



# Big targets, big ambitions: unpicking the pros and cons of woodland expansion in Scotland



Scot Ramsey

**Ruth Mitchell and  
Alison Hester**



The James  
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Institute

Increased tree planting will benefit the environment and the economy



PM promises to treble the rate of tree-planting in the UK, with up to 30million more planted every year

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Press release

## Government launches new scheme to boost tree-planting

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## Climate change: Tree planting rise 'needs to happen quickly'

News story

## Thousands of trees to be planted in England's towns and cities

Government to support tree-planting schemes through £10m Urban Tree Challenge Fund.

Environment

## UK needs to plant 1.5 billion trees to tackle climate change, government told

'Let's not shy away from the truth. It will be a challenge, it will cost money'

**Phoebe Weston** Science Correspondent | @phoebe0 | Tuesday 30 July 2019 15:04 | 32 comments

## Replanting Britain: 'It's about the right tree in the right place'

...than £1 per person a year is spent on planting English trees,  
mistakes loom large  
...our appeal [here](#)

Woodland Trust to plant 50 million trees over 5 years to fight climate crisis



## Why plant trees?





Scot Ramsey

# Talk structure

- Long term experimental results
- 5 min break
- Scaling up



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This project receives funding under the Forestry Grant Scheme.



Scottish  
Forestry  
Coilltearachd  
na h-Alba



Scottish Government  
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### The Forestry Grant Scheme

Scotland's woodlands and forests are a vital national resource and play an important role in rural development and sustainable land use. As well as helping to reduce the impacts of climate change and providing timber for industry, our forests enhance and protect the environment and provide opportunities for public enjoyment.

The Forestry Grant Scheme funding is supported by the European Union, is supporting the sustainable management of existing woodlands and the creation of new woodlands – contributing towards the Scottish Government's published targets for woodland creation.

### Forter Woodland Creation

This is a Forestry Grant Scheme (FGS) funded commercial planting which delivers a UKFS woodland by creating a commercial conifer woodland on land which is suitable for timber production and is accessible for timber transport. This planting will help deliver the outcomes set out in the Scottish Forestry Strategy.

This forest is being managed through deer exclusion, weeding and replacement of dead trees to ensure successful establishment. This woodland captures and stores carbon and will provide a sustainable supply of timber in the future.



The European Agricultural Fund for Rural Development:  
Europe investing in rural areas



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Woodlands

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# Tree planting and climate change mitigation



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Tree biomass  
= stored  
carbon



Less carbon  
dioxide in  
the  
atmosphere



Reduces  
climate  
change

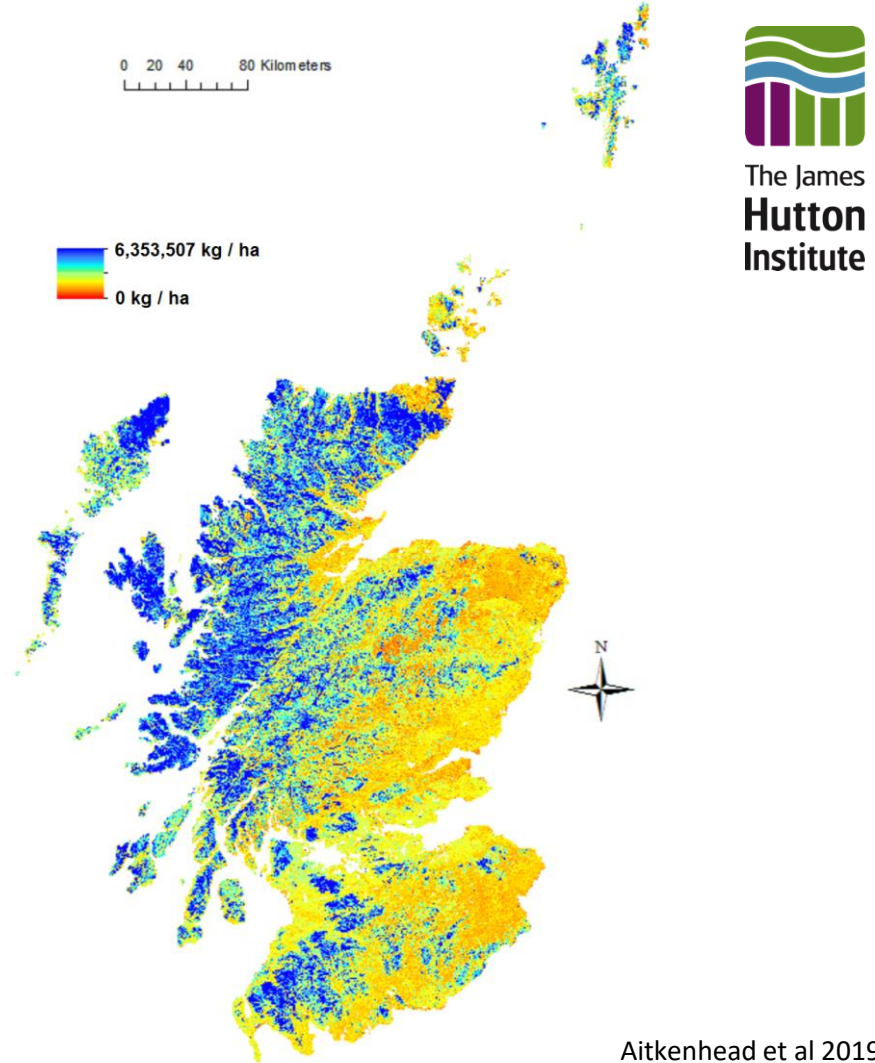
Is this always true?



