

HEALTHY ECOSYSTEM RESTORATION IN OXFORDSHIRE
(HERO)

MAY 11 2022

URBAN GRASSLAND MANAGEMENT



OXFORD
MARTIN
SCHOOL



UNIVERSITY OF
OXFORD



About HERO

Healthy Ecosystem Restoration Oxfordshire (HERO) is a three-year programme (in the first instance) supported by the Oxford Martin School, under their new Programme on Biodiversity and Society. HERO will explore how Oxford University can play a role in efforts to restore ecosystems to health in Oxfordshire, by bringing the University's strengths in academic knowledge, research capacity and convening power to support ongoing and planned nature recovery activities by a range of local partners and stakeholders, including landowners and farmers.

With its active network of nature recovery groups, Oxfordshire presents a compelling opportunity to test and showcase a portfolio of different ecosystem restoration strategies, to become a model county for nature recovery. HERO aims to build a community of practice between the University and local practitioners and will also form a resource for the University and its constituent Colleges within broader institutional sustainability goals.

The HERO network brings together researchers from the natural and social sciences with local authorities, environmental organisations, landowners and community groups who are already working on a range of initiatives to help support nature's recovery and enhance the multiple benefits that nature provides in Oxfordshire. We also aim to invite prominent supporters of Oxford's biodiversity research in the business, finance, government and NGO sectors, to strengthen links with external stakeholders.

HERO holds regular workshops and seminars to examine key opportunities, challenges and evidence gaps around nature recovery in Oxfordshire, and provides limited research support to help fill evidence gaps. The [inception workshop](#) in July 2021 identified the priorities for nature recovery across Oxfordshire. The second workshop in September 2021 explored mapping and assessment of nature recovery activities in Oxfordshire.

The [third workshop](#) in November 2021 focused on available datasets and evidence needs for a nature recovery strategy. The [fourth workshop](#), in February 2022, discussed priorities for the social science research agenda of HERO and outlined the socio-economic and cultural barriers to change. The fifth workshop in March 2022 looked at methods of monitoring biodiversity.

About this workshop

This note presents the outputs from the sixth HERO workshop, which was attended by 34 participants (15 in-person and 19 on-line) on the 11th of May 2022.

The purpose of the workshop was to consider the opportunities for improvements to urban grassland and verge management to support Nature Recovery in Oxfordshire and beyond.

Cecilia Dahlsjö provided a summary of academic literature on managing grasslands for biodiversity and Alison Smith summarised existing practical guidance on grassland management from organisations such as Plantlife and Buglife.

Chris Bell from Oxford City Council then spoke about the challenges and trade-offs of practical implementation of grassland strategies in urban areas, and the workshop concluded with a group discussion.

The group agreed that an informative poster concerning best-practice grassland management was needed to encourage people to mow less, enhance structural diversity and leave refuges for invertebrates.

HERO WORKSHOP #6

HYBRID MEETING

Table of Contents

HERO Workshop 6.....	2
List of participants.....	2
About HERO.....	3
Cecilia Dahlsjö: academic literature on managing urban grasslands for biodiversity	4
1 Perception and well-being	4
2 Structure and diversity.....	5
3 Mowing frequency and refuges	5
Alison Smith: existing practical guidance	6
Plantlife.....	6
Buglife.....	7
Chris Bell: practical challenges, trade-offs, and solutions	8
Group discussion: opportunities for optimising urban grasslands.....	9
Urban meadow and verge guidelines poster.....	10

Participants:

In person: Yadvinder Malhi (University of Oxford), Cécile Girardin (University of Oxford), Constance McDermott (University of Oxford), Chris Bell (Oxford City Council), Olivia Thornton (University of Oxford), Cecilia Dahlsjö (University of Oxford), Pete Sudbury (Oxfordshire County Council), Loéna Trouvé (Oxford Biodiversity Network), Carlyn Samuel (University of Oxford), Wallerand Bazin (University of Oxford / rapporteur).

