



SHEFFIELD  
LANDSCAPE  
ARCHITECTURE



# Futureproofing parks and greenspaces for climate resilience, people and wildlife

APSE Parks and Greenspace Online Advisory Group

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University of  
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# Content

- The problem with urban greenspace
- The need to build climate resilience and opportunities for biodiversity into our greenspace
- How can local authority land managers help?





The problem with urban greenspace

**This? “Sterile green carpet”?**



## **And this?**

**The inevitability of a changing and warming global climate**

**Arguably the most severe challenge facing our planet.**

**Taking 'action to combat climate change and its impacts' prioritised as Goal 13 of the United Nations (2015) 2030 Agenda for Sustainable Development.**

# Building climate resilience and opportunities for biodiversity into our greenspace: CLIMATE RESILIENCE



# Planting trees in urban areas

- absorbs carbon
- shades streets, pavements and people
- reduces temperatures by evapo-transpirative cooling
- reduces flood risk (reducing volume and speed of flooding by intercepting water on leaves, absorbing water through roots, promoting infiltration of rainwater)



Barcham Trees Plc  
Eye Hill Drove  
Ely  
Cambridgeshire  
CB7 5XF



This certificate shows the carbon performance for this tree. It indicates the efficiency of this tree based on the amount of carbon it will absorb from the atmosphere and store within its woody tissues, over its anticipated 'ideal' lifespan. The carbon capture for each tree is compared to all the other trees and shrubs which are supplied by Barcham to provide a rating. There is more advice on how to interpret this information on the Treeconomics website at: [www.treeconomics.co.uk/treecarboncertificate/](http://www.treeconomics.co.uk/treecarboncertificate/)

Species

Himalayan Birch

Betula utilis

Varieties, subsets, and hybrids which are included within this species calculation:

Grayswood Ghost, Jacquemontii Doorenbos, Jacquemontii Snow Queen

Carbon Performance Rating

More Carbon efficient:

Larger stature, longer lived, more carbon stored



← 3224kg

Less Carbon efficient:

Smaller stature, shorter lived, less carbon stored

# Air quality and climate change resilience

*I'm a great believer of "it's the right tree in the right place". We want to maximise the benefits of the trees and therefore it is important to know which trees are good for carbon sequestration and for air quality. (Greenspace manager, Luton Parks Service.)*

But we need to adapt what we are planting!



Growing evidence base for ecological value of introducing non-native urban planting including urban trees







ELSEVIER

# Urban Forestry & Urban Greening

journal homepage: [www.elsevier.com/locate/ufug](http://www.elsevier.com/locate/ufug)

Original article

## Performance testing to identify climate-ready trees

E.Gregory McPherson<sup>a,\*</sup>, Alison M. Berry<sup>b</sup>, Natalie S. van Doorn<sup>c</sup>

<sup>a</sup> *USDA Forest Service, Pacific Southwest Research Station, 1731 Research Park Dr. Davis, CA 95618 (530), 759-1723, United States*

<sup>b</sup> *Department of Plant Sciences, One Shields Ave., University of California, Davis, CA 95616, United States*

<sup>c</sup> *USDA Forest Service, Pacific Southwest Research Station, 800 Buchanan St., Albany, CA 94710, United States*



Climate-adapted urban trees  
*Quercus robur* (English Oak)?



Planning for 2050

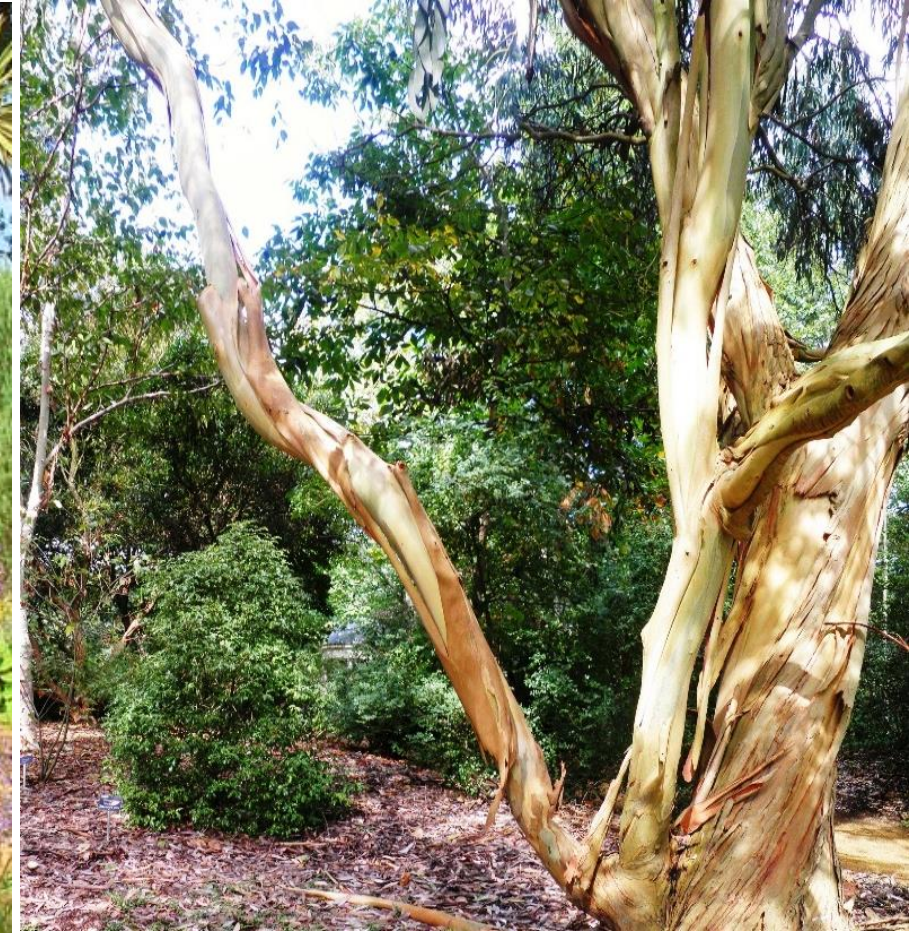
Climate-adapted urban trees  
*Quercus cerris* (Turkey Oak)?



