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# Evidence Project Final Report

Department for Environment Food & Rural Affairs

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## Project identification

1. Defra Project code: TWF-10
2. Project title: Understanding the social and cultural values of Trees outside Woodland: Peri-Urban and Rural (TOWPUR)
3. Contractor organisation(s): Forest Research
4. Total Defra project costs (agreed fixed price): £378,715
5. Project: start date ..... 01.02.23
   end date ..... 31.03.25

6. It is Defra's intention to publish this form.

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## Executive Summary


7.The executive summary must not exceed 2 sides in total of A4 and should be understandable to the intelligent non-scientist. It should cover the main objectives, methods and findings of the research, together with any other significant events and options for new work.Trees outside of Woodlands have not been as well studied as their forest or woodland counterparts, despite making up nearly a third of the trees in England, although studies of urban trees have been increasing in recent decades. This research, completed 2023-2025, on 'Understanding the public value of Trees outside of Woodlands: Peri-Urban and Rural' (ToWPUR) addresses this gap, with a focus on socio-cultural values and landscape change. This complements existing evidence about values relating to woodlands and related socio-cultural values, including those held by land managers and members of the public (e.g. Lawrence et al. 2010, O'Brien et al. 2024).

The research questions were:

**RQ1.** What social and cultural values are associated with ToWPUR?

**RQ2.** What implications do these values have for the creation, protection and management of ToWPUR in different regional, landscape and socio-economic contexts?

**RQ3.** What are the most effective ways to ensure these values are translated and incorporated into policy and practice?

Following a rapid review of the relevant literature, ongoing consultation with the Project Advisory Group and engagement with colleagues working on ToWPUR, the project developed into distinct work packages, each with findings and recommendations:

*WP1 – Summarising and scoping*

Work package 1 included three sets of research activities:

1. secondary data analysis from the 'People & Nature in a Pandemic project';
2. the commissioning of arts and humanities 'explainers' as a scoping piece and infographic (to be published), podcasts, and a photo essay; and
3. an expert workshop on socio-cultural value frameworks of relevance to ToWPUR which led to the production of a guide to using those frameworks.

This research has found that:

- ToWPUR offer substantial wellbeing benefits and enable nature connection.
- The arts and humanities have long explored real and imagined ToWPUR, recognising the diversity of representations and human-tree interactions. These approaches can represent, explore and engage types of values that traditional scientific methods cannot, particularly with regards to emotion, beauty, imagination, cultural memory and human connection.

- Conceptualising ToWPUR values can be theoretically complex, but it is important to focus on approaches that can account for changes in values across time and that consider care, belonging, access, power and decision-making.
- There are considerable opportunities for increasing community engagement in land use decision-making in relation to ToWPUR.

*WP2 - Mapping values in professional settings: Sycamore as ToWPUR*

Resilience to climate change, the threat of pests and diseases, tackling the biodiversity crisis and the implications of these issues for the future of the tree and woodland sector are necessarily being foregrounded in tree and woodland management discussions. As a naturalised, fast-growing and adaptable species with increasing evidence to support its ecological value and potential contribution to future forest resilience, sycamore has a place in those discussions. However, sycamore trees have long been considered a controversial species within the sector. The majority of these claims are not based on empirical social research. This research sought to address this evidence gap by exploring the variety of attitudes and values associated with sycamore by different professional groups, how these translate into management practices and policies, and the implications of this for future consideration of sycamore in UK landscapes.

This research involved interviews with land managers (n=5) and three focus groups with professionals from the tree and woodland sector (n=24), in addition to a rapid review of existing social science literature and a review of the ecological value of sycamore.

We found that:

- Professionals value sycamore in a variety of ways (including for their ecological/environmental benefits, aesthetic and cultural significance in certain landscapes, and as a resilient tree with strategic potential to mitigate tree loss to disease and contribute to future forest resilience). Most participants believed they approached sycamore pragmatically with a 'right tree, right place' attitude, which masked underlying values, attitudes and assumptions.
- Conservation professionals have historically expressed comprehensively negative attitudes towards sycamore, but our data shows attitudes are changing.
- There is a lack of up-to-date ecological evidence on both the benefits and disbenefits of sycamore within policy and practice guidance. This feeds into uncertainty about how to manage sycamore, especially on sensitive sites.
- The classification of sycamore as a native, naturalised, non-native species (or other) is contested. This reflects a frustration with existing metrics of value which do not account for the holistic, context-specific value of sycamore.

We produced a shorter, accessible version of the key results for professionals, which will be published on the project website (see Section 9 for more information).