# Soil carbon

Carbon stored in:

- Above ground vegetation
  - Soil
- 
- Need to look at both



# Miles planted plots

Heather control  
plots

Birch plots

- ❖ Established early 1980's
- ❖ 3 sites
- ❖ Each site 6 plots planted birch and 6 open moorland

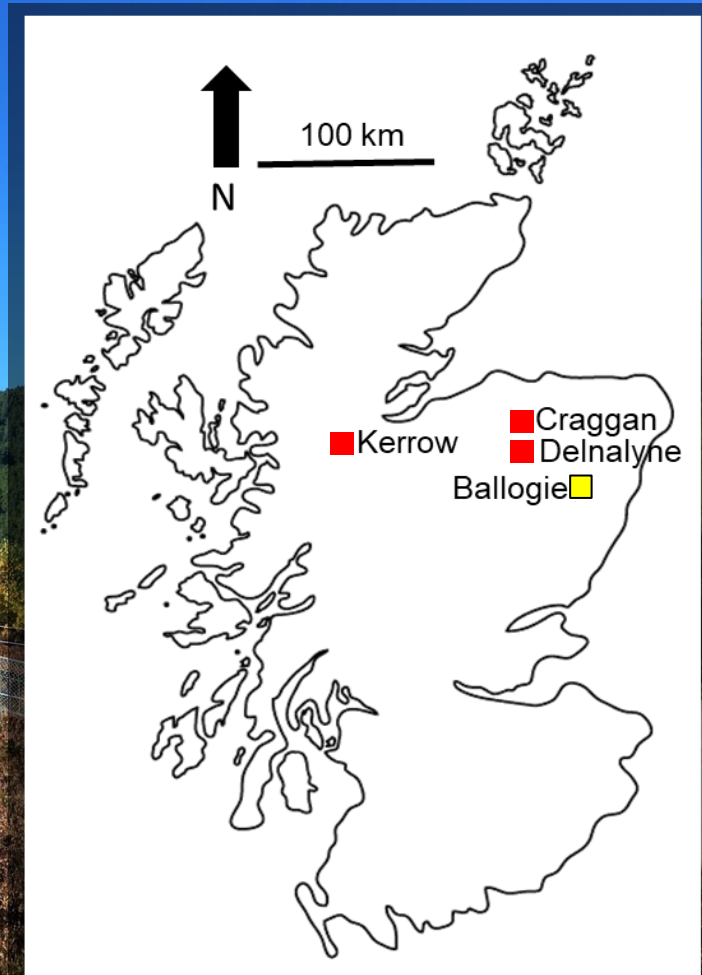


# 2005 new experiment

➤ Species effect – birch and pine