Planning for 2050



**Climate-adapted xerophytic herbaceous planting**



**ATTRACTIVE, CLIMATE-ADAPTED & SUSTAINABLE?**

How do people react to non-native planting in parks and greenspaces?

# UK Research: On site Walks and Questionnaires with the public

## 1411 participants



Torquay *Cordyline australis* 'palms'



Wisley Eucalypts



Abbotsbury 'Jungle Ride'

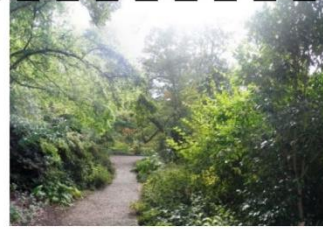
Strongly non-native



Wisley arboretum



Beth Chatto woodland



Wisley Wild Garden

Intermed



Stevenage arboretum



Stevenage Monks Wood



Stevenage Monks Wood

Strongly native



- The walk: observations of aesthetics and biodiversity
- Beliefs and values in relation to climate change
- Demographic characteristics

# UK Research: On site Walks and Questionnaires with the public

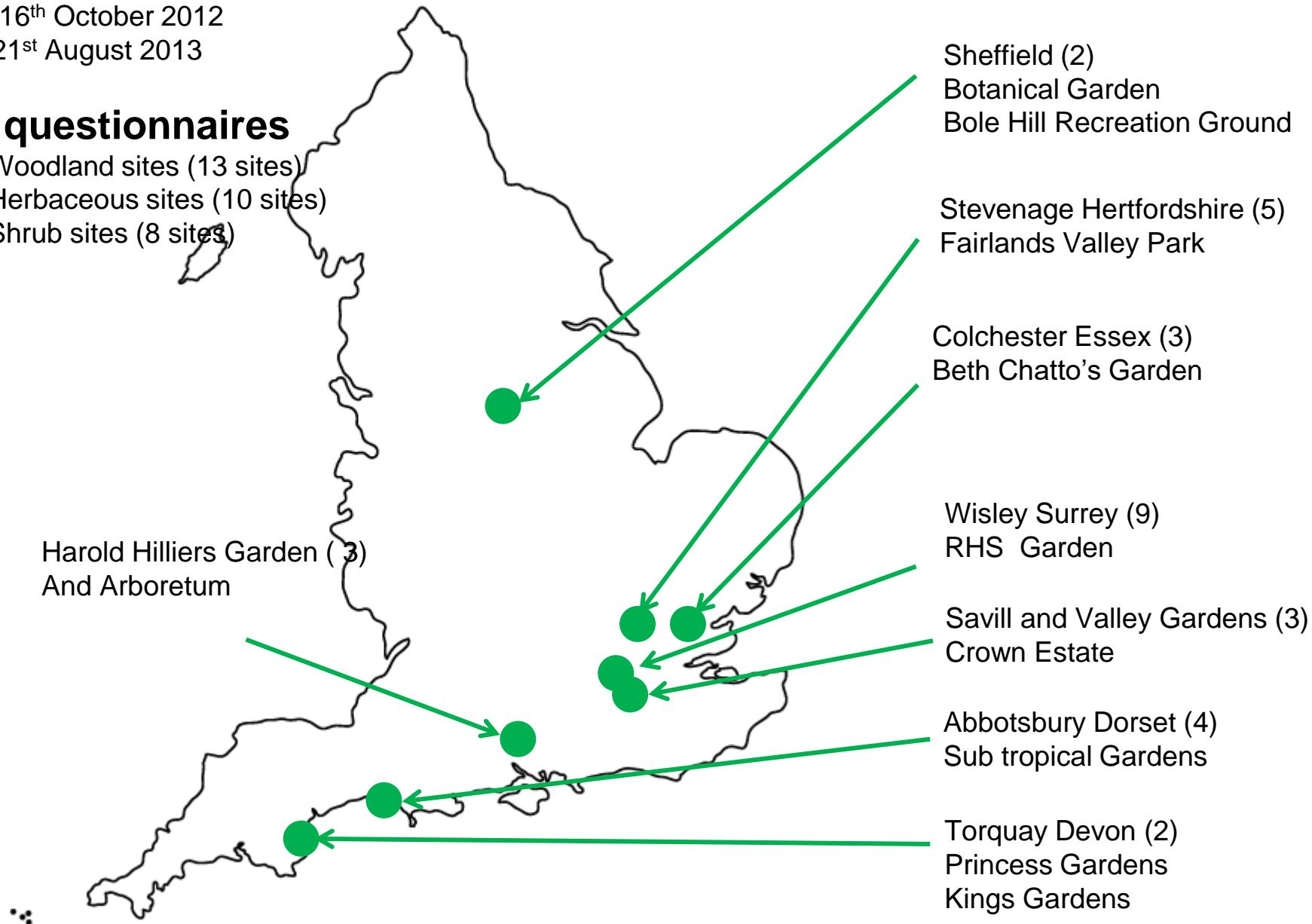


# UK Research: On site Walks and Questionnaires with the public

13<sup>th</sup> April – 16<sup>th</sup> October 2012

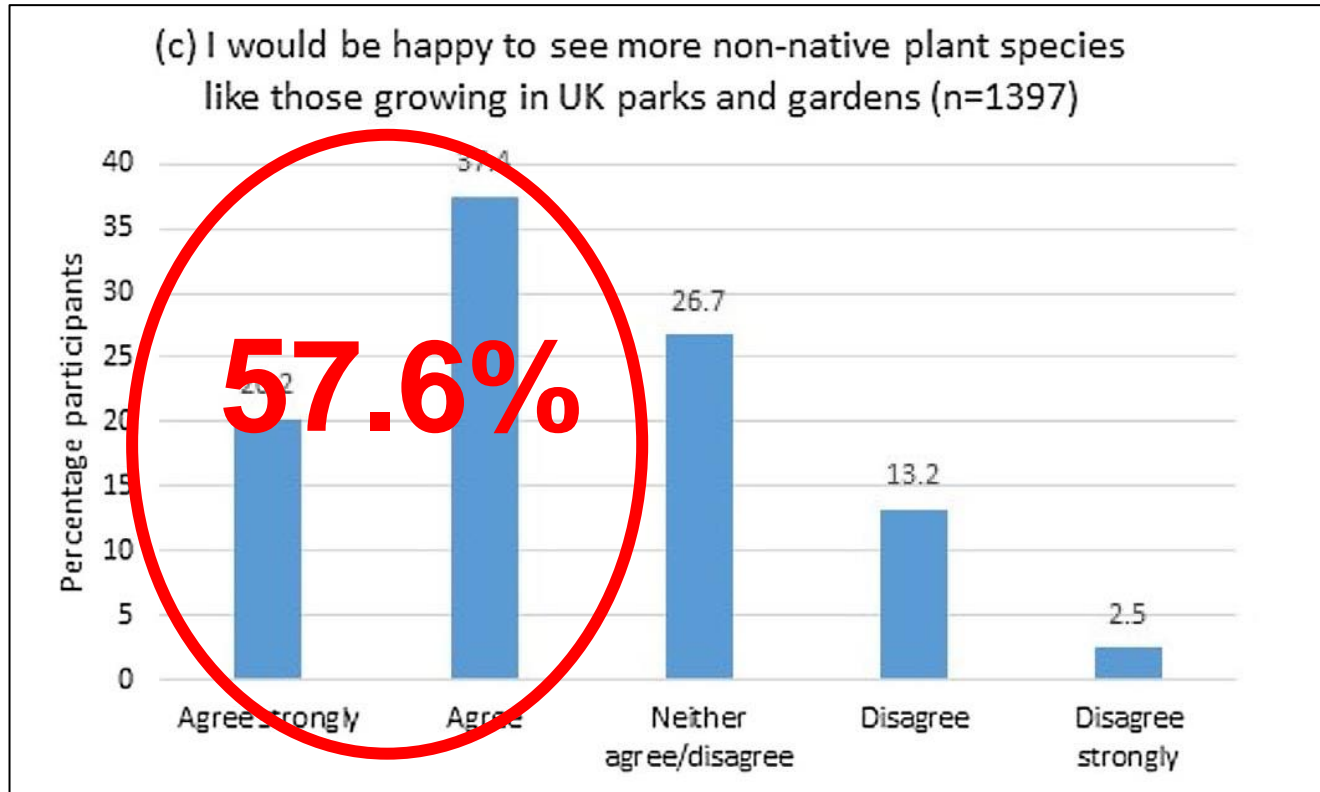
29<sup>th</sup> April – 21<sup>st</sup> August 2013

