

Frank Ashwood

Forest



Research



GLOBAL SYMPOSIUM ON SOIL BIODIVERSITY | 19-22 April 2021

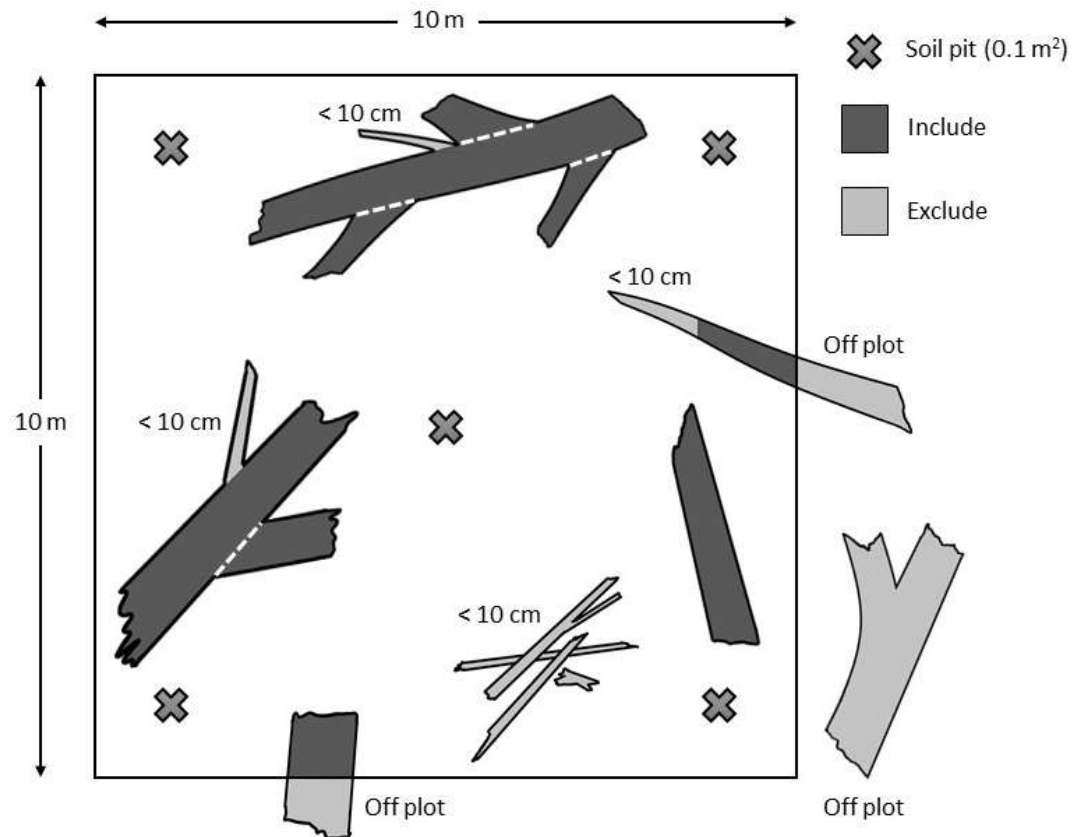
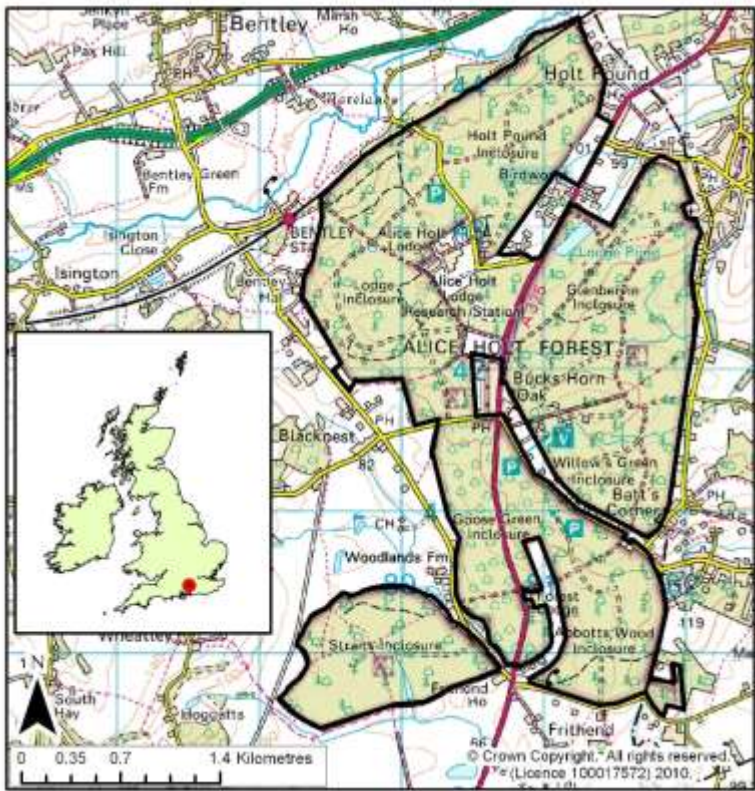
Introduction