*WP3 - Understanding value of specific ToWPUR: Dead and decaying ToWPUR*

Dead and decaying ToWPUR are of recognised environmental value. However, we found that site managers are uncertain how visitors to sites with such trees feel about them. For example, they are unsure as to whether a small number of vocal visitors who are negative about the presence of such trees are representative of wider feeling.

For this work package we piloted and then delivered a questionnaire survey with 1,177 visitors across three locations to understand what they thought and felt about dead and decaying trees in the landscape. The three locations varied in how 'formal' or 'natural' they were, from the landscaped Stowe Gardens in Buckinghamshire, to woodland pastures at Rydal in the Lake District, and the rewilding project at the Knepp Estate in West Sussex.

We found that:

- The majority of visitors were positive or neutral about visible dead and decaying trees.
- Visitors were most likely to notice their shape, structure and patterns, regrowth and things growing on the trees, and how they contrast with living or healthy trees. Negative attributes were less likely to be noticed. Nearly half of respondents agreed that such trees made them feel creative and inspired.
- Sixty three percent of respondents thought more dead and decaying trees should be left in the landscape to decay in place. With three-quarters of these reporting that their answer would change depending on the reasons for the tree death/decay, with many being concerned about the spread of diseases or pests to other trees.

- Visitors are generally knowledgeable about the benefits of leaving such trees in the landscape, with most knowing about biodiversity or wildlife benefits.
- Visitors to the least formal site felt most positive about the trees relative to the other sites and those from the most formal site the least positive but were still more positive than negative overall.

We produced a shorter, accessible version of the key results for site managers, which will be published on the project website (see Section 9 for more information).

*WP4 - Understanding values around ToWPUR and landscape change with young people*

Work package 4 employed a multi-site research design across three geographic areas (Cornwall, East Sussex, and the Peak District), conducting 12 participatory interactive and creative workshops with 48 young people aged 10-15. These addressed young people's experiences of, and relationships with, ToWPUR, exploring both their sociocultural values (shaped by shared cultural practices and social experiences) and their specific value orientations as expressed during discussions about landscape change.

This research found that:

- The development and preservation of ToWPUR should be prioritised given the positive value-forming role they play for young people.
- Empowering young people through engagement in decision-making around ToWPUR can have clear benefits for community consent, value formation and nature connection.
- Targeted as well as more routine educational opportunities for young people to engage with trees should be encouraged and expanded.
- There are opportunities to make use of age-appropriate platforms as a productive route to messaging to young people about ToWPUR and trees more generally.

This research was delivered by Forest Research and funded by the UK Government through Defra's Nature for Climate Fund.

## Project Report to Defra

8. As a guide this report should be no longer than 20 sides of A4. This report is to provide Defra with details of the outputs of the research project for internal purposes; to meet the terms of the contract; and to allow Defra to publish details of the outputs to meet Environmental Information Regulation or Freedom of Information obligations. This short report to Defra does not preclude contractors from also seeking to publish a full, formal scientific report/paper in an appropriate scientific or other journal/publication. Indeed, Defra actively encourages such publications as part of the contract terms. The report to Defra should include:
   - the objectives as set out in the contract;
   - the extent to which the objectives set out in the contract have been met;
   - details of methods used and the results obtained, including statistical analysis (if appropriate);
   - a discussion of the results and their reliability;
   - the main implications of the findings;
   - possible future work; and
   - any action resulting from the research (e.g. IP, Knowledge Exchange).

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# 1. Introduction

The England Trees Action Plan (ETAP) sought to contribute to the UK government's commitment to increase tree planting to 30,000 hectares per year by 2025 across England (Defra, 2021). The ETAP aimed to dramatically change the rate and type of woodland creation and expansion in the coming years. This will affect the number and type of Trees outside of Woodland (ToW) in the English landscape, with a potential for increase in some areas and decrease in others (as some ToW are enveloped within new woodlands). A large proportion of tree cover (~30%) in England is contained within ToW. These can include groups of trees <0.5 ha or at a very low density (e.g. parkland), linear trees, hedgerows and isolated trees.

Trees outside of Woodlands have not been as well studied as their forest or woodland counterparts, although studies of urban trees have been increasing in recent decades. This research[1] on 'Understanding the public value of Trees outside of Woodlands: Peri-Urban and Rural' (ToWPUR) addresses this gap, with a focus on socio-cultural values and landscape change. This complements existing evidence about values relating to woodlands and related socio-cultural values, including those held by land managers and members of the public (e.g. Lawrence et al. 2010, O'Brien et al. 2024).

