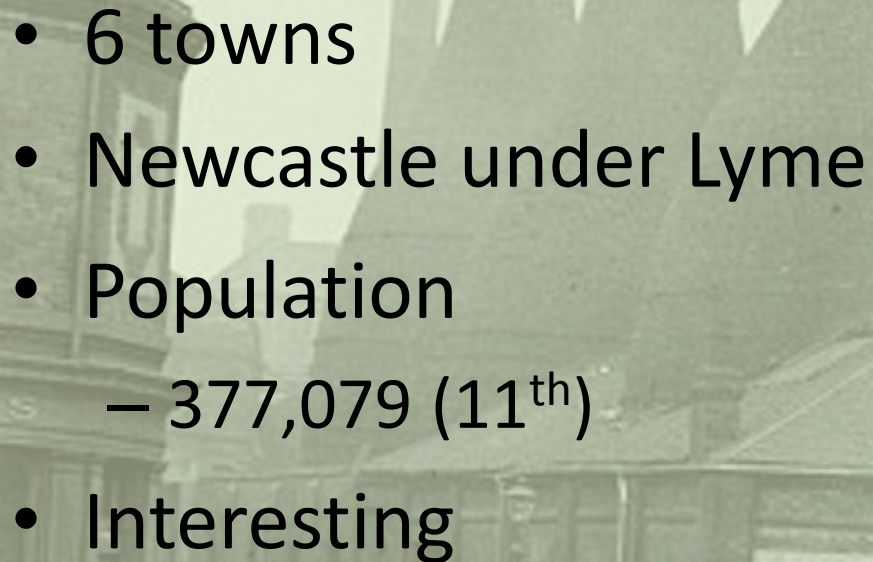
- 3 hedge species
- Birds, small mammals and invertebrates

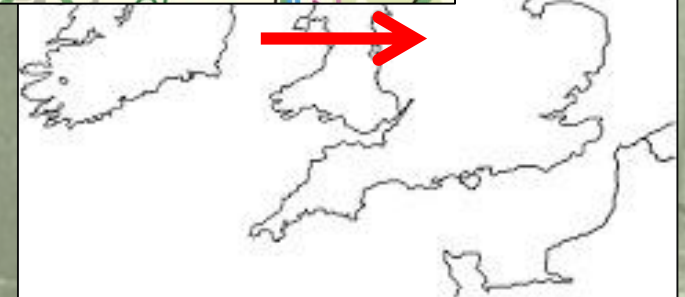
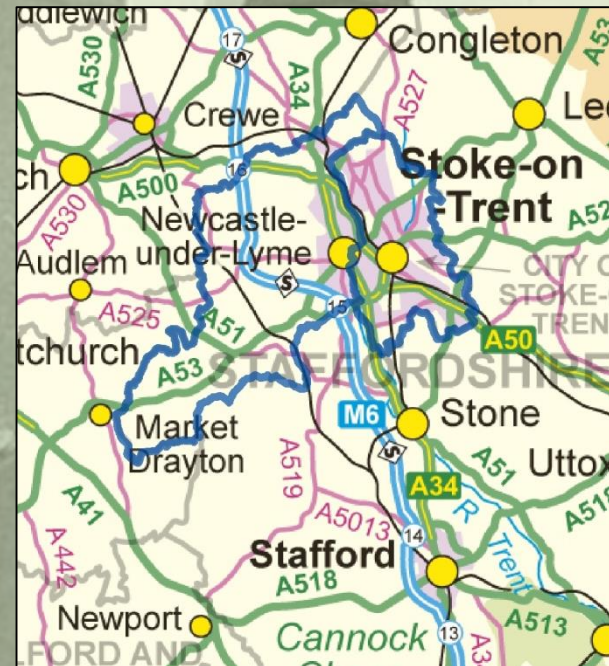
“The Animal Biodiversity of Green Walls in The Urban Environment”

Caroline Chiquet

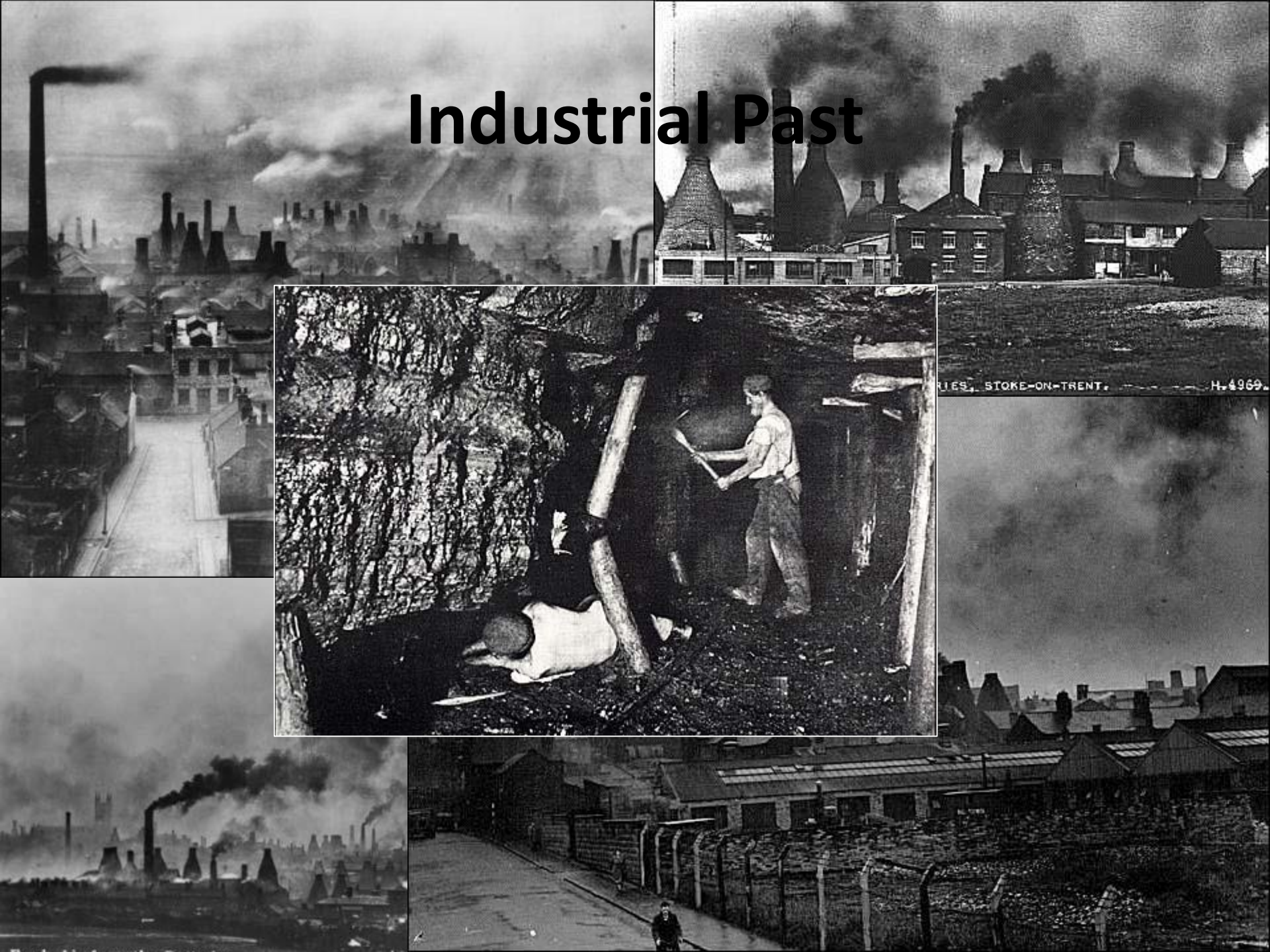
- Green Walls, Green Façades, Green Screens
- Birds, Snails, Spiders & Insects

Stoke on Trent

- 
- 6 towns
 - Newcastle under Lyme
 - Population
 - 377,079 (11th)
 - Interesting