Online participants: Alison Smith (University of Oxford), Rachel Crookes (West Oxfordshire District Council), Ada Grabowska-Zhang (University of Oxford), Lucy Kennerly (Oxfordshire County Council), Camilla Burrow (Wild Oxfordshire), Sam Riley (Forestry Commission), Angela Liu (University of Oxford), Emily Stott (University of Oxford), Kim Polgreen (Wytham Woods).



CECILIA DAHLSJÖ: ACADEMIC LITERATURE ON MANAGING URBAN GRASSLANDS FOR BIODIVERSITY

To introduce the challenges of managing grasslands, Cecilia Dahlsjö described how a flower-rich grassland area next to her local housing estate was mowed to the ground after two residents complained that it was untidy. It is now mown every two weeks, removing all the wildflowers. Using this example to frame the conversation, Cecilia then presented a summary of existing academic literature on managing grasslands for biodiversity.

This covered three topics:

1. Human perceptions and well-being
2. Grassland structure and diversity
3. Mowing frequency and refuges.

1. PERCEPTION AND WELL-BEING.

Hoyle and colleagues (2017) interviewed local authority managers involved with an experiment testing the public response to short grass, medium or tall meadows.[1] They found that all managers were concerned about the public reaction to changes in the aesthetic appearance of the landscape, with many believing that longer vegetation is less likely to be appreciated. Location was also considered to be an important factor, with some managers saying that long grass is not appropriate in certain settings such as formal parkland. Some recommended cutting a metre wide strip of short grass to frame areas of longer grass, showing that the area is maintained and the long grass is intentional. Local authorities are also concerned with economic sustainability and fear that departing from standardized mowing can incur additional costs. Cutting less would reduce costs but may incur additional costs for "cut and collect" procedures, to cover the cost of new machinery. In line with this concern, a participant noted that the recommendation from ecologists to mow in February or March could cause problems as staff could be busy on annual maintenance tasks and equipment could be out of service at that time.

Three other papers revealed differences in the perception of meadows between managers (local authorities) and users (people enjoying meadows) [2]. Although managers claimed that people prefer short mown grass, most people actually preferred meadows to formal bedding plants. When shown images of meadows or short grass, 65% of users preferred the meadows with only 16% preferring short mown grass. The highest preference was for medium height meadows. Meadows (as a 'dose of nature') were also shown to improve mental health. However, a participant noted that the papers did not distinguish local residents from visitors. Hence, it could be that people preferring short grass could be local residents, whilst those enjoying the meadows may be visitors. The studies did account for socio-economic factors, with wealthier people tending to have a more positive outlook on meadows.

[1] Hoyle, H., et al. (2017) "Not in their front yard: the opportunities and challenges of introducing perennial urban meadow", *Urban Forestry & Urban Greening*, 25:139-149

[2] Southon, G., et al. (2017) "Biodiverse perennial meadows have aesthetic value and increase resident's perceptions of site quality in urban green-space", *Landscape and Urban Planning*, 158: 105-118; Hoyle, H., et al., (2018) "Plant species or flower colour diversity? Identifying the drivers of public and invertebrate response to annual meadows", *Landscape and Urban Planning*, 180: 103-113 ; Southon, G., (2018) "Perceived species-richness in urban green spaces: cues, accuracy and well-being impacts", *Landscape and Urban Planning*, 172: 1-10.



2. STRUCTURE AND DIVERSITY

From an ecology perspective, there is a paucity of research on structure and diversity.[3] Existing research indicates that invertebrate taxa tend to be higher in tall, diverse meadows than in short lawns, with the former having higher species richness, providing a cool refuge in the face of increasing temperatures, and an important habitat for spiders and grasshoppers that overwinter in grasses. Urban meadows can suffer from high levels of nutrients and heavy metals,[4] and high soil nitrate concentrations are linked to low herbaceous diversity. Regular mowing and removal of the cuttings can reduce soil fertility and nitrogen levels, which increases herbaceous diversity and has positive impacts on invertebrates.