- **1411 questionnaires**
- 595 in Woodland sites (13 sites)
- 468 in Herbaceous sites (10 sites)
- 348 in Shrub sites (8 sites)





# How accepting are people of non-native planting in parks and greenspaces?

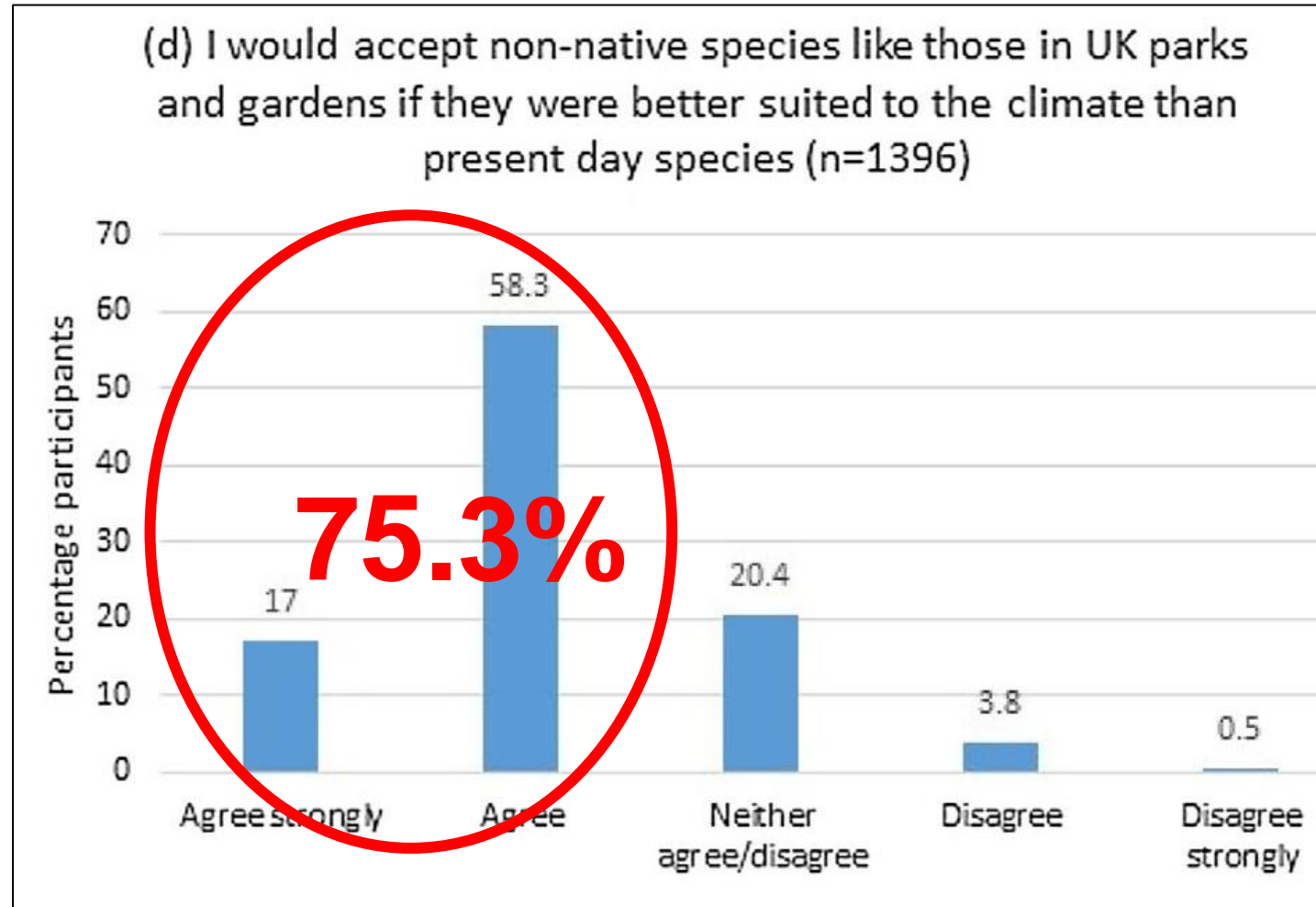


57.6%, (804/1397) participants either agreed strongly/agreed that they would be happy to see more non-native plant species in UK parks and gardens

Do these perceptions change when seen against a background of climate change?



*“I think it’s essential that we adjust our planting so that we don’t have to use fresh water to sustain our green areas. So yes, I’d accept variation in planting because its evolution in action”*



Research Paper

## Attractive, climate-adapted and sustainable? Public perception of non-native planting in the designed urban landscape



Helen Hoyle\*, James Hitchmough, Anna Jorgensen

*Department of Landscape, University of Sheffield, United Kingdom*

### HIGHLIGHTS

- 75.3% participants positive about climate-adapted non-native planting.
- Climate change identified as major driver of acceptance of non-native plants.
- Acceptance also related to aesthetics, context, perceived invasiveness.
- Perceived attractiveness not related to perceived nativeness.
- Contradictions in perception of non-native plants identified.