Industrial Past

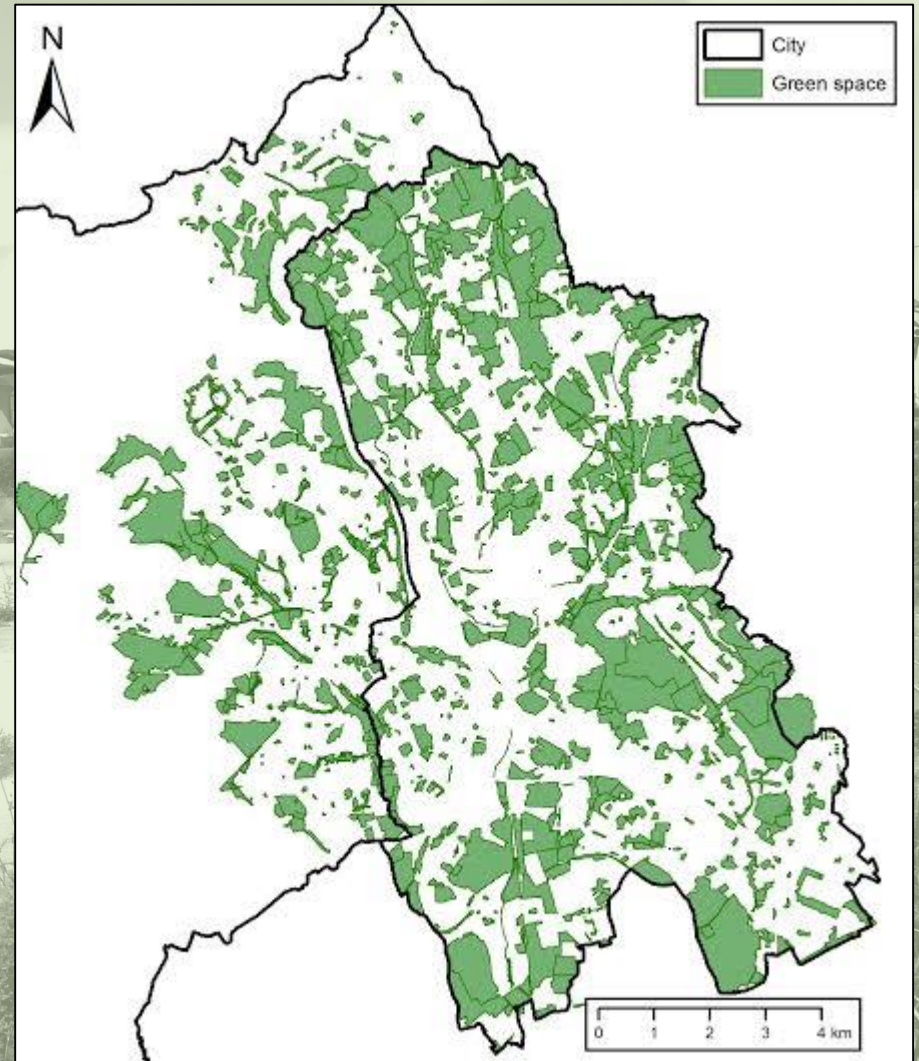


RIES, STOKE-ON-TRENT.

H.4969.

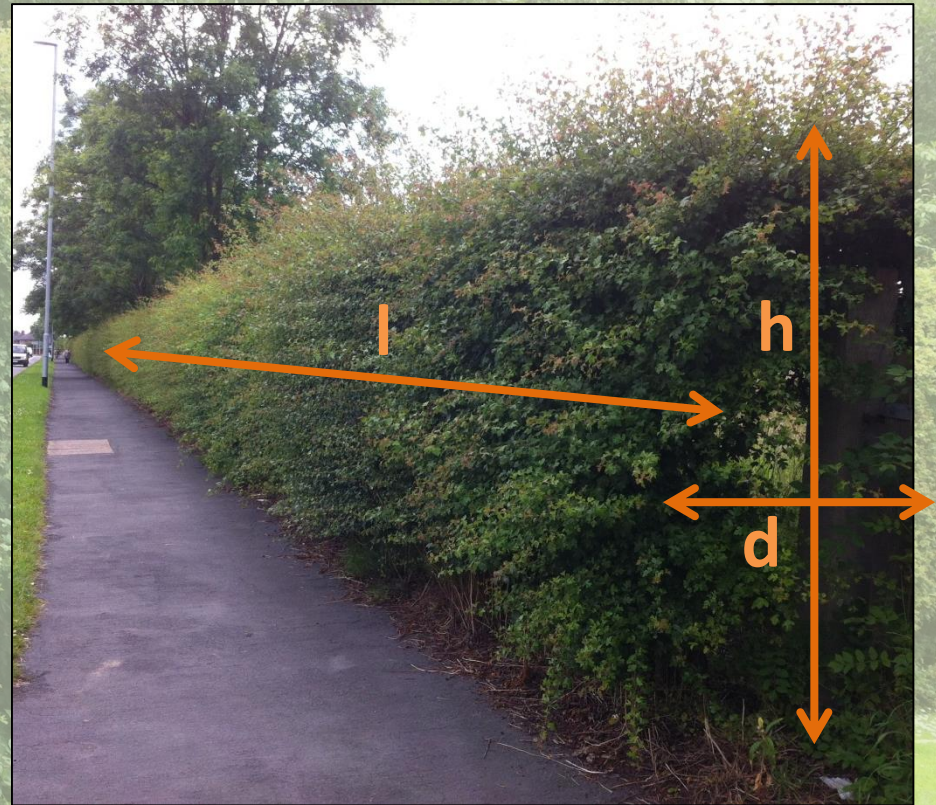
Stoke on Trent

- 1967 Derelict land
- 1970s Reclamation
- Still 350ha derelict
- **Now Greenest Cities**
- SoT 3,674ha (39%)



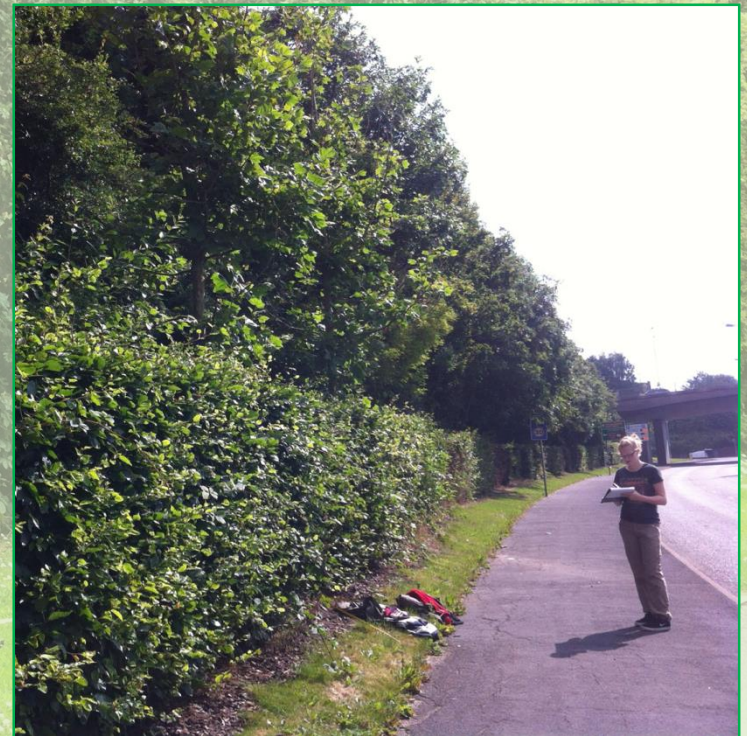
Hedgerow Selection

- Hedge criteria
 - 30m
 - Urban
 - Continuous >95%
 - Species >95%
 - Height >1.2m
- Control criteria
 - Similar location
- Hedge Survey



Bird Study

- 3 species of hedge + Controls (13)
- Observations x 4
- Roadside
- Summer – rolling cycle
- Species
- Behaviours



Surveyed

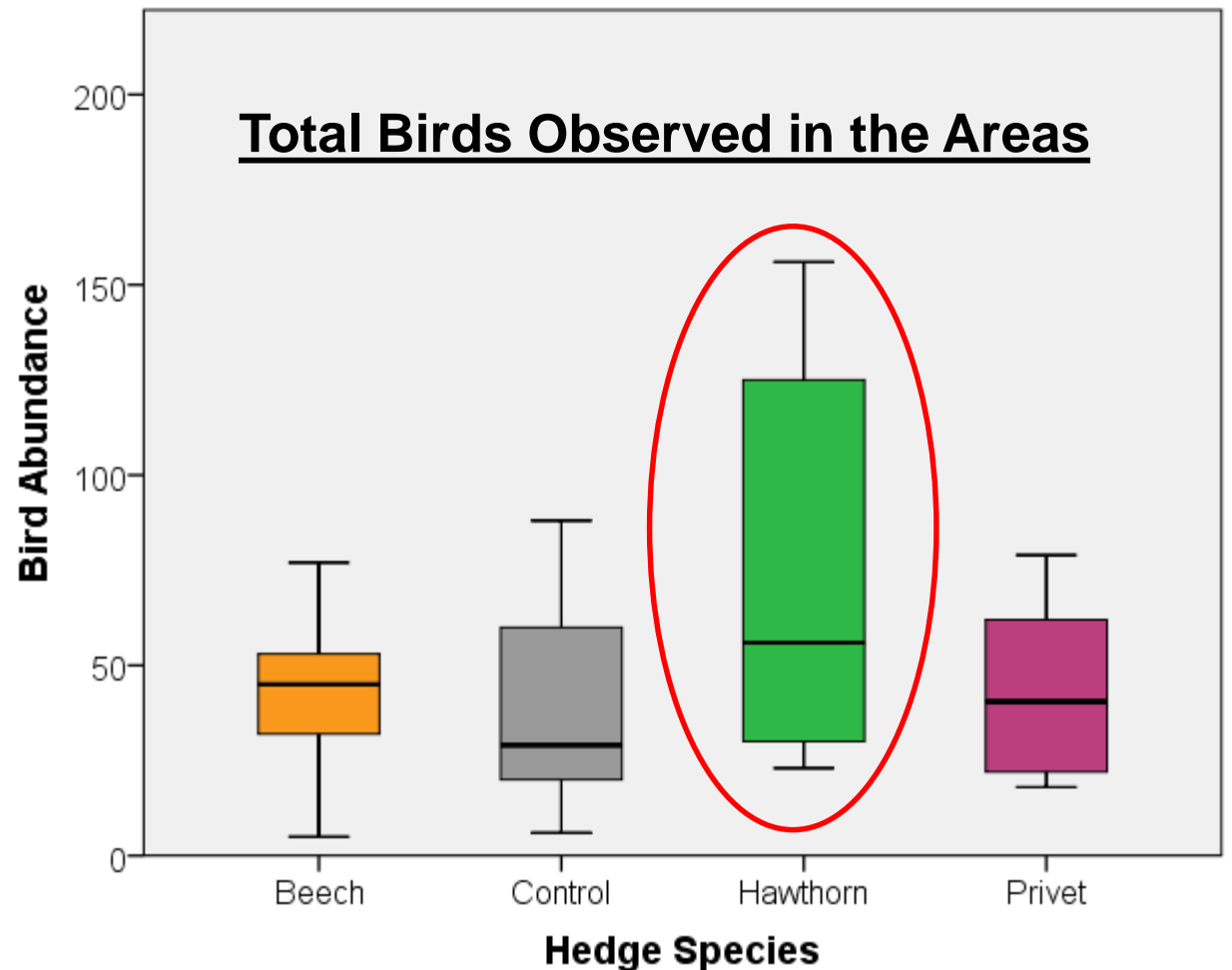
- 39 hedges
- 13 controls
- 208 surveys
- 2663 Birds surveyed in total
- 26 species

Data Analysis

Q1 Is there a significant difference in *total birds* across **location type**?