While ToWPUR have been understudied, the literature around socio-cultural values is vast and complicated, even when exclusively focused on values relating to nature. The term value itself has a varied usage, and the concept of eliciting values from participants is one that has been problematised (Fischhoff 1991). Values can be framed as attitudes, preferences, normative beliefs or morals and can include relationships, nature connectedness, identity, sense of place, experiences and perceptions, creativity, spirituality, cultural heritage, psychological wellbeing and more (Stålhammar 2021).

As well as being interesting in and of themselves and important in the context of public engagement and community consent, values are often positioned as a precursor or determinant to behaviour. For example, the Theory of Planned Behaviour, which has been widely applied and empirically tested, posits that intention to act is significantly determined by beliefs, norms and attitudes (Ajzen 1991). Identities and the 'cultural memory' or values stored in these have also been demonstrated to predict behaviour (Stryker & Burke 2000, Brenner, Serpe & Stryker 2014). Focusing on socio-cultural values allows us to move 'beyond attitude, behaviour and choice' alone to consider social practices and structural factors and avoid overemphasising individual responsibility (Shove 2010). Furthermore, it has been shown that values can be conservative, in the sense of resistant to change, and so holistic approaches are needed that can engage understanding across persons, social factors and broader socio-historical context (Albarracin & Shavitt 2018).

It is in line with these debates that researchers look across disciplinary boundaries to conceptualise and complicate values (Kenter et al. 2019). Furthermore, values can be categorised in many ways, including as instrumental, intrinsic and relational (e.g. Tadaki et al. 2017, Schröter et al. 2020, IPBES 2022). Other approaches to embracing diverse views of nature include the Life framework, which considers how nature values can vary in terms of how or whether human perspectives are centred, conceptualised as living from, living in, living with and living as nature (O'Connor & Kenter 2019, Kenter & O'Connor 2022, IPBES 2022).

How people experience trees in their everyday lives may differ from their response to abstract questions about the values of trees (c.f. Ordóñez et al. 2017) – which is an added complication when collecting and interpreting data on how ToWPUR are valued. It is important to elicit individual's relational connection to trees, whether through how they feature in their everyday lives (e.g. Sinclair et al. 2014) or links to any significant memories or relationships (e.g. Lumber et al. 2017, Austen et al. 2021). Other attributes that may shape people's values around ToW include tree age, size, floristic diversity, condition, landscape context, seasonality and other sensory qualities (e.g. Oreszczyn 2000). Other key criteria include geographical features such as landscape character and settlement type. For example, public values around ToW may differ between tree-denuded post-industrial landscape, low intensity farmland, areas with extensive tree cover or coastal regions. A further consideration is that values alone do not equate to behaviours (c.f. the value-action gap), and so caution is recommended in inferring actions from held values (and vice versa).

With this context in mind, the project's aims were to:

- Understand the social and cultural value of Trees outside Woodland in peri-urban and rural contexts (ToWPUR) amongst a range of publics and stakeholders, especially in relation to tree planting & establishment, including identifying appropriate values frameworks/domains and methods for measuring such values.

[1] Delivered by Forest Research and funded by the UK Government through Defra's Nature for Climate Fund

- Provide evidence to inform policy, practice, research and management of ToWPUR.
- Build an interdisciplinary understanding of the value of ToWPUR through close working with natural science colleagues.

The research questions (RQ):

**RQ1.** What social and cultural values are associated with ToWPUR?

**RQ2.** What implications do these values have for the creation, protection and management of ToWPUR in different regional, landscape and socio-economic contexts?

**RQ3.** What are the most effective ways to ensure these values are translated and incorporated into policy and practice?

Following a rapid review of the relevant literature, ongoing consultation with the Project Advisory Group and engagement with colleagues working on ToWPUR, the project developed into distinct work packages:

***WP1 – Summarising and scoping***

- A secondary data analysis from the People & Nature in a Pandemic project. This included analysis of survey, interview and photo elicitation data in the context of trees and treed places.
- The commissioning and dissemination of arts 'explainers' in the context of ToWPUR, which took the form of a scoping study, infographic, photo essays and three episodes of a podcast.
- An expert workshop on socio-cultural value frameworks of relevance to ToWPUR, including scenario testing, and resulting in an interactive visualisation for practitioners who wish to understand ToWPUR values and how to work with them.

***WP2 – Mapping values in professional settings: Sycamore as ToWPUR***

Interviews and focus groups with participants who have a professional interest in sycamore trees as ToWPUR. To understand how sycamore are perceived in professional settings and how attitudes and values differ within and between professional communities. Working with ecologist colleagues to review understanding of the ecological value of sycamore and how this intersects with professional values.

***WP3 – Understanding value of specific ToWPUR: Dead and decaying ToWPUR***

Gathering data on site visitor attitudes to and values related to dead and dying trees across three case study areas. To support site manager understanding of how to manage and communicate about dead and dying trees in such landscapes.