# Test the assumption Planting trees = increased carbon storage

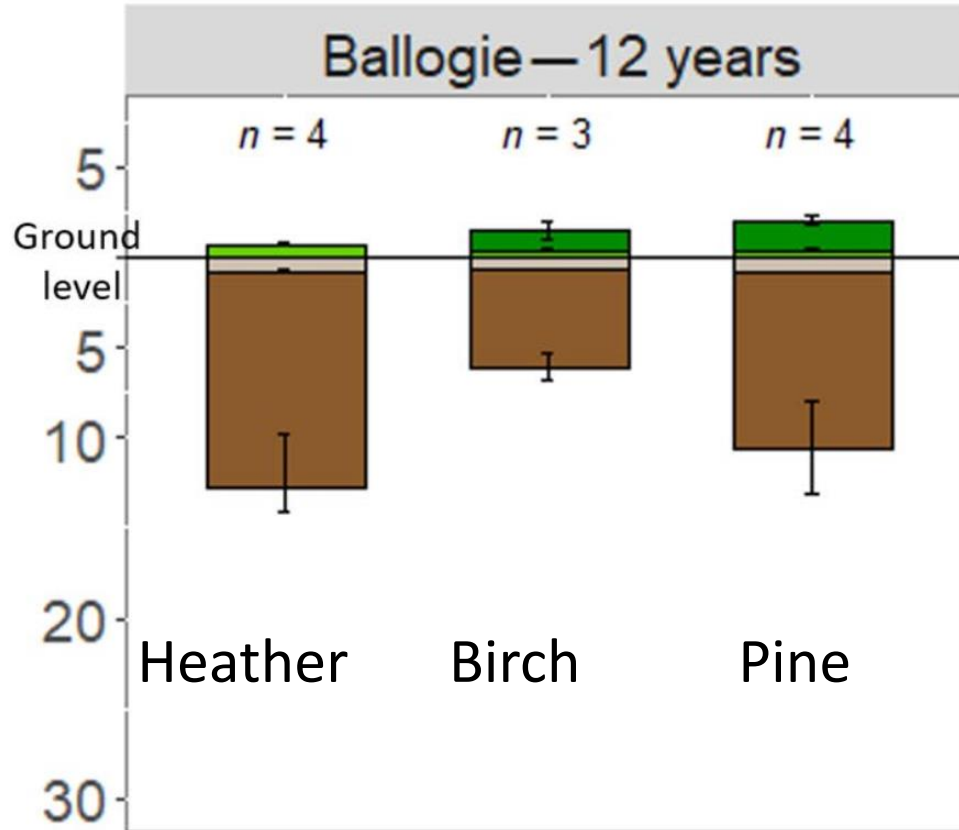
- Birch and Pine 12 years old
- Birch trees 39 years old



# Results – impacts on carbon storage



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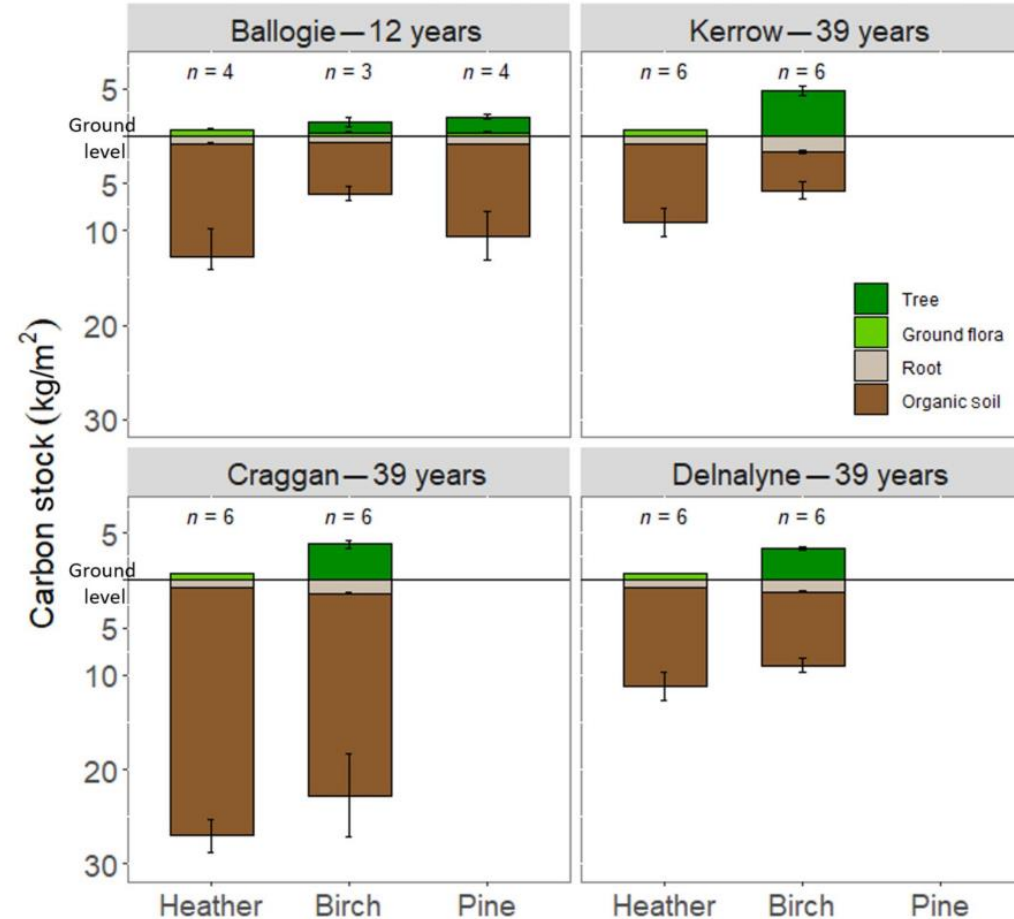


Friggens et al. 2020

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# Results – impacts on carbon storage