A No

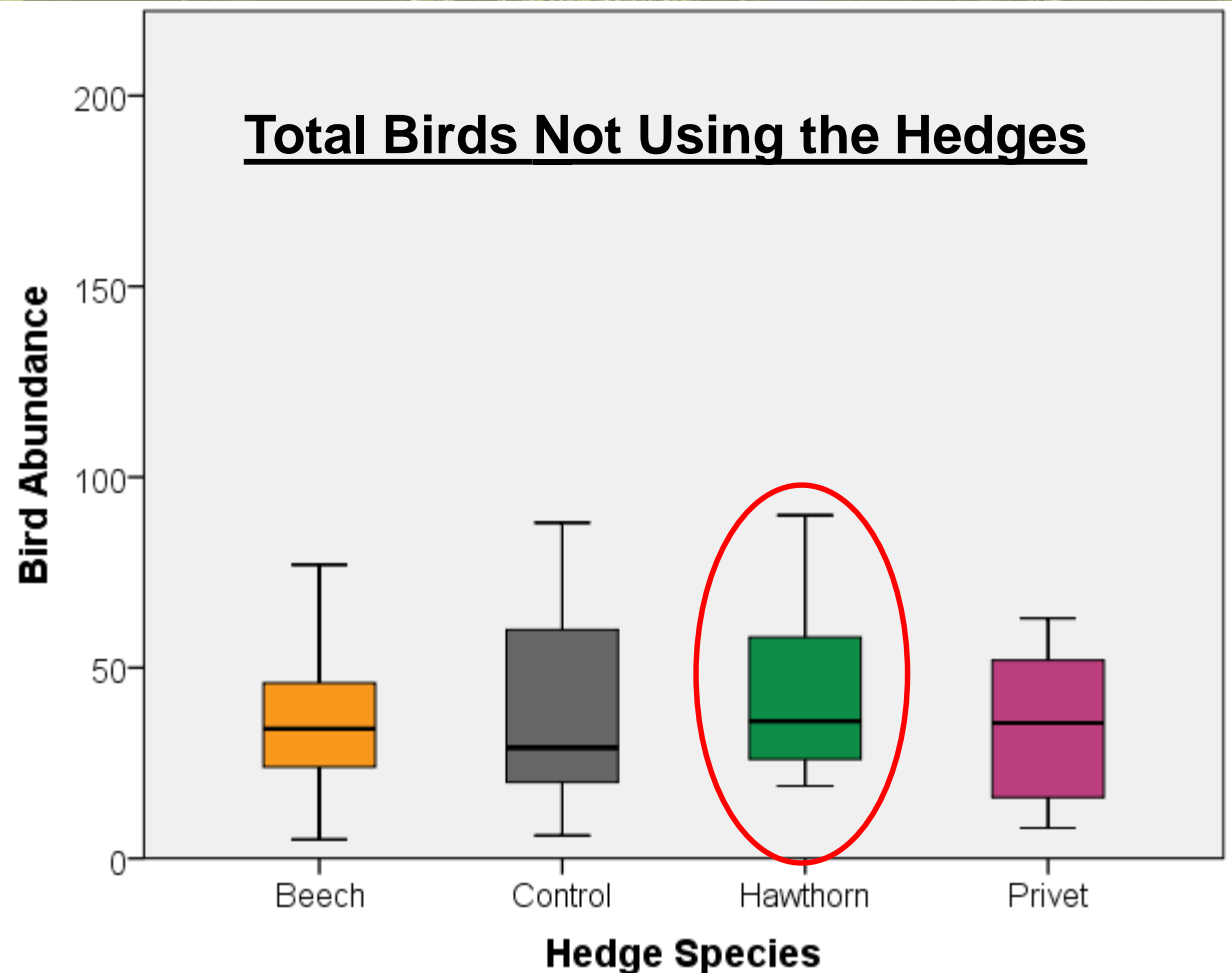
$p = 0.155$



Q2 Is there a significant difference in birds *not using* the hedges across **location type**?

A No

$p = 0.810$



Q3 Is there a significant difference in the **numbers** of birds *using* different **species of hedge**?