# Building climate resilience and opportunities for biodiversity into our greenspace: BIODIVERSITY ENHANCEMENT

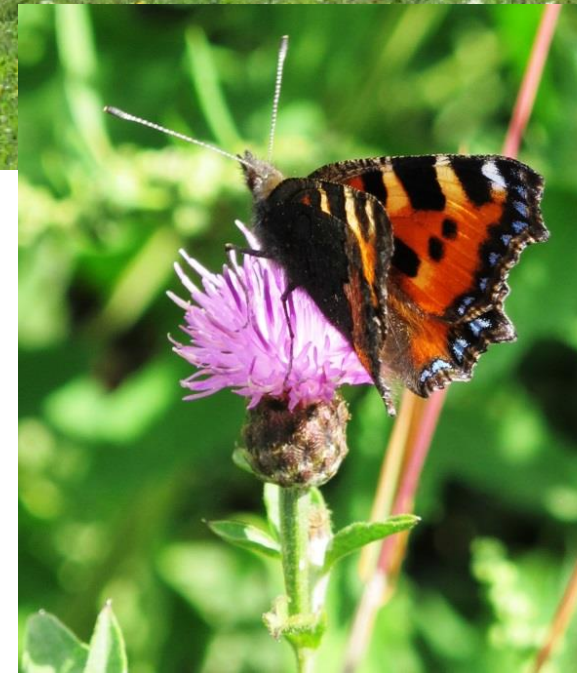


# Introducing urban meadows for people and wildlife

Urban BESS Meadow Manipulation Experiment  
Co-produced in urban green spaces with Luton Parks Service and Bedford Borough Council 2013-15.

*An integrative approach to achieving a balance between:*

- *The aesthetic impact on local green space users and residents*
- *The needs of local wildlife (invertebrate response)*
- *Cost effectiveness in a time of austerity*
- *Changes in water infiltration and soil carbon*



Nine  
different  
perennial  
meadow  
treatments

*Increasing structural diversity*



*Increasing floristic diversity*



Bramingham Road Luton, March 2013

This? “Sterile green carpet”?

Bramingham Road Luton, June 2014



Or this?



# Bramingham Road Luton, June 2023



# Public response: Findings

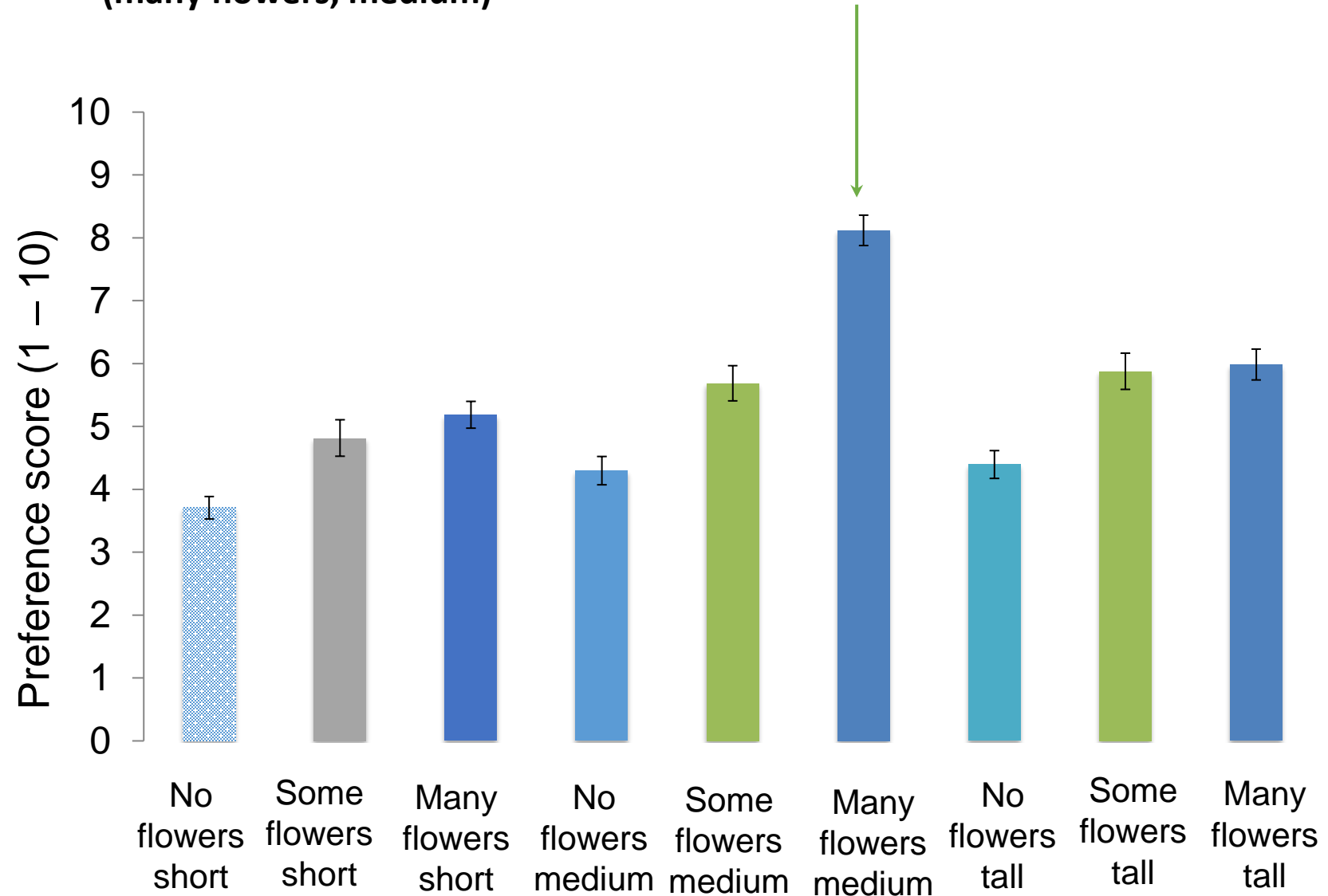
On site questionnaires ( n= 120 ) August 2013, 2014