3. MOWING FREQUENCY AND REFUGES

Five papers looked at the timing of the first mow. Cecilia Dahlsjö emphasized an important caveat, namely that the papers only investigate up to a maximum of three cuts. One paper recommends moving the first mow from spring (May-June) to summer (July-Sept) to increase plant and invertebrate diversity. Another found that as a rule of thumb, it is best to mow in February / March (before the growing season) and again in autumn after the growing season. This benefits butterflies, diurnal moths, orthoptera and spiders. Another study of grass verges found that bi-annual mowing with removal of cuttings was better than no mowing or mowing only once, for plants and invertebrates.[5] However, impacts vary according to the types of species. For instance, one study found that leafhoppers and planthoppers (where reproductive adults emerge in late summer) did better with a May cut than with a July cut, although uncut plots had even more leafhoppers.[6] However, another paper found that postponing mowing until as late as November, or from early to late summer, has a negative effect.

Papers were unanimous concerning the benefits of leaving an uncut refuge.[7] Leaving an uncut refuge of 10-20% can increase the abundance of butterflies, orthoptera, bees and moths, and provide an important safe haven during mowing and for overwintering species. Papers therefore recommended leaving uncut refuges to maximise the survival of invertebrates during mowing.

[3] Francoeur, X., et al., (2021) "Complexifying the urban lawn improves heat mitigation and anthropod biodiversity", *Urban Forestry & Urban Greening*, 60; Norton, B., et al., (2019) "Urban meadows as an alternative to short mown grasslands", *Ecological Applications*, 29(6); About Orthoptera, website, Accessed: September 2022

[4] Manninen, S., et al., (2010) "Management mitigates the impact of urbanization on meadow vegetation", *Urban Ecosystems*, 13(4): 461-481

[5] Noordijk, J., et al., (2010) "Effects of vegetation management by mowing on ground-dwelling anthropods", *Ecological Engineering*, 36(5):740-750

[6] Morris M.G. (1981) Responses of grassland invertebrates to management by cutting: III. adverse effects on Auchenorhyncha. *Journal of Applied Ecology*, 18, 107-123.

[7] Garbuzov, M., et al., (2014) "Public approval plus more wildlife: twin benefits of reduced mowing of amenity grass in a suburban public park in Saltdean, UK", 8(2): 107-119 ; Noordijk, J., et al., (2010) "Effects of vegetation management by mowing on ground-dwelling anthropods", *Ecological Engineering*, 36(5):740-750; Bruppacher, L., et al., (2016) "Simple modifications of mowing regime promote butterflies in extensively managed meadows: Evidence from field-scale experiments", *Biological Conservation*, 196: 196-202; Buri, P., et al., (2013) "Delaying mowing and leaving uncut refuges boost orthopterans in extensively managed meadows: Evidence drawn from field-scale experimentation", *Agricultural, Ecosystems and Environment*, 181: 22-30; Buri, P., et al., (2016) "Delayed mowing promotes planthoppers, leafhoppers and spiders in extensively managed meadows", *Insect Conservation and Diversity*, 9:6

In summary:

1. Local authorities perceive people’s perceptions towards meadows more conservatively than they are.
2. Diverse vegetation structure benefits invertebrates.
3. Bi-annual mowing is most beneficial, particularly in spring and autumn.
4. Delaying the first cut from spring to late summer may be beneficial for some species.
5. Mowing at the height of the summer has a negative impact on some species.
6. Leaving an uncut refuge benefits invertebrates during mowing as well as overwintering species.

ALISON SMITH: EXISTING PRACTICAL GUIDANCE

Alison Smith presented a summary of existing practical guidance for mowing from Plantlife, Buglife and Wild Oxfordshire.

PLANTLIFE

Plantlife has different publications (i.e. The Good Verge Guide, Road verges, Managing Grassland Road Verges, The Good Meadow Guide) that suggest alternative mowing regimes, all based on one or two cuts per year. For instance, in rural settings, Plantlife recommends mowing in late summer followed by grazing. In urban settings, the first cut should be made in February or March with a second cut during September to October. They mention the contribution of yellow rattle, which increases the presence of wildflowers since it is parasitic on grass.