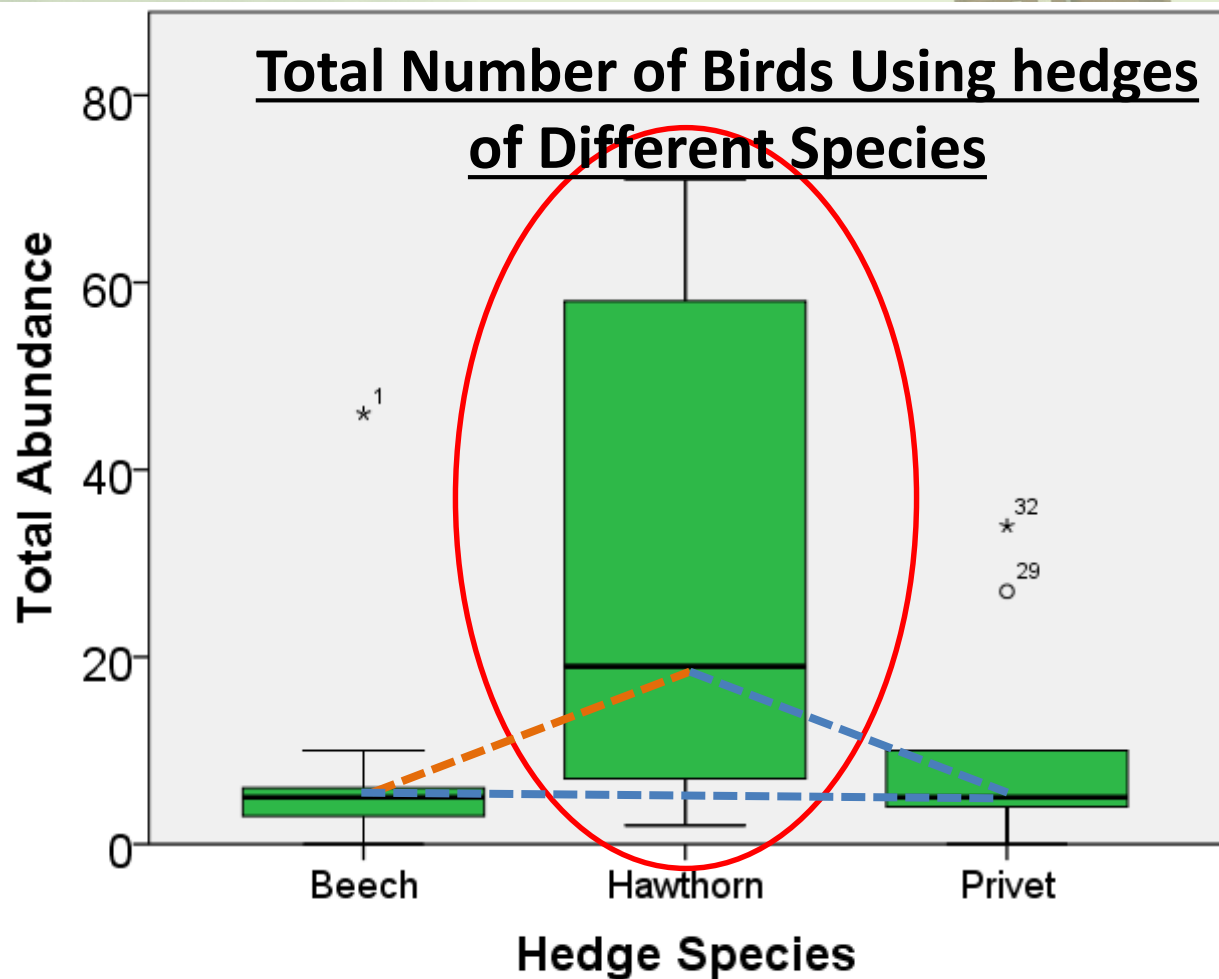
No control

A yes

$p=0.015$

--- Not sig

--- Sig



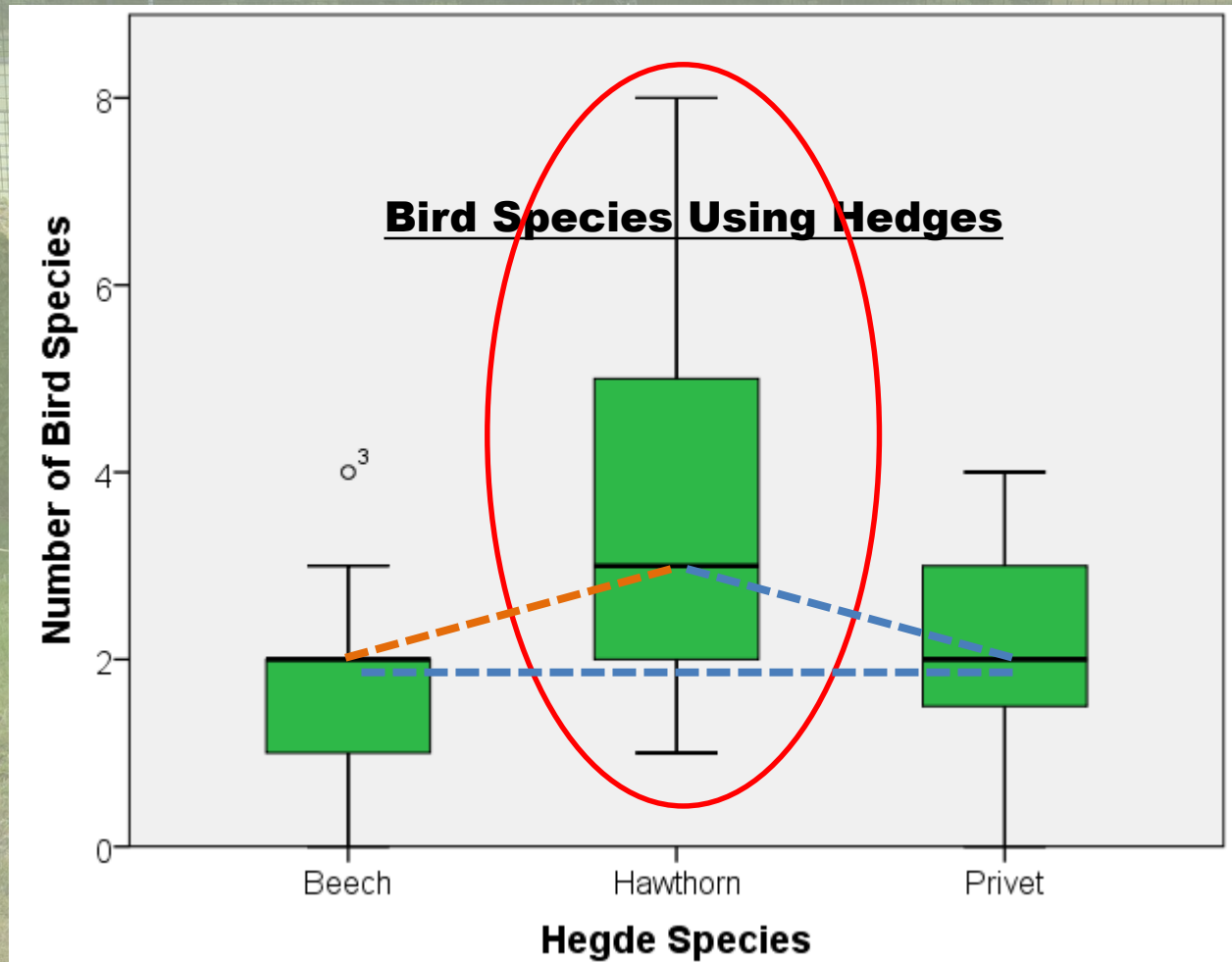
Q4 Is there a significant difference in the number of **different species** using across **hedge Species**?

Significant
difference

$p=0.025$

Total 15 Spp.
(58%)

- 15 Hawthorn
- 8 Beech
- 9 Privet

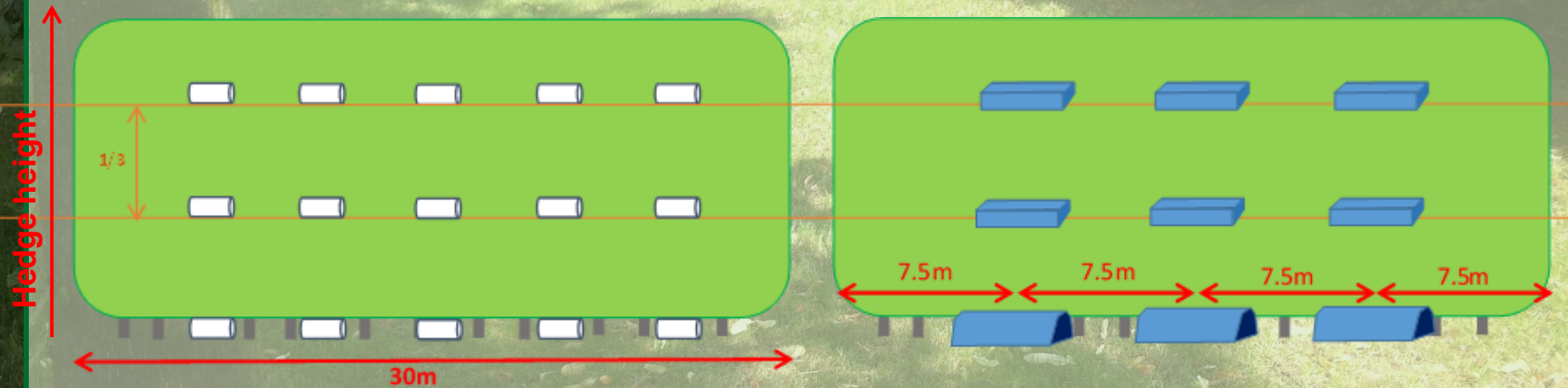


Bird Summary

- 15 species of bird used the hedges
- More birds are found in areas with a hawthorn hedge
- **Significantly** more birds **use** hawthorn than beech
- Species richness is **significantly** higher in hawthorn than beech

Mammal Study

- 2 Survey methodologies
 - Feeding / Hair tubes
 - Footprint tubes
 - Cheap – challenges of urban
- Autumn surveys



Feeding Tube Data Analysis

- Evidence
 - Droppings
 - Hair
 - Feeding remains
- Analysis
 - Comparisons between all – Ground level
 - Comparisons between hedges – all data

Q1 Is the evidence of small mammals uniformly distributed in each location type?