- All meadow treatments were preferred to the standard mown amenity grass treatment (no flowers, short)
- When comparing plots of the same height, plots that contained more floristic diversity were preferred

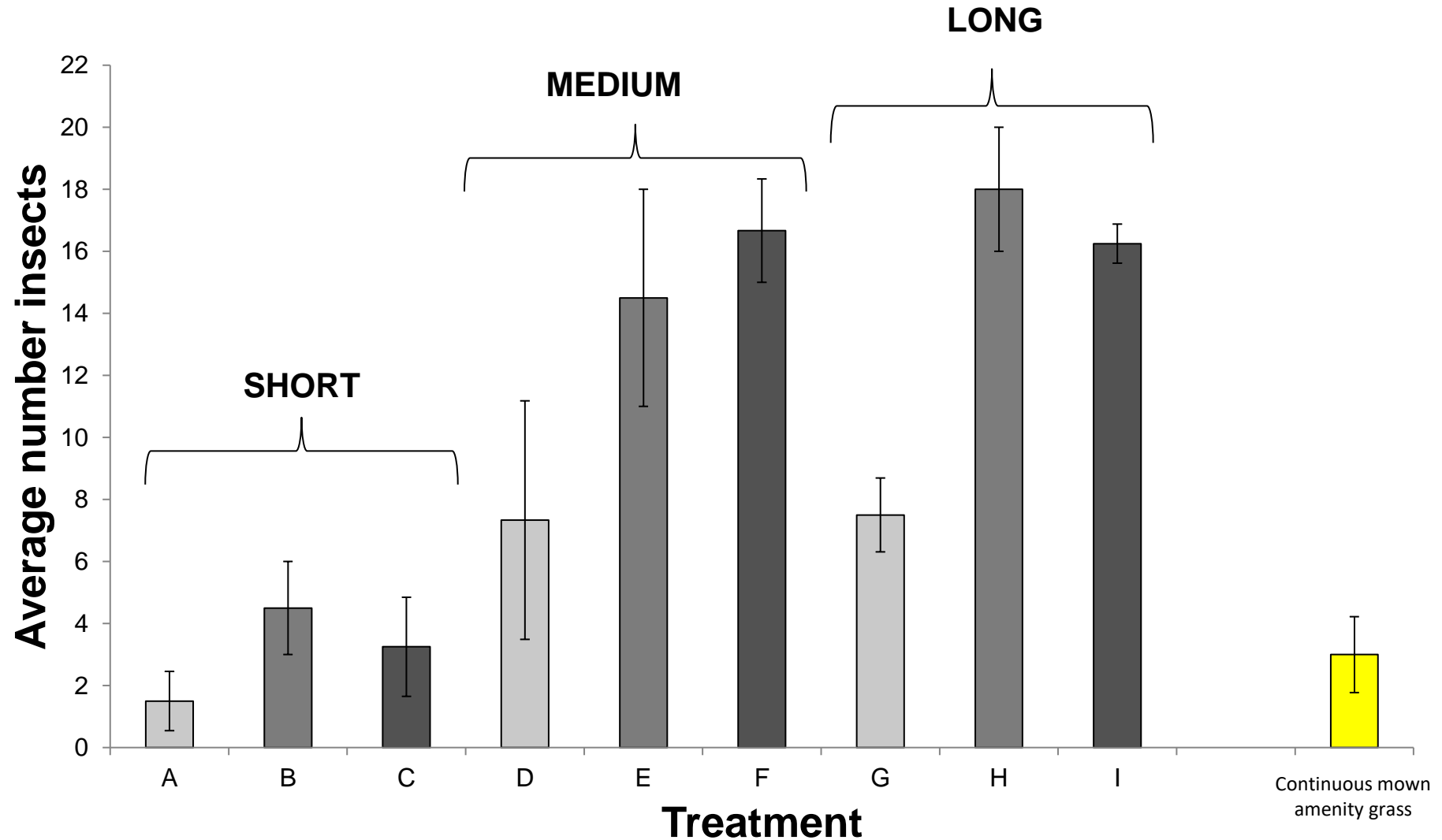


# Public aesthetic response

- The most preferred treatment was the high diversity, medium height treatment (many flowers, medium)