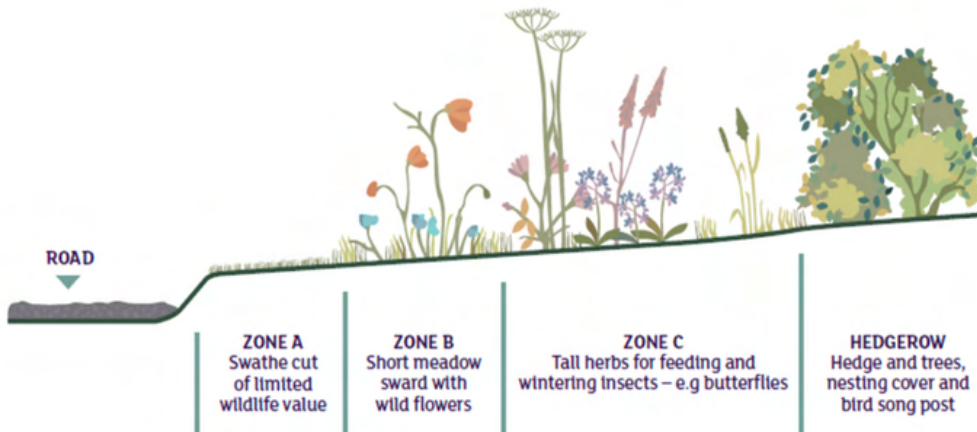
Table 1: Plantlife’s recommended mowing cycle

Management option		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
One cut									full cut				
Two cuts	Summer and autumn cutting								partial cut		full cut		
	Late winter and autumn cutting		full cut							full cut			
	Dry verges (short vegetation)		regular cuts							regular cuts			
	Species-rich verges with mown edge		1m strip							full cut			

To summarise, their recommendations are to:

- Cut once in early spring (Feb-March) and once when seed has set (~Aug-Sept).
- Skip the spring cut if wildflowers are growing. After a few years, the spring cut may no longer be necessary.
- Cut with a mower at its highest setting (greater than 10cm), or with a strimmer or brush cutter, to reduce mortality of invertebrates.
- Remove cuttings (ideally leave for a week for seeds to drop) or leave in habitat piles to allow invertebrates to escape and find refuges.
- Leave about 10-20% of verges uncut, e.g. a strip of longer grass at the back, cut every 2-5 years on rotation. On narrow verges leave some sections uncut (e.g. 50m every 200m) instead.
- Enhance the grassland with yellow rattle
- Leave some scrub (5-10%) and cut every few years on rotation.

Figure 1 summarises what Plantlife is aiming for on roadside verges, namely stratified zones for cutting short (Zone A), medium (B) or a taller uncut refuge (C), with a hedgerow border.



BUGLIFE

Buglife has very similar guidance but focuses more on optimizing habitat for invertebrate species. Their ideal vision for rural areas emulates English landscapes dating back 10 000 years where open areas are maintained by grazing animals, creating rich structural diversity. However, while grazing is rarely possible in urban areas, they emphasise the goal of creating structural diversity, which is as important as plant species composition, recommending to:

- Cut as late as possible, ideally late September since many larvae develop in seedheads. As mentioned above, cutting will affect species differently. Cutting in June will badly affect planthoppers and many flies, mowing in July/August will affect leafhoppers and cutting in April will be particularly harmful for dandelions and daisies that bees use to forage.
- Cut on a rotational basis and leave uncut refuges for invertebrates over-wintering in stems and old seed heads.
- Vary the cutting height and frequency for a mosaic of different sward heights.
- Leave islands of tussocky vegetation as shelter and over-wintering sites. Where possible, encourage wilder margins of tall herbs including species such as Ragwort, thistles, and nettles. Most people would think of these as weeds, but they are extremely valuable for many species.
- Leave some cuttings on site, which would reduce operational costs in addition to the biodiversity benefits.
- Leave some scattered scrub, especially old scrub with dead wood.