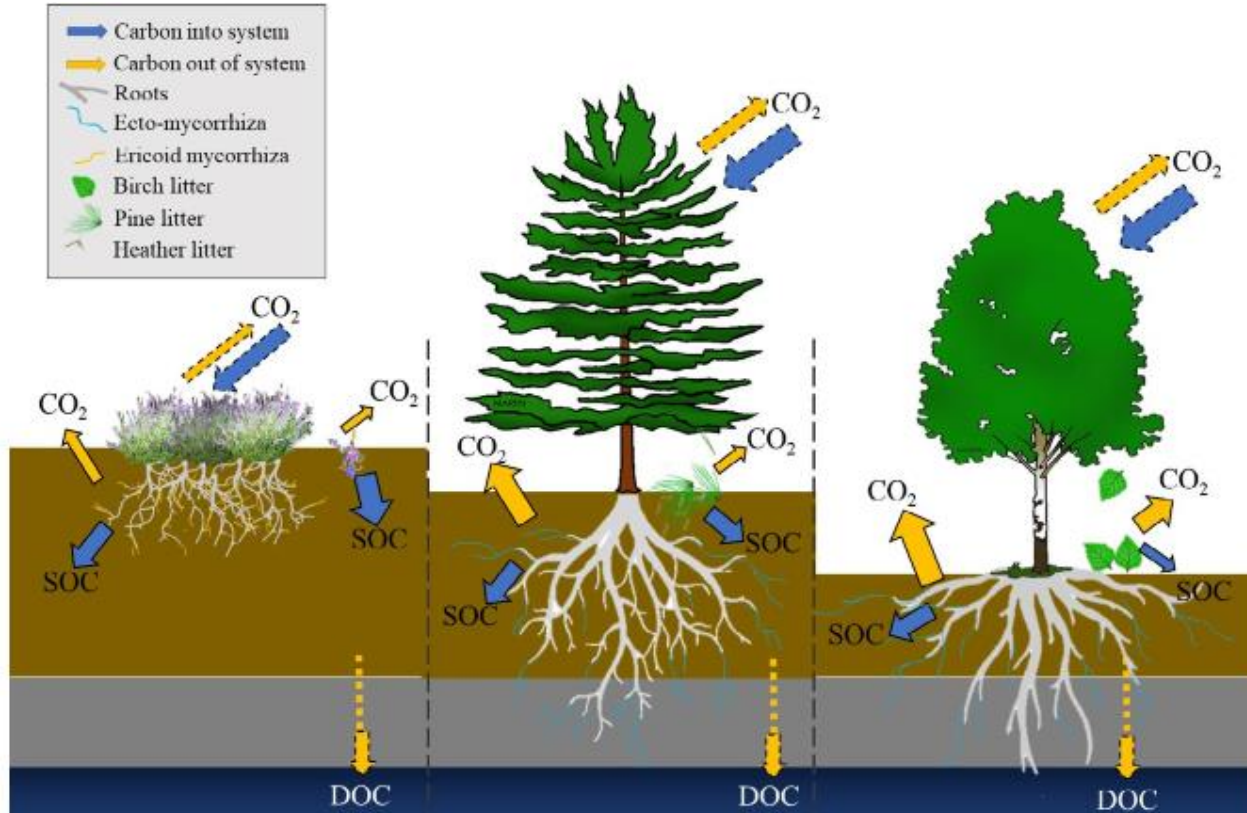


- Above ground – increase in carbon
- Below ground – losses of carbon
- Overall no net gain in carbon

## Summary

- Below ground impacts of trees very important
- On decadal timescales, trees were not mitigating climate change