***WP4 – Understanding values around ToWPUR and landscape change with young people***

Commissioned research on ToWPUR and landscape change with young people, including a series of consecutive workshops at three case study sites and a focus on value formation.

These work packages are reported on section-by-section below.

Ethics approval was obtained through Forest Research's ethics approval process.

## 2. WP1 – Summarising and scoping

Work package 1 included three sets of research activities: secondary data analysis from the 'People & Nature in a Pandemic project', the commissioning of arts and humanities 'explainers', and an expert workshop on socio-cultural value frameworks of relevance to ToWPUR.

***Secondary data analysis***

The full report has been published on the project webpage (White et al. 2023), presenting the results of analyses of data from three sources: an online, UK-representative survey (n =850), in-depth interviews (n = 34), and 808 photographs of nature taken by the interview participants. Four research questions were addressed through the analyses:

1. What terms did people use to describe trees & treed places?

2. Were tree-focused places perceived as more natural and did respondents feel more connected to nature in tree-focused places?

3. How important were trees and different treed settings in participants' nature engagement experiences?

4. Were trees & treed places associated with greater wellbeing?

*Findings summary*

1. Tree-focused places (i.e. places where trees & woodland were mentioned) were perceived as more natural than places without a tree focus, with respondents perceiving more greenery, animals, birds and insects, natural sounds, and natural materials. Respondents also felt more connected to nature in tree-focused places.

2. Both the survey and photo analyses evidenced the key role of trees in participants' nature engagement experiences, with trees regularly featuring in photographs, and participants engaging with trees in a range of settings (in woodland, outside of woodland, in urban and rural locations).

3. Trees & treed places contribute to self-reported wellbeing in a range of ways.

4. General terms for tree (e.g. "tree") and treed environments (e.g. "woodland") are in much wider use than more specific terms (e.g. "grove", "orchard", "oak").

*Recommendations summary*

1. Researchers and practitioners could explore the potential value of 'the presence of trees' as a proxy for greater perceived diversity (of sounds, habitats, lifeforms) in an environment.

2. Research should examine the perceptions of trees in different settings (in/outside woodland, in urban/rural locations), as well as capture a range of activities & motivations for engagement with trees. More research is needed on the perceptions & benefits of rural ToW.

3. Researchers and practitioners should further explore, understand and promote the different wellbeing benefits of trees, as well as explore ways that promoting the public health benefits of trees could further support other areas of tree-related research, policy and practice, such as tree and land management.

4. Researchers and practitioners should consider peoples' language preferences and design future studies and interventions according to participants' level of understanding/usage of various terms for tree.

***Arts explainers***

Inspired by Saratsi et al. (2019), the project team recognised the benefits and necessity of engaging with arts perspectives on nature values and ToWPUR more specifically. Both to acknowledge the role the arts play in representing socio-cultural values in relation to ToWPUR and their role in influencing such values. This was approached through the commissioning of summative research and creative outputs, which were framed as 'explainers'.

To engage with the arts on their own terms, the brief for the production of the explainers did not stipulate a specific methodology and actively encouraged creative approaches. The successful bidder, Lestari, delivered:

- A scoping study with a summative infographic (to be published).
- A selection of short-form photo essays based on interviews with arts researchers and practitioners.
- A three-episode podcast series.

These outputs are hosted on the project webpage along with a link to a communications campaign by The Tree Council which disseminated the outputs, as they were deemed likely to be of public interest, including a recording of a webinar.

***Expert workshop***

In 2023, the project team engaged with relevant experts to discuss theoretical frameworks that might be appropriate to the project's focus on ToWPUR and socio-cultural values. Seven experts were engaged in the workshop, along with one supplementary interview. The experts represented the arts, history, ecological economics, human geography, sociology, anthropology and social sciences. The workshop lasted three hours and included summary and discussion of selected theoretical frameworks (ecosystem services, biophilia/nature connectedness, sense of place and the Life framework) according to agreed terms of consideration – fit, feasibility, validity and limitations. This was followed by discussion about how these different frameworks could be applied, focusing on three scenarios identified based on evidence needs raised by the Project Advisory Group – protecting individual trees, attitudes to landscape change and understanding public values around tree rot and decay. The final section gave participants a few minutes to pitch and justify their preferred approach for framing values within each scenario.

Themes that arose during the workshop related to the intended use of each value framework, how to account for locality or specificity while also making the framework generalisable, the assumption that place is a strong motivator for action on behalf of ToWPUR, how to account for changes in values across time and space, taking a considered approach to language and how to consider ToWPUR in relation to care, belonging, access, equity, power and land use decision-making.