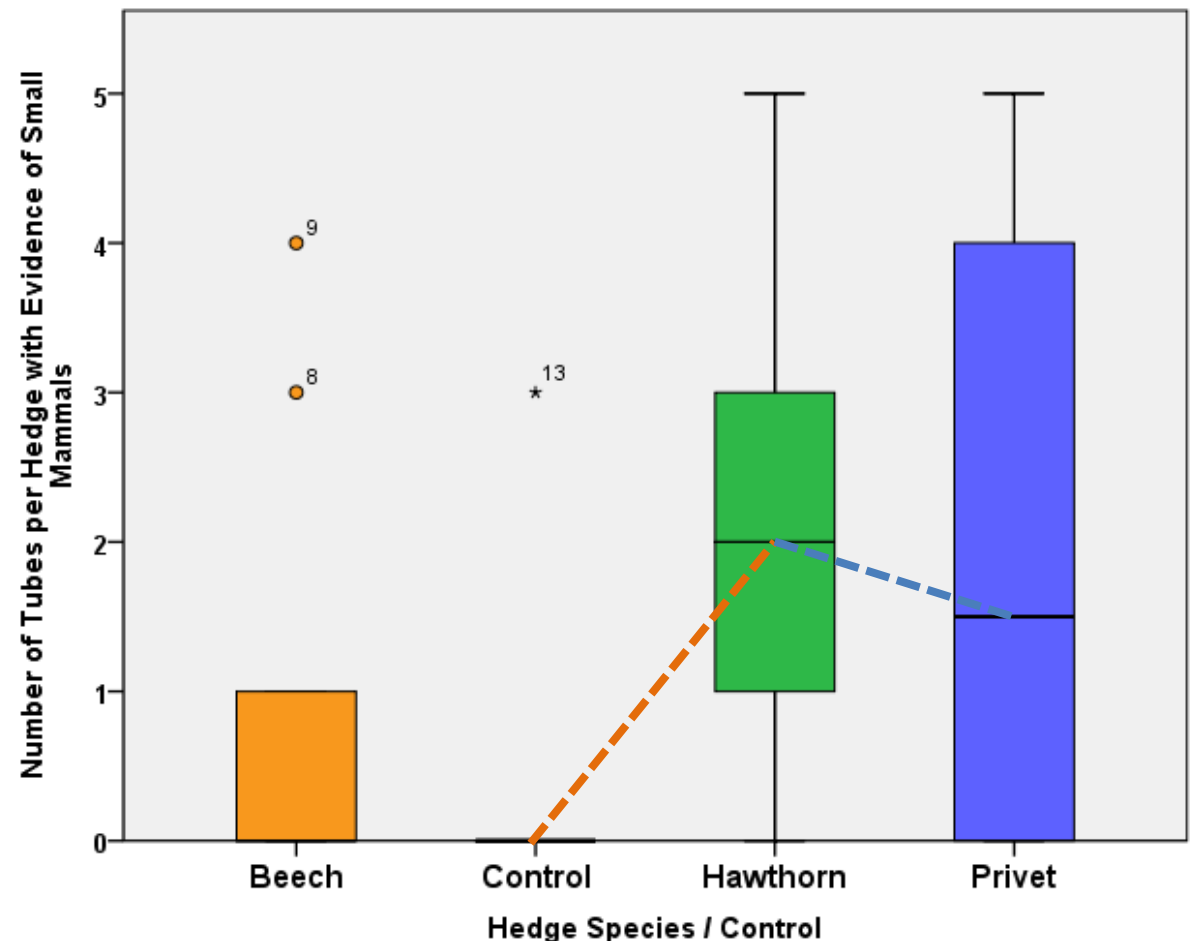
Significant difference

$P=0.020$

Hawthorn significantly more than control

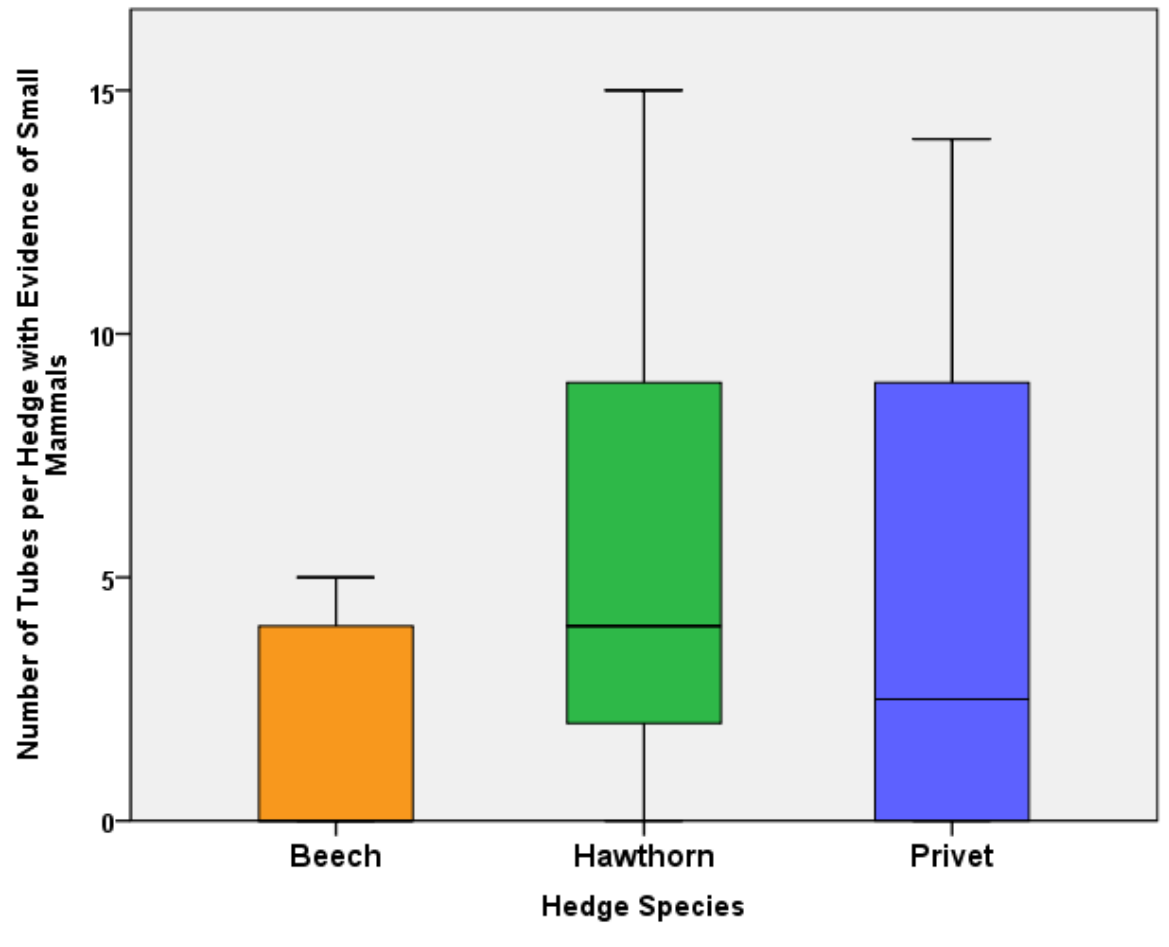
$P=0.031$

Hawthorn privet
 $p=1.000$



Q2 Is the evidence of small mammals uniformly distributed between hedge species?

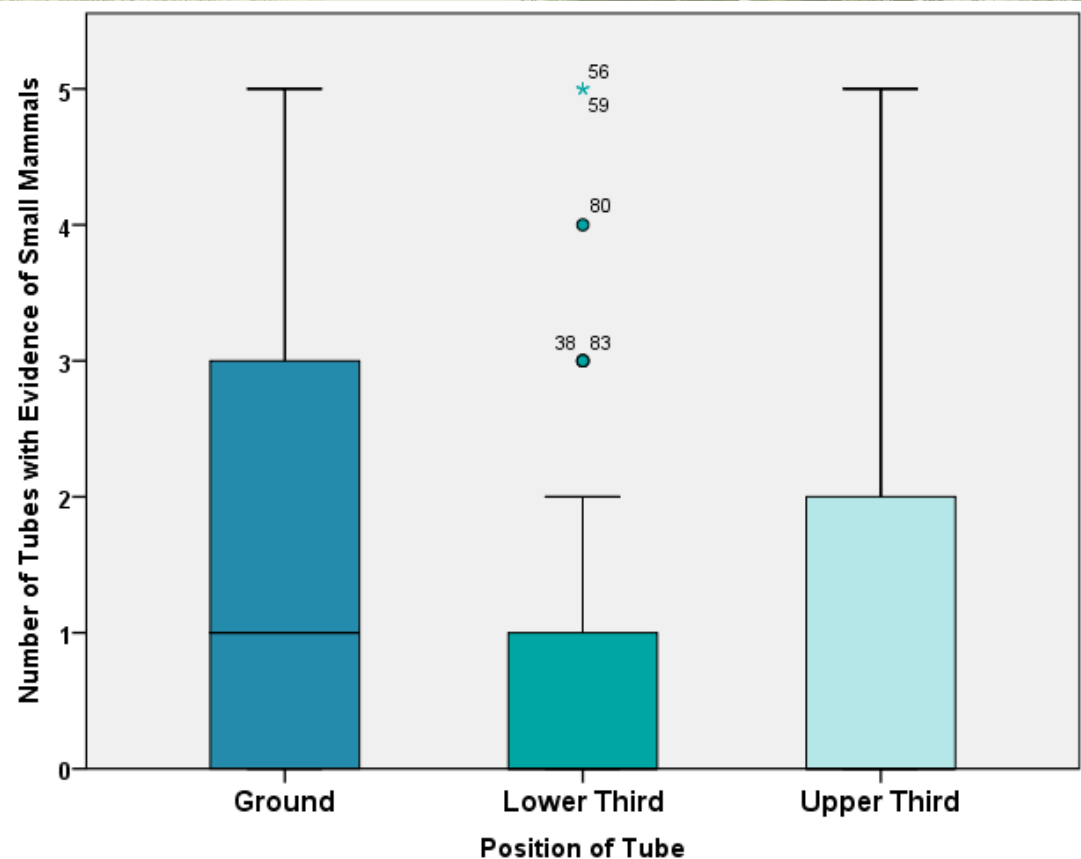
Not significantly different
 $p=0.089$



Q3 Is the evidence of **small mammals** uniformly distributed with *height*?

Not significantly
different

$p=0.476$



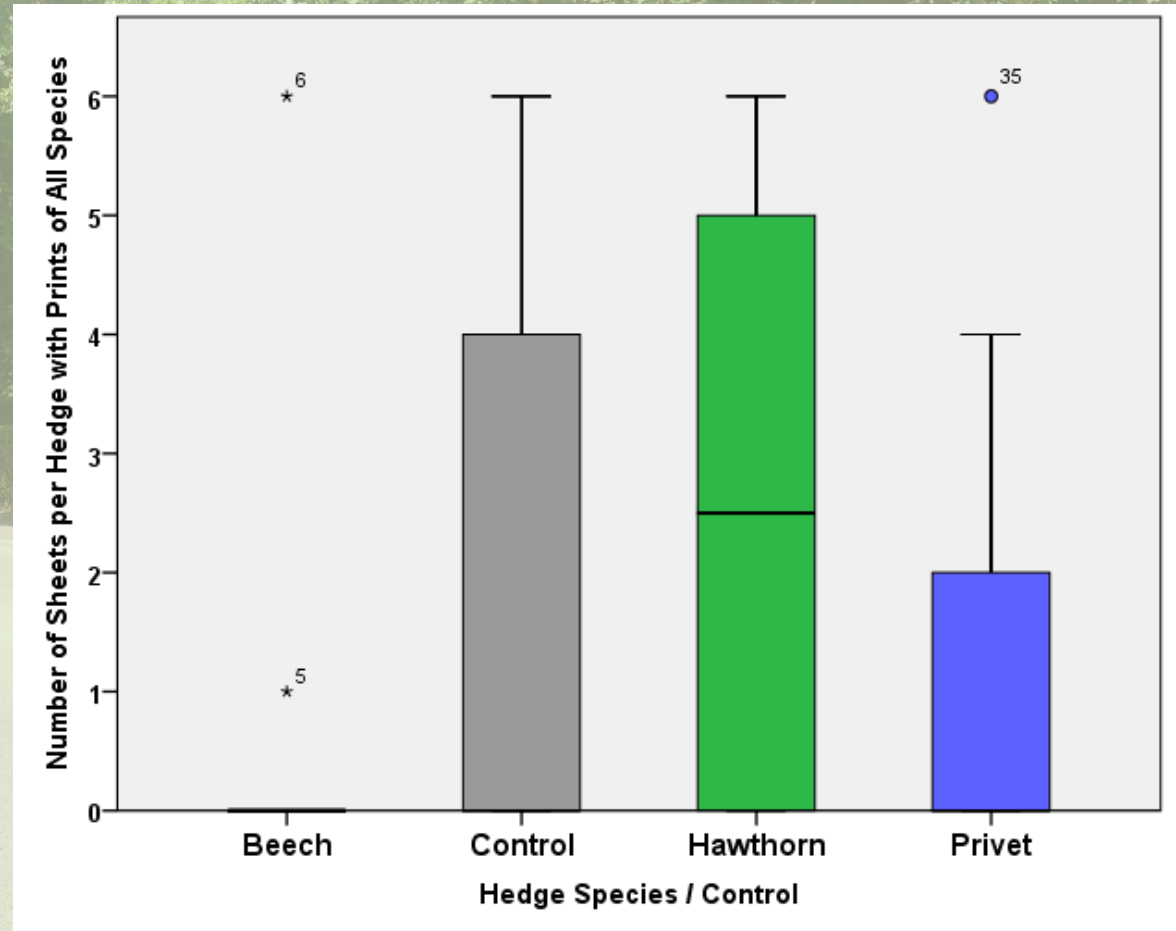
Footprint Tube Data Analysis

- Evidence
 - From sheets with footprints on
- Analysis
 - Comparisons between all – Ground level
 - Comparisons between hedges – all data
 - Only Mice, Voles & Shrews

Q1 Is the **number of prints** of all species the same **across location type**?