- Traditional sampling methods may miss earthworm species in alternative habitats such as deadwood
- This can lead to false classifications regarding species distributions and conservation status and value
- Resolving the lack of a systematic methodology for surveying earthworms in microhabitats may give valuable insights into earthworm ecology

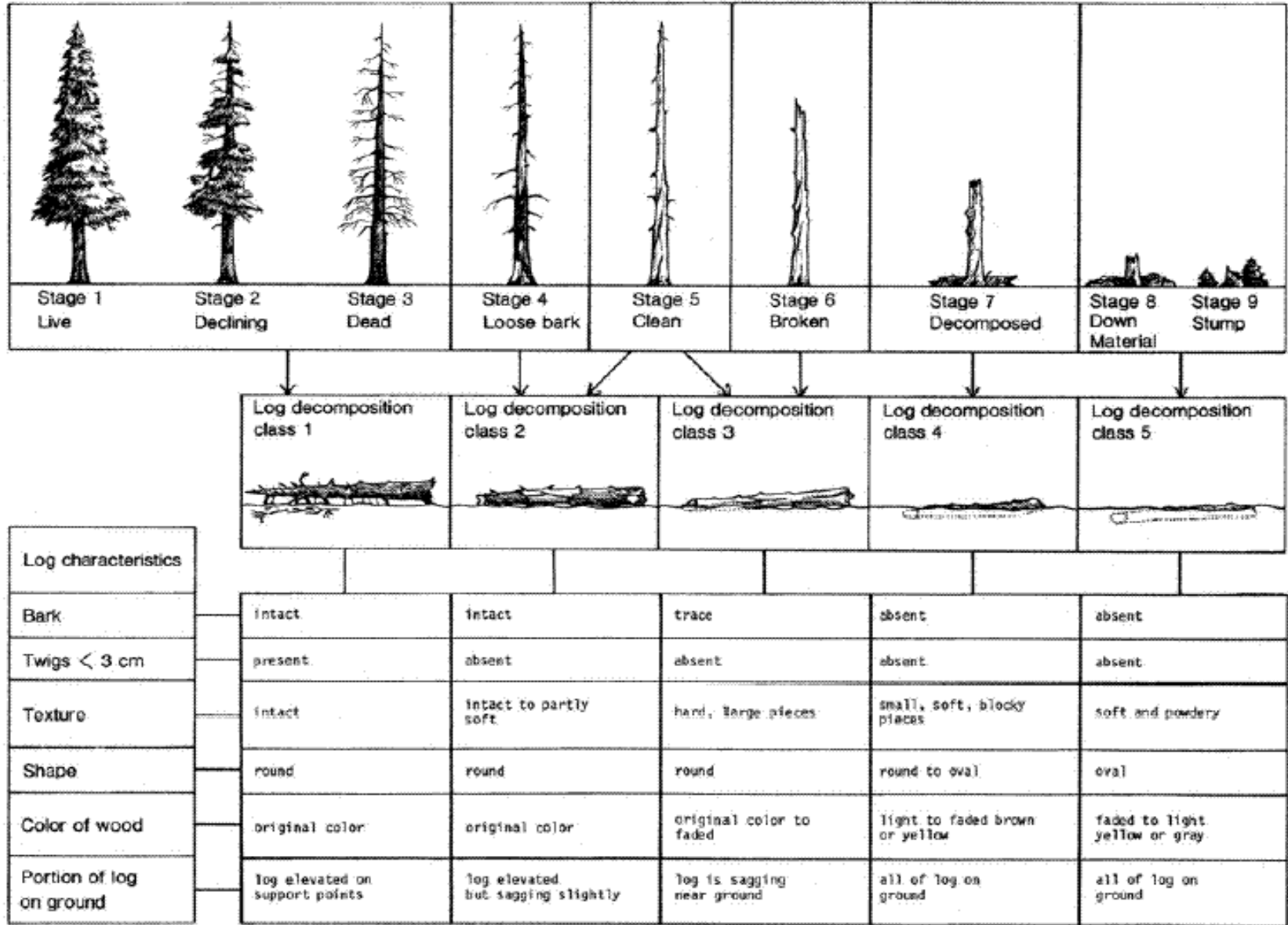


Pilot Deadwood Survey

- Alice Holt Forest in Surrey, England, is one of 11 terrestrial Environmental Change Network (ECN) long-term monitoring sites across the UK
- Marked out square plots of 10 m × 10 m within each forest stand ($n = 12$)
- Three woodland ages: young (30 to 40 yrs.), mid-rotation (70 to 90 yrs.) & old (> 190 yrs.)



Deadwood Decay Class



Decay class (1 – 5). The deadwood decomposition is assigned in 5 decay classes according to Hunter, 1990.