The findings from the workshop and interview informed the creation of an illustrated guide to the social and cultural values associated with ToWPUR. This is available on the project webpage and is aimed at social

researchers, policymakers and practitioners, and includes examples of real-life issues regarding ToWPUR and describes how they might be approached through the consideration of social and cultural values.

***Conclusions***

WP1 focused on exploring existing research in relation to the public value of ToWPUR from a range of disciplinary perspectives. This directly informed the focus of work packages 2-4 and has resulted in explanatory outputs for a range of audiences. An academic article is also in preparation.

## 3. WP2 – Mapping values in professional settings: Sycamore as ToWPUR

Resilience to climate change, the threat of pests and diseases, tackling the biodiversity crisis and the implications of these issues for the future of the timber industry and conservation sector are necessarily being foregrounded in tree and woodland management discussions. As a naturalised, fast-growing and adaptable species with increasing evidence to support its ecological value and potential contribution to future forest resilience, we posit that sycamore has a place in those discussions[2]. However, sycamore has long been perceived as a controversial species in the UK, particularly among conservation professionals. A 1991 Forestry Commission Occasional Paper acknowledges 'the antagonism which [sycamore] traditionally arouses among conservationists' (p 15) and Taylor described how sycamore has been 'reviled by conservationists' (1985, p2). More recently, Oliver Rackham (2006) argued that the status of sycamore in Britain has become 'contaminated by value judgements' (p 30), Morecroft et al. (2008) concluded that 'sycamore remains a controversial species' (p 60), and Rotherham and Lambert describe sycamore as 'the most despised of exotic trees in England' (2012, p9). With the notable exception of Taylor's 1985 survey of conservation practitioners' attitudes towards sycamore, which found that negative attitudes dominated but were largely not based on scientific evidence, claims that sycamore is a controversial species are anecdotal and not based on empirical social research. We propose that understanding prevailing social and cultural values and how these relate to professional values and attitudes is important to wider discussions about current management of sycamore and decisions about the future of the species in UK treescapes. This project was conducted in collaboration with ecologist colleagues who undertook a review of the ecology of sycamore and the ecosystem services it provides in a UK context.

We began by reviewing the social sciences literature to ascertain what evidence exists to support anecdotal claims that sycamore is a controversial species amongst professionals in the tree and woodland sector. This was followed by empirical research with land managers and different groups of tree and woodland professionals to understand the range of values and attitudes held in relation to sycamore and the future role it may play in the UK's treescapes.

The research questions were:

- RQ1 What values and attitudes do different professional groups associate with sycamore?
- RQ2 Do these values and attitudes differ within and between professional groups?
- RQ3 Do these values and attitudes translate into professional practices?
- RQ4 How might these values be shaped by considerations of the future and regional and landscape contexts?

### *Scoping review of the social science literature*

A scoping review was conducted to explore evidence relating to the social and cultural values associated with sycamore and to ascertain whether empirical evidence exists to support anecdotal claims that sycamore is a controversial tree species among tree and woodland professionals. Following Arksey and O'Malley (2005), the review followed five stages: Identifying the research question, identifying relevant studies, study selection, charting the data, and collating, summarizing and reporting the results. The review showed that there is little in the way of empirical evidence on professional values, nor social and cultural values, associated with sycamore in the UK, despite frequent references to negative cultural perceptions of the species, especially in the scientific literature. The results of the review were organised into four key themes which relate to the research questions set out below: group identity, perceived benefits and disbenefits, classification and terminology, and regional and cultural context. These themes fed into our lines of enquiry regarding professional groups, landscape context, and region, and the design of subsequent empirical research to explore these (interviews with land managers and focus groups with tree and woodland professionals). The results of the rapid scoping literature review were incorporated into the full report (appendix II).

### *Ecological literature review*

[2] Sycamore (SY) - Forest Research

In parallel to our review of the available social science and attitude related evidence, ecologist colleagues conducted a review of the existing ecological literature. A previous review (Barsoum et al 2024) had found that sycamore was relatively understudied in the UK, in comparison to its cover. However, the new review (Manicom-Smith et al. 2024) found that sycamore delivers a, perhaps surprising, range of ecosystem services, sometimes more or of greater positive effect than equivalent 'native' species. We presented the preliminary results of this review within the focus groups as a prompt for discussions about the ecological value of sycamore and its future in the UK (appendix IV).