Not significantly
different

$p=0.139$



Q2 Is the number of prints of **Mice, Voles and Shrews** the same across **location type**?

Significant
difference

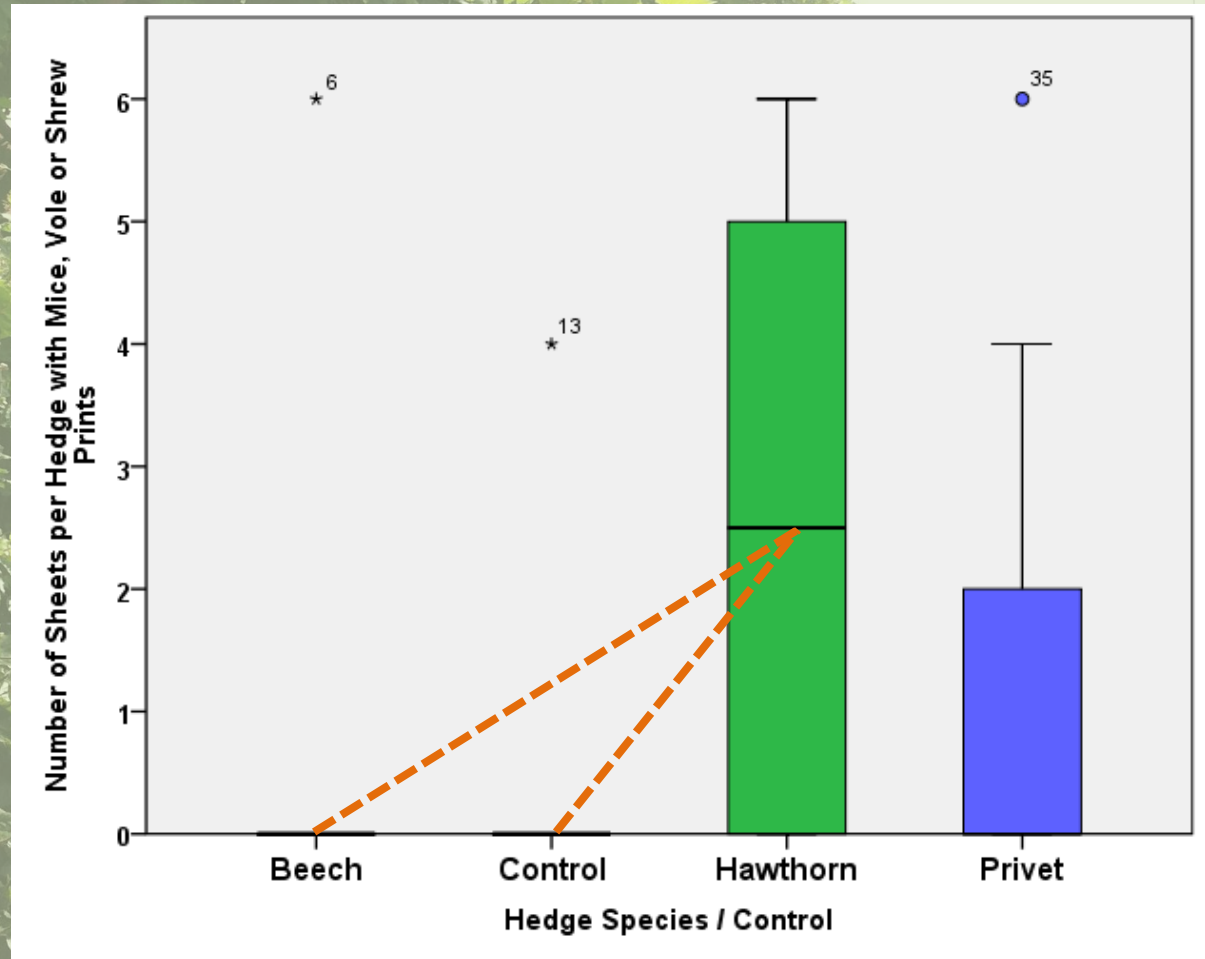
$P=0.017$

Hawthorn
significantly more
than control

$P=0.029$

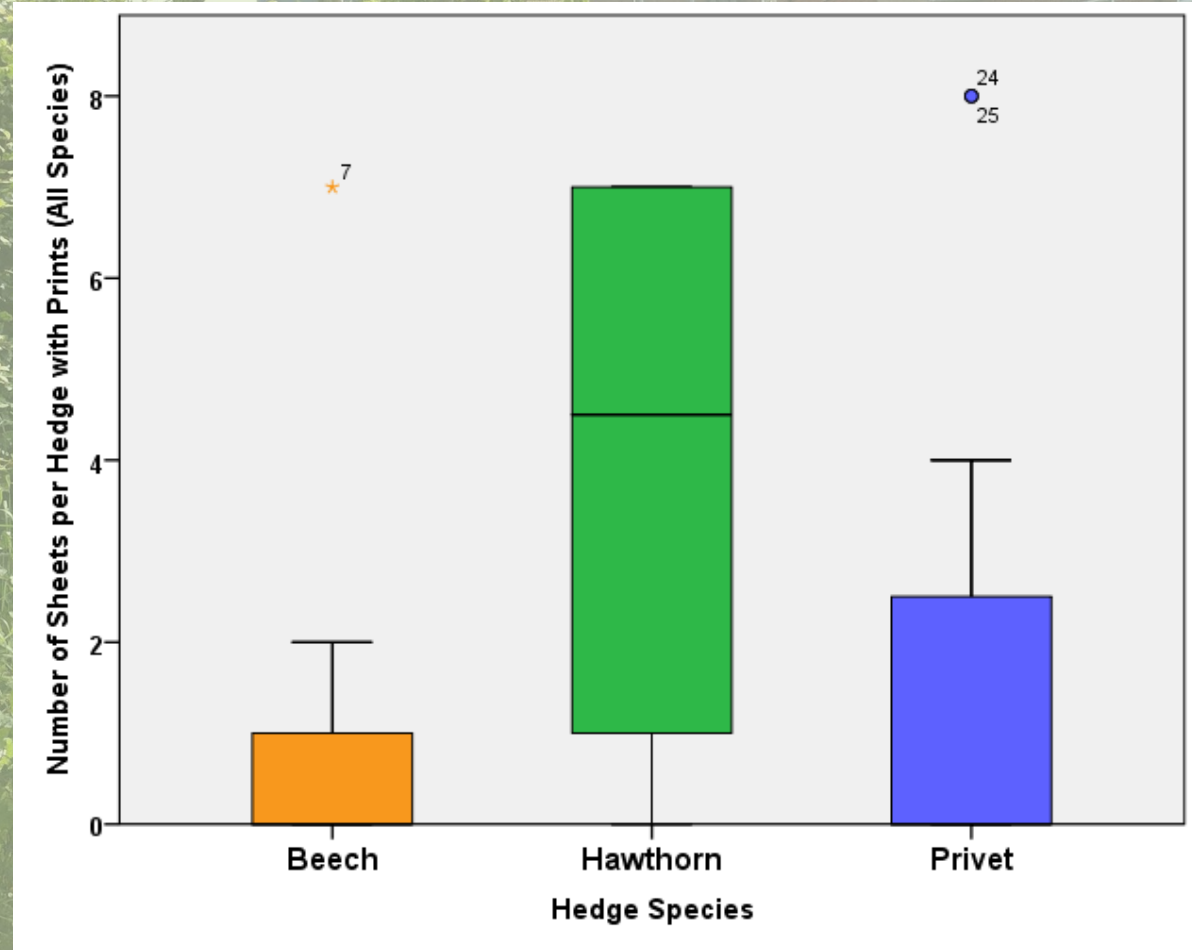
and beech

$P=0.041$



Q3 Is the number of prints of **all species** the same across ***hedge species***?