Floodplain meadows are special places as they hold unique plant communities that set seeds early, meaning that they will survive early mowing. The original purpose of these meadows was to create hay to feed animals and mowing early would provide more nutritious hay. However, changing the mowing times may impact species that have been used to these mowing cycles.



To summarise Buglife's take on hay meadows, they encourage long term management regimes and recommend to:

1. Leave an uncut headland, or margin around a field.
2. Aim for a mosaic of different sward heights. Medium to tall vegetation supports more invertebrates than short vegetation.
3. Allow flowers to set seed
4. Retain grass and flower seed heads throughout the winter in refuges (e.g. for acalyptate flies to complete their life cycle)
5. Allow scattered scrub and hedgerows to provide structural variations, especially with margin of longer grass.

Alison concluded by referencing Wild Oxfordshire's website that provides additional guidance (e.g. for biodiversity in new housing developments).

CHRIS BELL: PRACTICAL CHALLENGES, TRADE-OFFS, AND SOLUTIONS

Chris Bell, from Oxford City Council provided insights on the practical challenges of implementing local strategies for green spaces. Although Oxfordshire is not starting with a blank canvas – given years of efforts in nature recovery – local authorities are still trying to challenge the black and white idea that people have of natural and urban spaces. This is the result of environmentally disastrous management of urban spaces from the parks and countryside teams, based on short mown grass and seasonal bedding, while dead leaves and dead wood are removed from the ecological cycle. Chris Bell works with these teams to see what can be achieved. However, there remains much room for progress given that the climate and biodiversity crisis require much more than simply leaving small areas of land unmown. Moreover, the city owns a huge amount of land, which means that a big difference can be made at a grand scale. Nonetheless, there are many challenges and compromises, with many stakeholders and members of the public still not on board. For every email Chris receives from people wanting to stop mowing, another email invokes 'paying taxes' as a justification for having more spaces mowed. This can be linked to views of nature as external and isolated. Moreover, there is an obsession with planting aesthetically pleasing colourful seed mixes, regardless of the hydrological or soil condition of the meadow and disregarding the fact that some sites of traditional flower meadows may still have their ancient seedbank. People need to take advantage of the historical remnants of meadows rather than starting new meadows from scratch, which can take decades. Finally, there are constraints surrounding financial resources (e.g., upfront costs of developing anaerobic digestion for waste) and political challenges. Land is becoming increasingly precious, and sites must be scrutinized for their unique potential (i.e., recreation, housing, tree planting). For instance, you can plant trees on slopes, but they should not be planted on meadows.

Chris Bell's team has focused on dedicating fields and parks to restore historic meadows and for more trees in the right place. If land becomes scarcer, there is less potential to plant more trees, whereas there is still much potential for hedgerows around fields or to replace fences with hedges. However, financial schemes remain skewed towards tree planting despite the carbon-storage potential of well-managed meadows. Chris remains confident that many successes in nature recovery can be achieved if political barriers are circumvented. This requires stakeholder management through adequate communication. For instance, people that were afraid that grass verges would increase fire risk (e.g., throwing a cigarette out of the window) were reassured through fire risk assessments. Moreover, people may object very strongly in one location and agree in another. Hence, decision makers must acknowledge these geographical differences and prioritise areas where people agree.



GROUP DISCUSSION: OPPORTUNITIES FOR OPTIMISING URBAN GRASSLANDS

Alison Smith opened the discussion with four overarching questions as well as a proposal for a poster with guidelines for managing meadows and road verges.

- To what extent are Buglife, Plantlife and other guidance followed in Oxfordshire?
- Do we need more emphasis on habitat structural diversity, refuges, and rotational mowing?
- What are the practical challenges, including social barriers, to more nature-friendly management and (how) can they be overcome? (including use of contractors.)
- Next steps: can we identify three opportunities for improved management that could be trialled across Oxfordshire?