### *Empirical methodology*

**Interviews with land managers**

Following the lack of empirical evidence returned by the literature review, we undertook interviews with five land managers to understand their values and attitudes relating to sycamore. This also served as a pilot study, to test our assumptions and research questions, given the paucity of the evidence. Researchers developed the interview guide to address the research questions and informed by the themes identified in the literature review and WP1. Topics included professional role and land management, tree and sycamore management, specific sycamores on their land, perceptions and values of sycamores generally, and ecological questions. The full interview guide is included in appendix III. The results have been incorporated into the wider results and discussion and informed the discussion guide for subsequent focus groups with other tree and woodland professionals.

Interviewees were recruited from a sample of land managers already engaged with a sister ecology project (TWF-11) who had opted in to further research (convenience sampling). Interviewees were all located in rural areas in the south of England. Ecology colleagues had found it difficult to identify sycamore ToWPUR for study in this region and so a focus here to explore possible causes related to land manager values was deemed appropriate. Interviewees came from a variety of professional backgrounds (farming, forestry, conservation, rural surveying, land agency, tree inspection, and local authority work) and sites covered a range of management objectives (farming, woodland, parkland, common land, protected for biodiversity). Interviews were conducted over the phone or via video call. Informed consent was obtained for all participants.

All interviews were professionally transcribed. The interview transcripts were analysed thematically and for content using NVivo 14 following Braun and Clarke's (2006, 2021) reflexive thematic analysis framework (six iterative stages: i) familiarisation; ii) open coding; iii) generating initial themes; iv) developing and reviewing themes; v) refining, defining and naming themes; and vi) writing up the analysis). The analytical approach was inductive, identifying both semantic and latent content to address the research questions. Two researchers developed a coding framework based on a mixture of inductive codes derived from the interviews and deductive codes derived from the literature review themes. This analysis was conducted by the 1st author supported by discussions regarding the efficacy of the codes in the developing and reviewing stage with the 2nd author. Coded data was organised and annotated in Microsoft Excel according to theme. The results have been incorporated into the full report (attached in the appendix II) and a summary is included below.

**Development of theoretical approach**

Our theoretical approach benefited from collaboration with an academic colleague, Professor Rob Fish, who had taken part in the WP1 workshop. Aware of negative perceptions of sycamore, we were mindful of taking an approach which would account for not only positive values, but that would account for tensions between values. We drew on the research, results and outputs from WP1 and the interviews with land managers to develop a pragmatic and holistic approach to eliciting and identifying these values. Mindful of the difficulties of eliciting values, we elected to gather data on management practices and policies in relation to sycamore, on the basis that these would, to some extent, reflect how sycamore is (or isn't) valued by different professional groups. We stratified our sample into three broad professional groupings based on the ways in which they conceptualise or interact with sycamores in their role:

> **Strategic** – those who make decisions about sycamore (or that will indirectly affect sycamore) e.g. policy-makers.
> **Tactical** – those who view sycamore as an object of interest, who may 'absorb' sycamore into their work e.g. landscape architects, scientists, ecologists, ecology consultants.
> **Operational** – those who directly manage or otherwise 'deal with' sycamore e.g. land managers, arboriculturists/arborists (including hedge-layers), conservation practitioners, foresters.

This stratification was intended to facilitate analysis of differences in attitudes and values within and between professional groupings.

**Focus groups with tree and woodland professionals**

Following learning from the interviews with land managers that professional group identity plays a significant role in shaping perceptions and management of sycamore, we decided to explore this further

through focus groups with other tree and woodland professionals, rather than interviews, to enable collection of data on participants' shared understandings and the ways in which individuals are influenced by others in a group situation (RQ2).

Participants (n=25) were recruited through internal networks and by approaching relevant organisations directly. The focus groups were broadly recruited and organised into sessions according to the categories above (strategic, tactical and operational). Focus groups one (n=9) and two (n=7) consisted of a mix of professional groupings, though focus group one was largely tactical and two was largely strategic. Focus group three (n=9) was entirely operational. The focus groups were held online via video call and facilitated by two researchers. Informed consent was obtained for all participants.

The focus group discussion guide was developed by the researchers with reference to the themes from the literature review and findings from the interviews with land managers. The full discussion guide is included in appendix IV. Topics included distinctions in perceptions of sycamore inside versus outside of woodland, terminology and classification, how they encounter sycamore in their role, perceptions of sycamore's value, organisation and sector views on sycamore, management of sycamore, reflections on ecological evidence, and sycamore's future role in UK landscapes.

The sessions included delivery of a poll which asked participants to select the terms they would use to describe sycamore and a summary presentation of the ecological evidence review on the ecosystem services provided by sycamore (as described above). The latter was included on the basis that the new review provides additional information on the ecological value of sycamore, known to be particularly contested in discussions about the value of sycamore in professional circles. Its inclusion part way through the session was intended to explore participants' awareness of the evidence referenced and their reactions to it.