Not significantly
different
 $p=0.067$



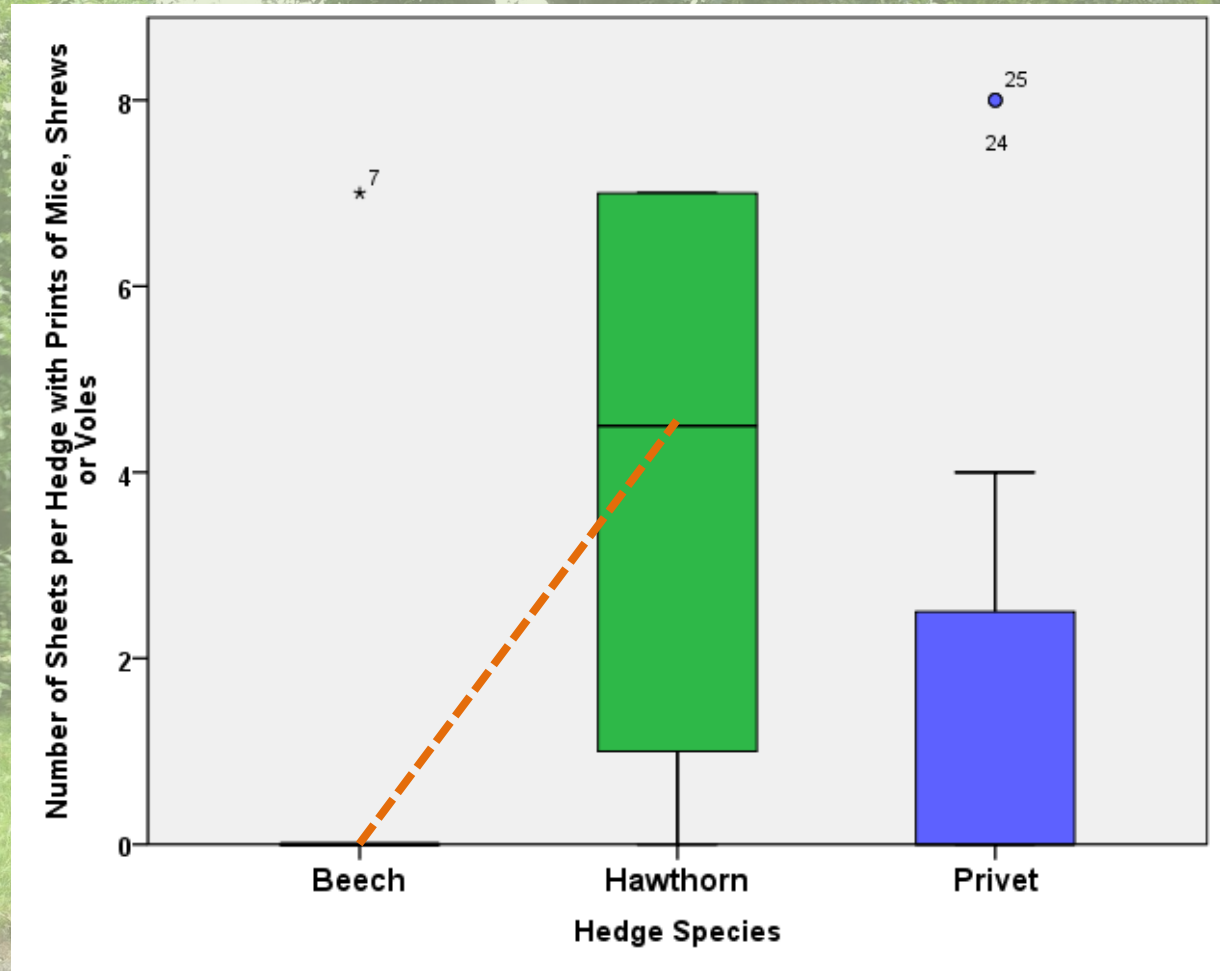
Q4 Is the number of prints of Mice, Voles and Shrews the same across *hedge* species?

Significant
difference

$p=0.021$

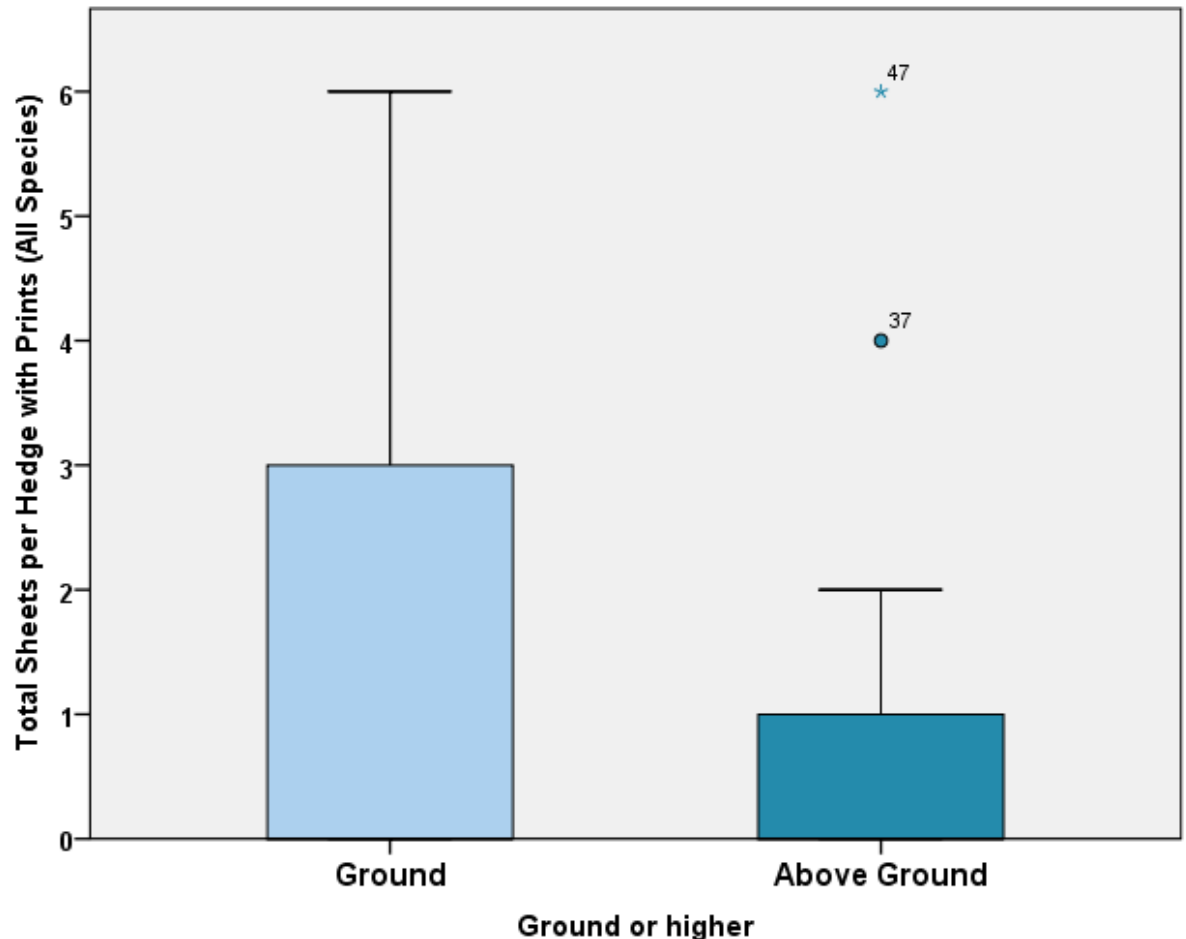
Hawthorn
significantly more
than beech

$p=0.017$



Q5 Are the number of footprints of all species the same at different *heights* within the hedges?

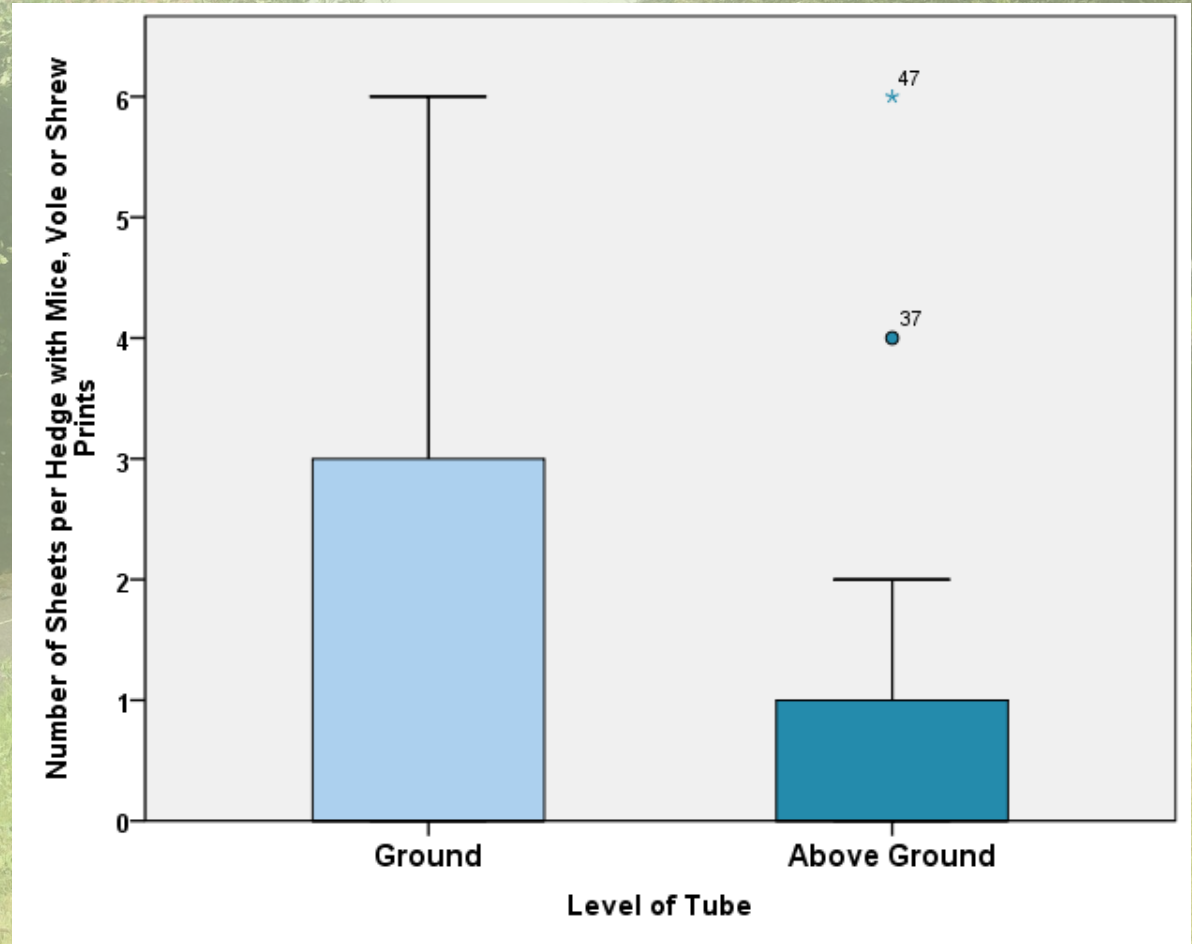
Not significantly
different
 $P=0.181$



Q6 Are the number of footprints of Mice, Vole and Shrews the same at different *heights* within the hedges?