# Where did all that carbon go?



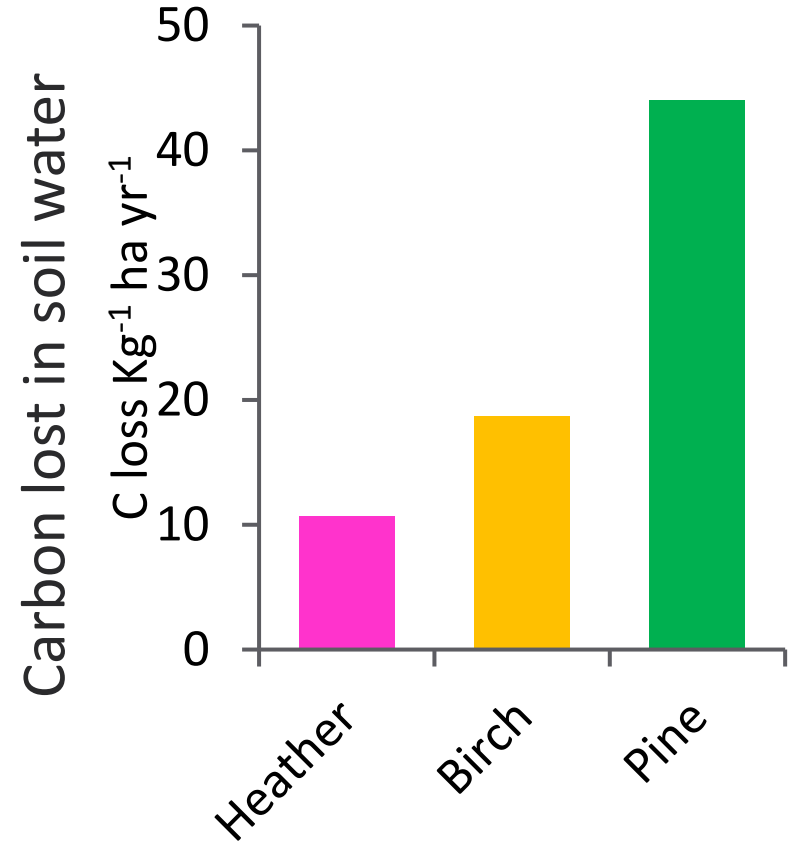
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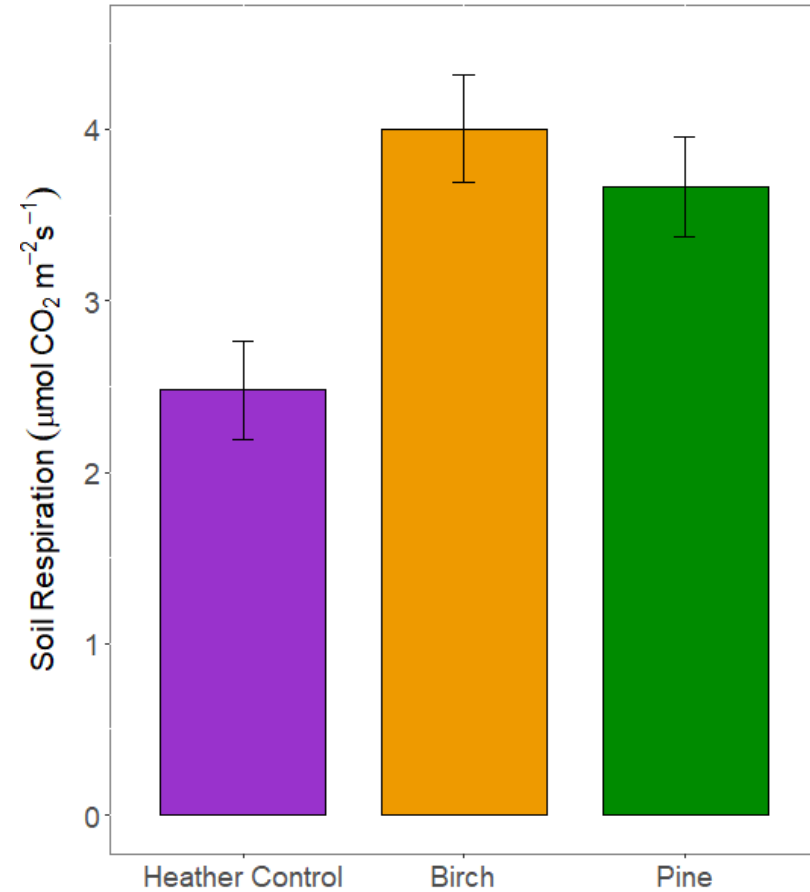
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# Where did all that carbon go?



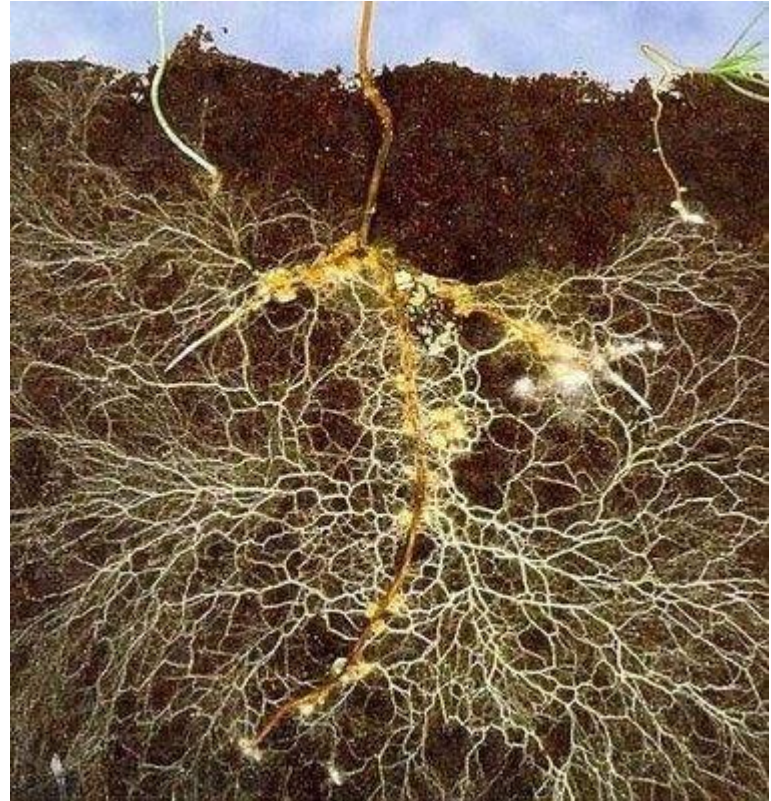
Increase in soil respiration  
The soil community is changing