## Average number of insects per treatment





***“Not in their front yard”***

**The opportunities and challenges of introducing perennial urban meadows:  
A local authority stakeholder perspective.**

***Helen Hoyle, Anna Jorgensen, Phil Warren, Nigel Dunnett & Karl Evans***  
***University of Sheffield***





***People like to see 'cues to care' – neat mown edges framing an area of longer meadow or grassland***

# On site Signage

Introduced  
Spring 2014

## Urban Meadow Trial

These experimental meadow areas have been sown with a variety of native grasses and flowers. They are part of a major research project into improving urban biodiversity.



Luton Borough Council staff are cultivating a variety of seed mixes at this site and managing the meadows using different mowing frequencies. Researchers from Cranfield, Sheffield and Exeter Universities are monitoring the sites.

### Why is this being done?

Results of this research, combined with knowledge gained from the project team's work in the Olympic Park, will help inform how best to improve the quality of our urban parks and green spaces for butterflies, bees and other insects, as well as for the people who use and value them.

For further details see: <http://bess-urban.group.shef.ac.uk/>  
or contact: [trevor.tween@luton.gov.uk](mailto:trevor.tween@luton.gov.uk)

### How will the plots change over time?

The plants in these plots are perennials and typically take two growing seasons before flowering fully. During the first year the plants are germinating and establishing. Management work such as weeding is being carried out when necessary.

At the end of each summer each plot is cut back to ground level in order to promote healthy growth the following spring. Over the winter months there is little change, but when temperatures rise in the spring plants start to regrow before flowering again in the summer.

### What plants can you expect to see?

Many of these native meadow flowers and grasses were once much more common than they are now. Many are particularly attractive to butterflies, bees and other insects.



Red Clover  
(*Trifolium pratense*)



Seed heads of Wild Carrot (*Daucus carota*) and  
yellow Lady's Bedstraw (*Galium verum*)



Viper's Bugloss  
(*Echium vulgare*)



Yellow Bird's Foot Trefoil  
(*Lotus corniculatus*) with Wild  
Carrot, Clover and Viper's  
Bugloss



Yarrow  
(*Achillea*)



Black Knapweed (*Centaurea  
scabiosa*) and Ox-eye daisies  
(*Leucanthemum vulgare*)



Musk Mallow  
(*Malva moschata*)



# How can local authority land managers help?





# How can local authority land managers help?

- Introducing trees, shrubs and flowering plants which are 'fit for place' and adapted to the changing climate. This may mean sourcing species from other parts of the world.
- Leaving some areas of semi-natural grassland in parks and greenspaces to grow longer to support invertebrate biodiversity. This supports pollinators and provides habitat for other invertebrates, particularly over winter.
- Creating a mosaic of meadows with different heights and species diversity to support wider invertebrate biodiversity



# How can local authority land managers help?

**Prioritising plants and trees with colourful foliage and flowers in focal parts of parks and greenspaces to support human delight.**




# How can local authority land managers help?



**Sowing colourful flowering perennial and annual meadows in areas where human aesthetic enjoyment is a priority.**

# How can local authority land managers help?

A photograph of a park with a grassy field, trees, and a bench. The scene is a lush green park with a large grassy field in the foreground and middle ground. Several trees are scattered throughout the landscape, some with dense foliage. A metal bench is visible on the left side of the frame, partially obscured by a large green bush. The background shows a line of trees and a clear sky.