Not significantly
different

$P=0.259$



Mammal Summary

- Feeding tubes
 - **Significantly** more mammals found in hawthorn hedges than control locations –
 - No significant difference in evidence of mammals across hedge species –
- Footprint Tubes
 - **Significantly** more M,V,S in Hawthorn than beech or control locations
- Mammals found in similar numbers at different heights of the hedge

Summary of findings so far

- 15 Species bird using the hedges (kestrel)
- 15 used Hawthorn, 8 Beech, 9 Privet
- 63% of study hedges used by mammals
- More Bird Spp. were found to use Hawthorn
- Hawthorn hedges were found to be very important for both birds and mammals
- Hawthorn and Privet were important for mammals
- Hedges are a 3D habitat for mammals

Implications

- Hedges should be protected and integrated into in urban planting schemes as habitat for small mammals
- Hawthorn and Privet hedges provide a preferred habitat
- Hawthorn hedges are also important for bird abundance and species richness



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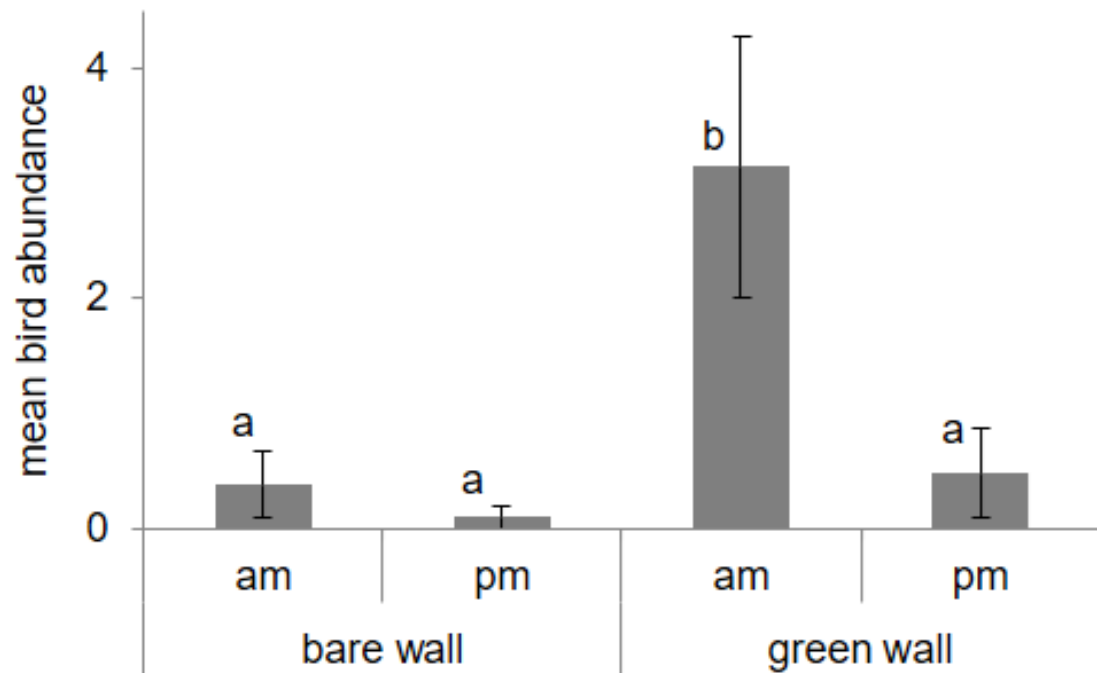
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Birds & Green Walls

- Green walls = LW, GF, GS,
- Bare walls
- Visual searching am & pm, winter & summer
- Recorded - bird abundance, Species richness, individual species abundance

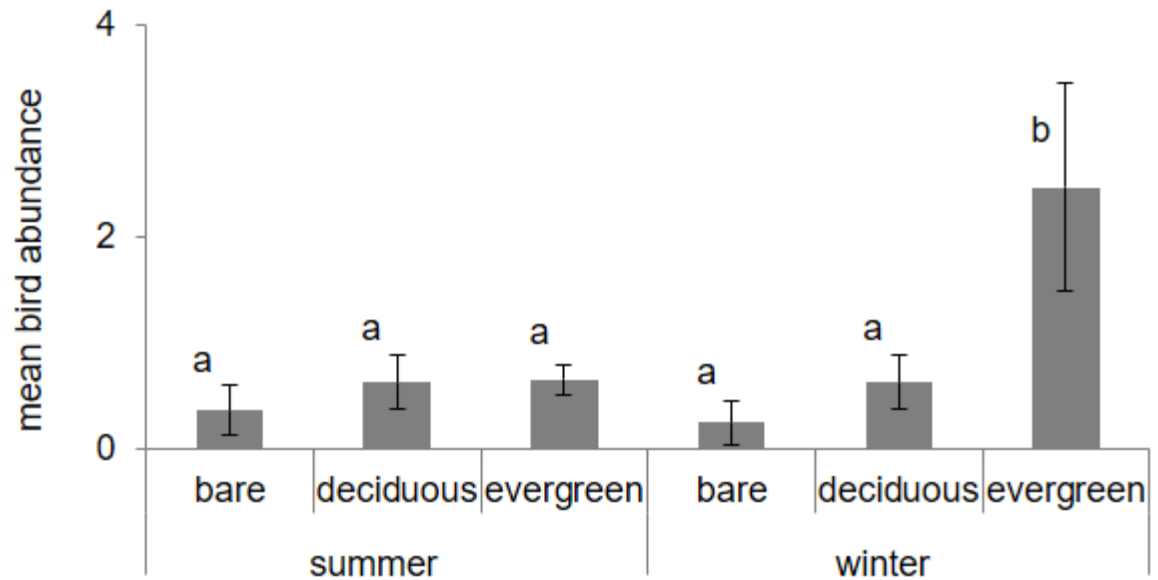
Results

- Total 83 birds, 9 species
- GW **significantly** more birds than BW



Results

- Evergreen walls - **significantly** more birds in winter
- Little difference in the summer



Invertebrates & Green Walls

A Summary

- Suction Sampling & direct counting of Spp.
- Recorded –
 - Total abundance, Species Richness
 - Richness and abundance within groups

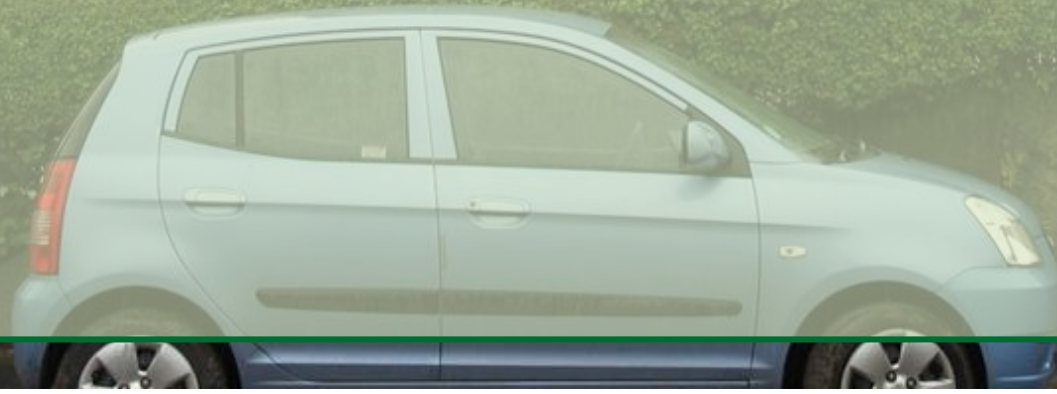


Key Results

- Green façades and living walls – abundant , diverse insect fauna
- Diptera, Hymenoptera and Hemiptera – Most abundant & rich groups.
- Evergreen walls were found superior to deciduous
- Different species composition found on Green Façades then Living walls

In Summary

- If there are green walls there are **significantly** more birds present than areas without
- Evergreen walls are more important for both birds and invertebrates
- The species composition is different on Green Façades than Living walls



Overall

- Both Green walls and urban hedges are important for urban biodiversity
- Significantly more birds, mammals and invertebrates are found in areas with hedges or green walls than areas without.
- Different species are found on different hedges or living walls
- Hedges and green walls require little horizontal space – space efficient way of incorporating biodiversity

Work at the Green Wall Centre

- Atmospheric Particulate Matter Pollution mitigation using Living walls
- Particulate Capture capabilities of Green Screens
- Indoor Plants and Living Walls: Air Quality and Rhizosphere Interactions
- NO_x Capture Capabilities of Green Walls
- Active Green Walls



Thank you

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