The focus groups were professionally transcribed. The data was analysed as described above.

Prior to the focus groups, participants were asked to share any resources or policy documents that had shaped their perceptions of sycamore and how it should be managed. Analysis of these documents was incorporated into the findings of the research.

### *Results and discussion*

**RQ1 What values and attitudes do different professional groups associate with sycamore?**

Having initially approached this topic by making a distinction between attitudes and values, our empirical research demonstrated that these are difficult to disentangle in practice. As outlined in the introduction to this report, values are sometimes framed as attitudes (Stålhammar 2021), and the nature of the relationship between the two concepts is a grey area. While stratification of the sample by professional group (strategic, tactical, operational) was useful for recruitment and research design, analysis of the focus group results did not reveal a correlation between our assigned professional groupings and values/attitudes recorded. The relationship between the values/attitudes of professional groups versus individuals and wider social and cultural values proved to be complex and differences between professional groups could not be comprehensively distinguished.

Participants described how conservation organisations, or those in a conservation role, have historically expressed negative attitudes towards sycamore. They explained that these attitudes were largely based on the understanding that sycamore was invasive and posed a threat to native habitats. Some argued that there was little evidence to support these claims. Participants had observed that attitudes towards sycamore within conservation were shifting to become more accepting but they were uncertain about the impacts of historical negativity towards the species. One arboriculturist described how sycamore was commonly perceived as a weed within their profession. Two hedgelayers agreed that sycamore is not regarded as a desirable species within the hedge-laying community due to its perceived dominance of hedgerows, shading out other species and its difficulty to work with. Participants involved in forestry gave a mixed picture of attitudes to sycamore within the sector. One participant thought, on the whole, forestry had a 'pragmatic' attitude towards sycamore. Conversely, other forestry participants described how sycamore is either 'ignored' or negatively regarded due to its status as an invasive non-native species. One participant observed that sycamore had recently become more desirable to foresters where he was based in northern Scotland. One participant from the landscaping profession observed that sycamore was ignored by her profession. She suggested that this could be due to a preference from within her organisation and its clients for native planting mixes.

As individuals, participants expressed a variety of ways they value sycamore: as a resilient tree with unique ecological and environmental benefits; an important aesthetic and cultural feature of certain landscapes; and a tree with strategic potential to mitigate tree cover loss to disease and contribute to resilient and multifunctional woodlands of the future. Participants highlighted sycamore's value as a habitat and to wildlife, particularly pollinators, and to other plant species including lichens. Sycamore was valued as a resilient tree that contributes to various ecosystem services (including carbon absorption, shade, shelter, pollution filtration) particularly in urban or degraded environments. While none of these ecological and

environmental benefits were directly disputed within the focus groups, the level of agreement and shared awareness of them appeared to be variable. In contrast, there was near consensus across participants that sycamore was valued as one species (among others) which could contribute to species diversity objectives in relation to striving for forest resilience to environmental change. Some participants expressed positive personal values in relation to specific sycamore trees, as well as affinities for the species in general. These were often framed in terms of a familiarity with the tree (sometimes from an early age), a recognition of its cultural and historical importance in certain landscapes, and a sense of the intrinsic value of trees. Participants also described what they saw as the relational value ascribed to sycamore trees by members of the public who, in their experience, valued trees that they are familiar with, for their age, historical presence, contribution to landscape aesthetics and provision of ecosystem services.

**RQ2 Do these values and attitudes differ within and between professional groups?**

We found that site and management context (e.g. in a forestry plantation, in a hedge, on a site protected for biodiversity, on farmland, in a peri-urban area lacking tree cover, on an ash-depleted site) was more likely to affect participants' attitudes to sycamore and its acceptability than membership of professional group. 'Right tree, right place' can act as a barrier to stakeholders recognising and reflecting on their preferences regarding sycamore. Thus, differing approaches to managing or researching sycamore in similar contexts can be divorced from understanding of why conflicting approaches and subsequent tensions might occur (and how to address them).

The research highlighted some points of tension between the values associated with sycamore (detailed above) and what can broadly be understood as the priorities and norms of certain professions. In this sense, sycamore could be considered as a proxy for some of the tensions inherent in multi-functional treescapes. Participants explained that sometimes the traits of sycamore (e.g. prolific natural regeneration, difficulty to work with in hedge-laying, as a 'labour-intensive' plantation tree) conflict with the objectives of their role, profession or organisation.

Sycamore's non-native status is commonly the basis for assessing its value and some participants expressed frustration that this means the holistic, context-specific value of sycamore is not fully accounted for. While this conceptualisation originates from within the conservation sector, evidence from both our empirical research and the available literature suggests that the negative associations accompanying the classification of sycamore as non-native have also influenced how sycamore is perceived within other professions.