Data Collection & Soil Sampling



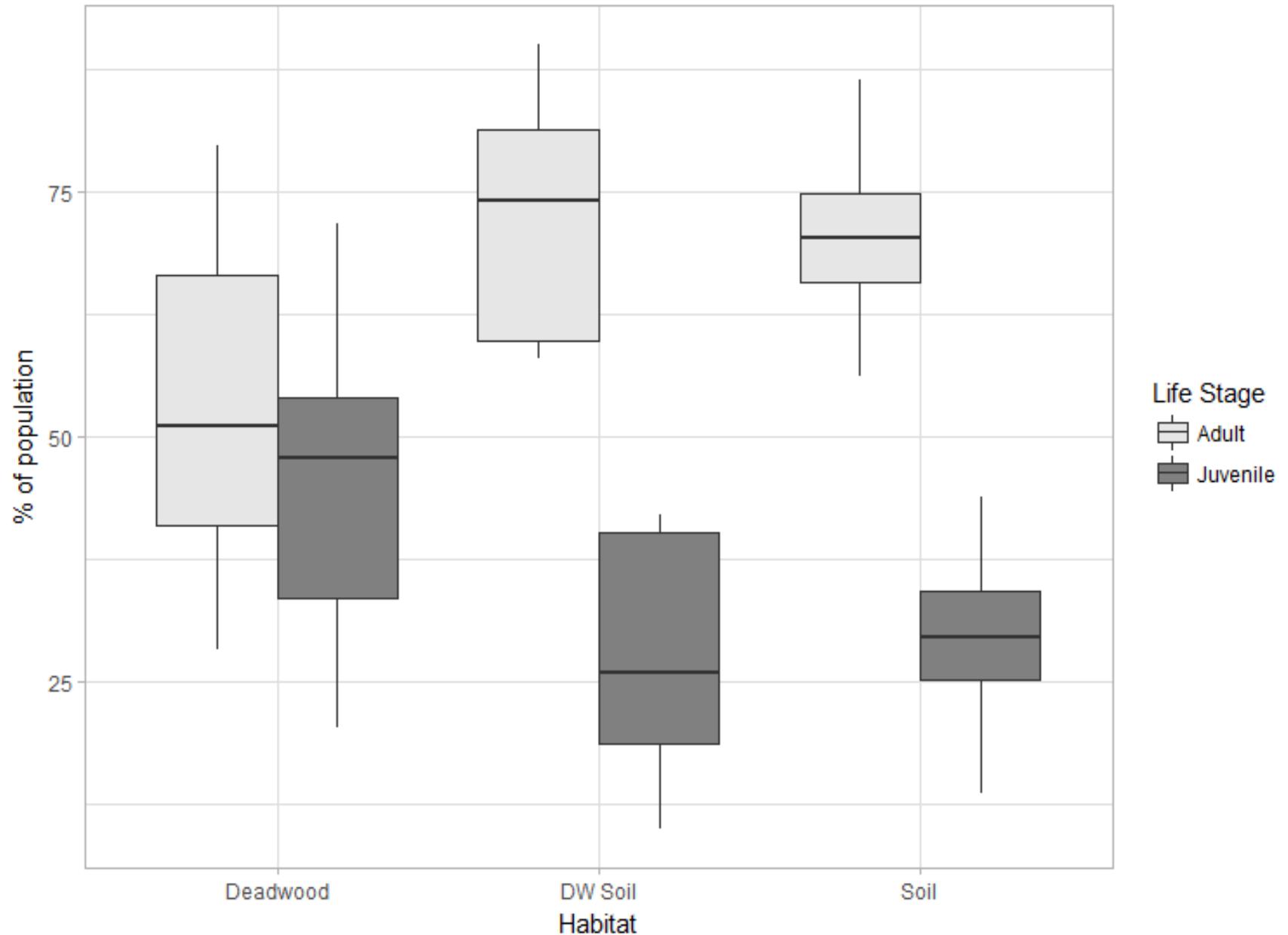
Deadwood Sampling



Results – Earthworm Communities

Earthworm species	Habitat		
	Soil	Deadwood soil	Deadwood
<i>Allolobophora chlorotica</i>	19.5 ± 23.8 a	9.8 ± 13.9 a	0.6 ± 1.3 b*
<i>Aporrectodea caliginosa</i>	2.2 ± 3.9	1.0 ± 2.9	-
<i>Aporrectodea longa</i>	0.8 ± 2.9	0.2 ± 0.6	-
<i>Aporrectodea rosea</i>	0.5 ± 1.2 †	-	-
<i>Bimastos eiseni</i>	0.2 ± 0.6 a	0.3 ± 0.8 a	1.9 ± 2.3 b**
<i>Bimastos rubidus</i>	4.5 ± 7.5	6.5 ± 7.8	2.8 ± 3.1
<i>Dendrobaena attemsi</i>	8.8 ± 25.3	6.7 ± 17.8	0.9 ± 2.4
<i>Dendrobaena octaedra</i>	16.8 ± 23.8	12.5 ± 17.2	3.2 ± 4.6
<i>Dendrobaena pygmaea</i>	0.3 ± 1.8	0.2 ± 0.6	
<i>Eisenia fetida</i> 	-	-	0.2 ± 0.5 †
<i>Lumbricus castaneus</i>	0.3 ± 1.2	0.3 ± 1.2	-
<i>Lumbricus rubellus</i>	19.2 ± 10.5 a	13.8 ± 9.9 a	1.6 ± 1.4 b***
<i>Octolasion lacteum</i>	0.2 ± 0.6	0.5 ± 1.7	-
Total abundance (Ind. m ⁻²)	102.0 ± 63.8 a***	21.33 ± 15.0 b	21.18 ± 10.1 b
Total biomass (g m ⁻²)	23.8 ± 9.1 a***	5.0 ± 2.8 b	2.6 ± 1.3 b

Results – Earthworm Life Stages



Key Findings

- One earthworm species found in deadwood that wasn't also captured during soil sampling, though very variable at plot level
- Deadwood added ~20% earthworm abundance and ~10% biomass data per plot
- Soil below deadwood less habitable than uncovered soil (moisture, pH, SOM)
- Presence of bark and moss not measured, but observed in the field to have an influence – needs recording in future surveys
- No effect of woodland stand age



Conclusions

- Excluding deadwood microhabitats from woodland earthworm surveys can underestimate total earthworm populations and species richness.
- Systematic deadwood surveys cannot replace traditional soil pit sampling alone but should be considered as additional and complementary, to provide a realistic estimate of earthworm populations in woodland systems.



Next Steps & Improvements

- Collaboration? e.g. *LOGLIFE experiment, Zuo et al. 2020.*
- Collection of other invertebrate fauna groups
- Alternative microhabitats (e.g. stones and other debris)
- Collecting and incubating/DNA sequencing cocoons



Ashwood, F., Vanguelova, E. I., Benham, S. and Butt, K. R. (2019). Developing a systematic sampling method for earthworms in and around deadwood. *Forest Ecosystems*. 6:33.



Ashwood, F., Vanguelova, E., Benham, S. & Butt, K. (2020). Looking for Earthworms in Deadwood. *Front. Young Minds*. 8:547465. doi: 10.3389/frym.2020.547465



Thank you for
your attention