# Changes in the fungi in the soil

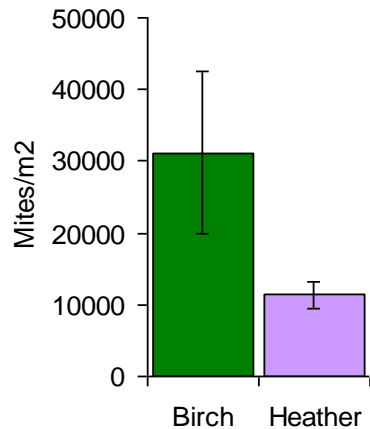
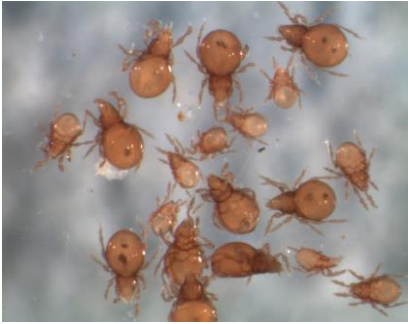


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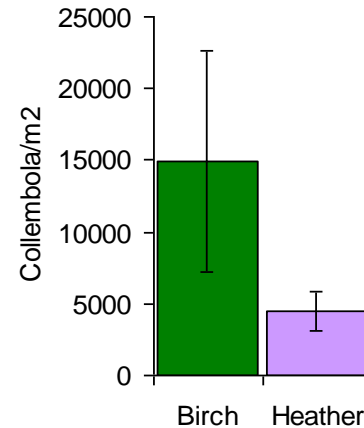


# Other impacts on soil communities

Mites



Springtails

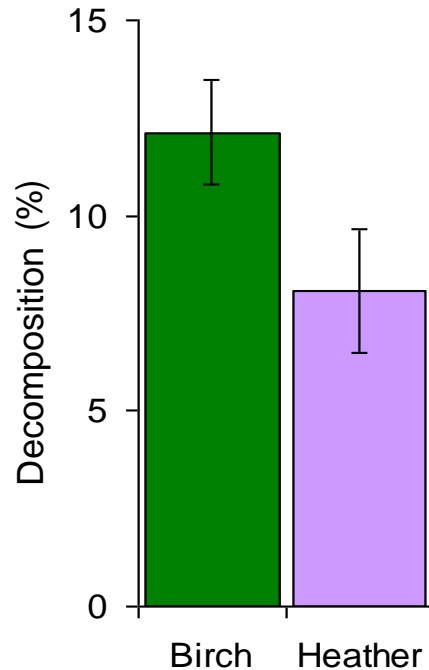


# Consequences for nutrient cycling rates

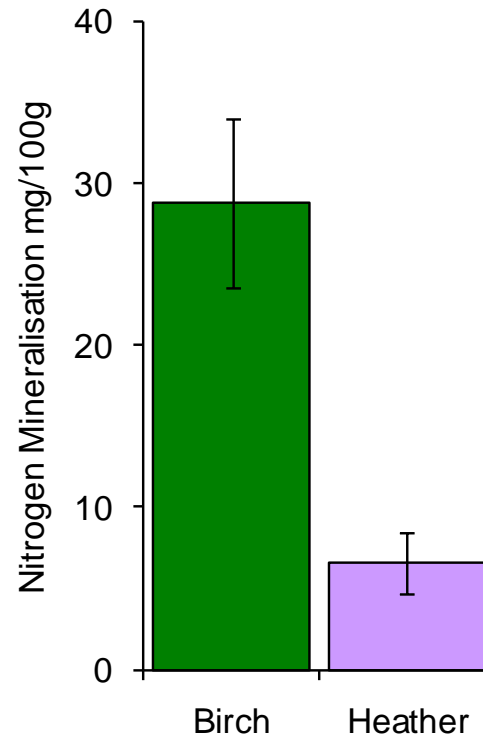


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Decomposition



Nitrogen mineralisation



# Above ground changes



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## Vegetation

- Loss of heather
- Mosses (grasses and blaeberry)