Chris Bell reiterated the economic and social challenges linked to inherited perceptions of what should or should not be done. Creating stakeholder awareness is much needed so that people are aware of the benefits of mowing less and creating refuges. In fact, participants were concerned at the level of cognitive dissonance linked to habits. A participant argued that public consultation was key and could be improved by training council customer service teams so that they provide well-informed advice to members of the public. The role of Oxford University's parks team is also important in coordinating efforts across colleges and the city, given that many green spaces are managed by the university. Finally, although mowing less may reduce operational costs, there remains resource gaps for collecting mowed grass.

It was agreed that it could be useful to produce an informative poster to be rolled out to town and parish councils, explaining the benefits of:

1. Mowing less,
2. Encouraging a diverse structure,
3. Leaving refuges.

The poster would be mainly aimed at people in charge of maintaining urban grasslands, including those who set the cutting schedules, the staff and contractors carrying out the work, and elected council members who might need to approve any changes in management. A QR code could lead to a separate landing page that will provide further details in a leaflet and have further links. This could either be part of the HERO web pages or could go to a Wild Oxfordshire grassland webpage which is being developed.

Building on participants' feedback, the HERO team drafted the following poster after the workshop:

URBAN MEADOW AND VERGE GUIDELINES

HOW YOU CAN HELP LOCAL WILDLIFE TO THRIVE



1. Mow less often (once or twice a year)



- Mow once between Feb–March if necessary, then leave flowers for spring pollinators.
- Mow once between Sep–Oct, so flowers have time to set seed & insects can complete their lifecycles.
- Remove grass cuttings to reduce soil fertility, so that wildflowers grow rather than just grass.

2. Leave refuges of long grass and shrubs



- Leave 10%–20% as an uncut refuge of tall grass & flowers. This helps insects & spiders complete their lifecycle, as larvae & eggs overwinter in dead vegetation like seedheads & hollow stems.
- Leave 10% as shrub cover (mixed UK species e.g., hawthorn, bramble & blackthorn) to ensure food & nesting sites for wildlife.
- Stop shrubs from spreading by trimming back as necessary.
- Mow towards the refuge to help wildlife such as insects, frogs & voles to escape.
- Having a mix of vegetation heights & leaving dead wood in place supports many species, & is good for biodiversity.



3. Work with local people



- Explain what is happening, e.g., with signs, & address any concerns.
- A mown edge or path shows that the area is cared for.
- Prioritise safety and visibility at road junctions.

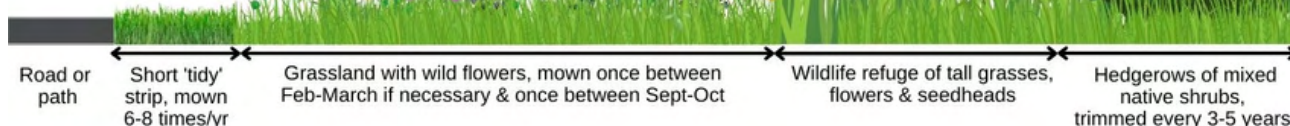



Figure 2: Draft poster about urban grassland management

ABOUT HERO

HEALTHY ECOSYSTEM RESTORATION IN OXFORDSHIRE

HERO is a three year programme (in the first instance) supported by the Oxford Martin School, under their new Programme on Biodiversity and Society. HERO will explore how Oxford University can play a role in efforts to restore ecosystems to health in Oxfordshire, by bringing the University's strengths in academic knowledge, research capacity and convening power to support ongoing and planned nature recovery activities by a range of local partners and stakeholders, including land-owners and farmers.

 www.biodiversity.ox.ac.uk

 [@BiodivOxford](https://twitter.com/BiodivOxford)

ABOUT OUR FUNDER

THE OXFORD MARTIN SCHOOL

The Oxford Martin School is a world-leading research department of the University of Oxford. Its 200 academics, work across more than 30 pioneering research programmes to find solutions to the world's most urgent challenges. It supports novel and high-risk projects that often do not fit within conventional funding channels, with the belief that breaking boundaries and fostering innovative collaborations can dramatically improve the wellbeing of this and future generations. Underpinning all our research is the need to translate academic excellence into impact - from innovations in science, medicine and technology, through to providing expert advice and policy recommendations.