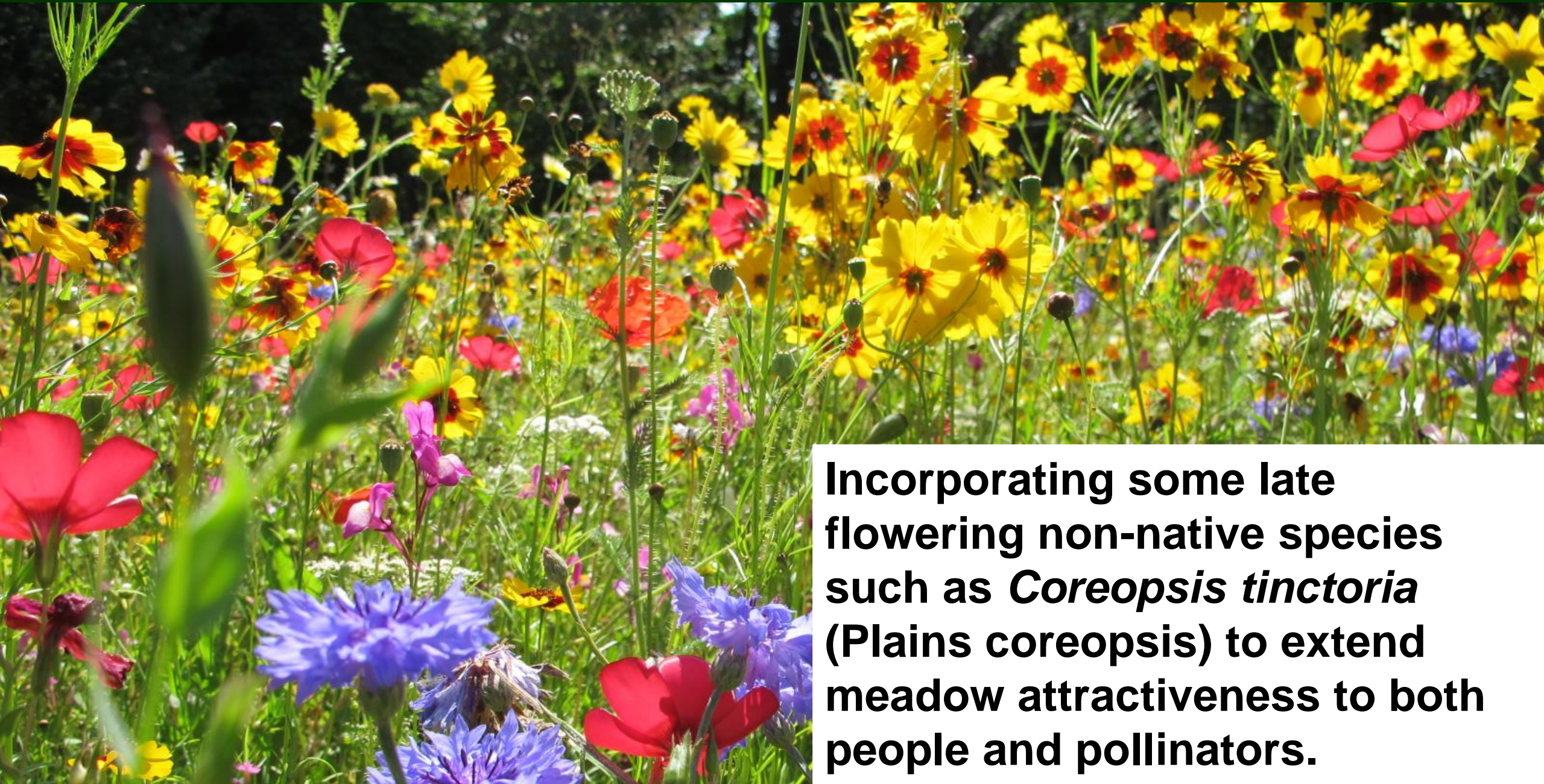
**Framing the edges of longer urban grasslands and meadows to create ‘cues to care’ – visible signs of intentional management practice, enhancing public acceptability.**

# How can local authority land managers help?

Providing on-site signage to explain the biodiversity benefits of urban grasslands.



# How can local authority land managers help?



**Incorporating some late flowering non-native species such as *Coreopsis tinctoria* (Plains coreopsis) to extend meadow attractiveness to both people and pollinators.**

# Improving urban grassland for people and wildlife

## Policy and practice note

Hoyle, H. (2016)

<https://www.ukri.org/wp-content/uploads/2021/12/081221-NERC-LWEC-PPN32-ImprovingUrbanGrasslandPeopleWildlife.pdf>

### Improving urban grassland for people and wildlife

Access to nature is beneficial to human health.  
How can designed urban meadows help to enhance  
public well-being and urban biodiversity?



Living With Environmental Change  
Policy and Practice Notes

Note No.32  
July 2016

The Living With Environmental Change Partnership brings together 22 public sector organisations that fund, carry out and use environmental research and observations. They include the UK research councils, government departments with environmental responsibilities, devolved administrations and government agencies. The private sector is represented by a Business Advisory Board.

Policy and Practice Note 1

## **Futureproofing urban parks and greenspaces for climate resilience, people and wildlife**

Access to parks and greenspaces is key to public health in cities. How can we futureproof parks and greenspaces to provide climate resilience whilst supporting human wellbeing and biodiversity?



# **Futureproofing urban parks and greenspaces for climate resilience, people and wildlife**

## **Policy and practice note**

**Hoyle, H. (2021)**

<https://uwe-repository.worktribe.com/output/7502183/who-collaborating-centre-for-healthy-urban-environments-policy-and-practice-note-1-futureproofing-urban-parks-and-greenspaces-for-climate-resilience-people-and-wildlife>



Thank you for listening!

Thank you to Jane Conway, Steve Battlebury, Sam Willis, and all at Luton Parks Service

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