# Trees and Ticks



Public Health  
England

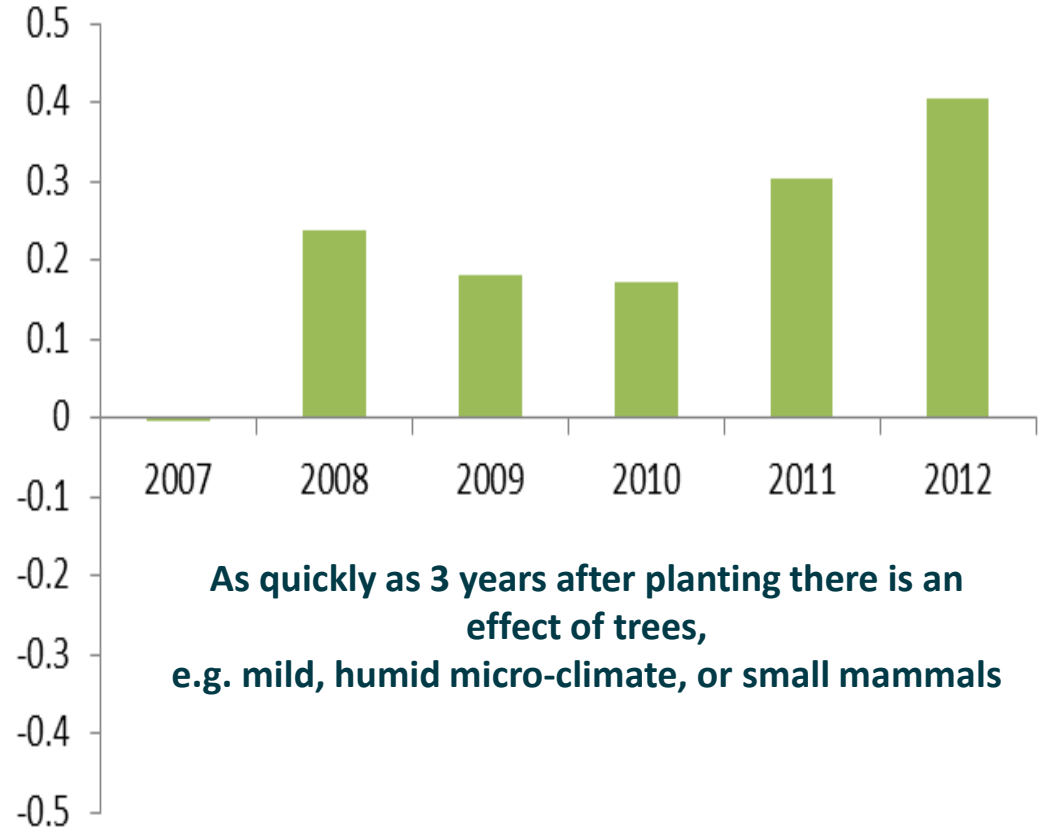
Protecting and improving the nation's health

## Lyme Disease: Signs and Symptoms

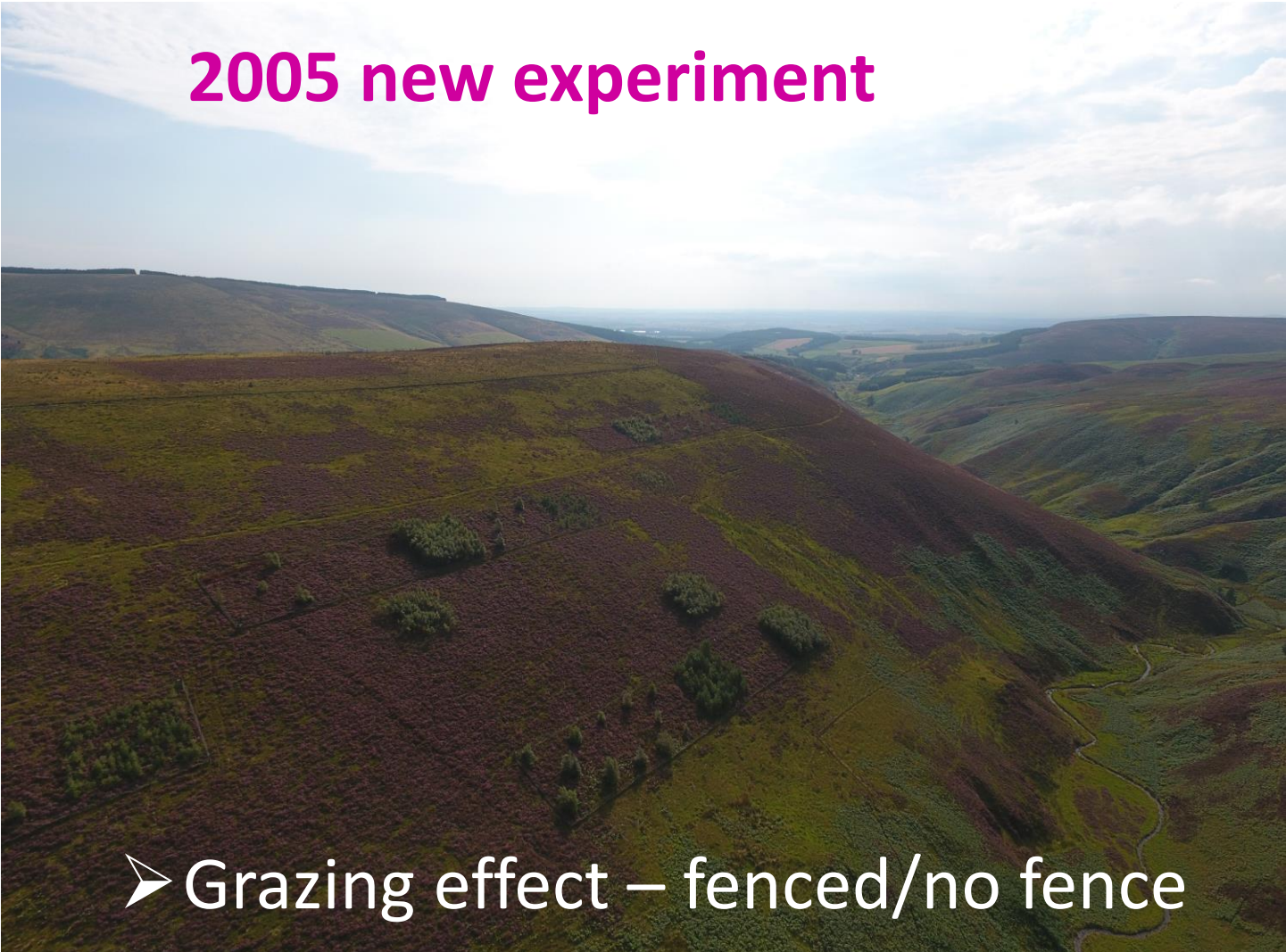
What is Lyme disease?



Proportional difference in ticks  
between heather and birch



# 2005 new experiment

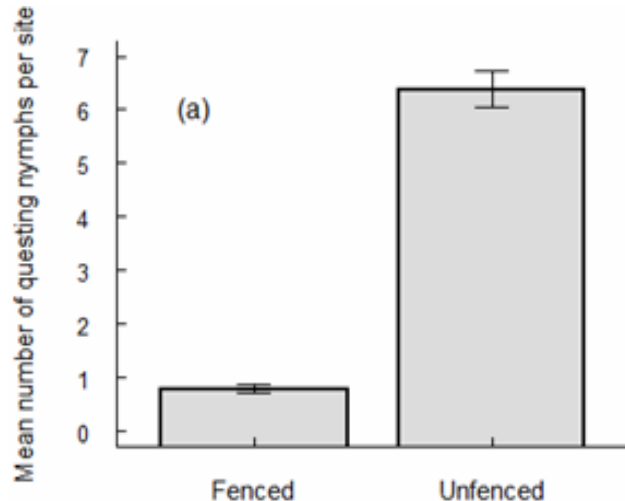


➤ Grazing effect – fenced/no fence

# An effective way to control ticks can therefore be through deer management

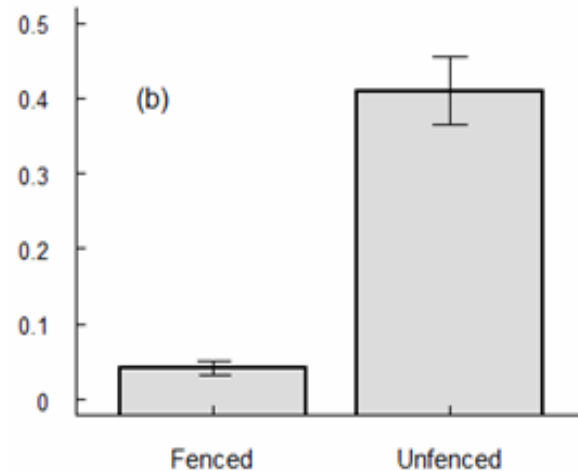
## Moorland - deer farm

V high deer density



## Moorland – sporting estates

“typical” deer density



# Only experiments, what about the rest of Scotland?

Our sites typical of many potential tree planting sites in Scotland  
(heather moorlands with organic rich soils but not peat)

# Relevance to policy



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- Experiment time scales  $\approx$  Net zero timescales of 2050
- No net carbon gain for c 25% of potential tree planting area?

## However

- Mineral soils likely to lead to net gain
- Differences between tree species
- Ground disturbance when planting increase soil carbon losses



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Challenges the assumption held in many policy circles that tree planting will always mitigate climate change



## Benefits/disbenefits – Trade offs



# Thank you to you for listening and...



## The Team

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Steve Palmer  
William Young  
**And many other**

## The Funders

- Nature Conservancy
- ITE/CEH/NERC
- British Ecological Society
- Strategic Research Programmes of the Scottish Government.

## The Landowners

- Ballogie Estate
- Invercauld Estate
- RSPB
- Crown Estate



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