We observed a diversity of attitudes and values relating to sycamore within professional groupings and that individuals can hold what could be seen as conflicting attitudes and values. It is therefore unsurprising that a variety of values and attitudes towards sycamore can exist within an organisation. This becomes problematic when there is a lack of organisational clarity in relation to sycamore and how it should be considered in practice, particularly in the context of forest resilience.

**RQ3 Do these values and attitudes translate into professional practices?**

Historically, negative attitudes towards sycamore within the conservation sector corresponded to a significant investment in their removal from sites managed for biodiversity or conservation. Changing attitudes towards sycamore by conservation professionals has corresponded with various organisations publishing guidance indicating when and how sycamore can be included on sensitive sites. However, some participants expressed uncertainty about how to interpret this guidance in practice, some continued to remove it, and some were taking the approach that they would allow sycamore to 'seed in' to native woodlands or sensitive sites but were opposed to the idea of planting it 'on purpose'. Other participants, particularly those who were responsible for the management of sites affected by tree loss due to disease, found the distinction between planting and natural colonisation arbitrary (i.e. not evidence-based) and pointed to cases in which it would be ecologically beneficial and, in their view, a priority, to plant sycamore. This scenario relates to a broader tension (referenced above) between sycamore's ecological/environmental value and its position within some current conservation value metrics and classification which inhibit recognition of its ecological/environmental value (and relational/landscape value) and the 'realisation' of its ecological/environmental value on sites where there may be a case for its benefits (e.g. restoration of ash or elm-depleted sites). Participants also highlighted a tension between what they saw as professional or scientific perceptions of the (lack of) value of sycamore and the way in which members of the public perceive the value of sycamore. By extension, they felt that public (social and cultural) values are not currently being translated into professional practices.

There appears to be an absence of up-to-date evidence within guidance and policy documentation about the ecological/environmental benefits and disbenefits of sycamore in different contexts.

**RQ4 How might these values be shaped by considerations of the future and regional and landscape contexts?**

This research has shown that a range of values and attitudes have historically influenced and continue to influence how sycamore is perceived by tree and woodland professionals. However, uncertainty and

tensions in how sycamore is valued are now being foregrounded as the sector feels the impacts of and the need to adapt-to and mitigate-for rapid environmental change (i.e. increasing prevalence and impact of tree pests and diseases, changing climate, biodiversity loss). Some of the professionals we spoke with are observing and experiencing the consequences of such uncertainty and tension; in terms of tangible impacts on the capacity-for and speed of tree and woodland habitat restoration and adaptation, but also in relation to a broader question about the efficacy of current metrics of conservation value and success in the face of environmental change. In a forestry context, participants highlighted the growing pressures on woodlands to deliver multiple benefits (i.e. productive forestry and other public goods) and related uncertainty and tensions around the role of sycamore in this.

This research has highlighted the role regional and landscape contexts play in shaping values and attitudes in relation to sycamore. Sycamore trees are valued as important aesthetic, cultural and historic features of certain landscapes, particularly in Scotland and in the west coast and north of England. Participants described how sycamore are 'often the only tree growing' in harsh or exposed environmental conditions and are ascribed particular value as mature trees outside of woodlands. Regional and landscape contexts are also significant determinants of where sycamore will be considered 'useful' or viable to plant now and in the future. For example, participants highlighted the impacts of sooty bark disease and grey squirrel damage in the south and southeast of England. In contrast, other participants highlighted the acute tree loss of both ash and elm and the absence of grey squirrels in Scotland, alongside different climatic conditions to the south and southeast of England.

### *Recommendations*

- Acknowledging the diversity of values that sycamore has in different professional contexts will allow for better and more strategic decision-making about where it should be included and why. This could include a review of current assessment systems associated with tree species classification as native/non-native, which often don't account for the value of sycamore in a holistic, context-specific way.
- Participants spoke about the need for cross-sectoral discussions about the role of sycamore in treescape resilience and articulated a need for a more 'joined-up' approach to managing trees in the landscape for multiple benefits. There were also calls for a more consistent approach to sycamore across organisations in the sector.
- More up-to-date evidence about sycamore in different UK settings is needed, including something which addresses the range of terminology used to describe the species (e.g. naturalised, non-native, invasive, advancing native). Participants also called for 'philosophically coherent' guidance about the inclusion of sycamore on sensitive or ash-depleted sites.

A briefing note was also produced and will be published on the project website (see Section 9 for more information)..

## 4. WP3 – Understanding value of specific ToWPUR: dead and decaying ToWPUR

### *Introduction*

Dead and decaying ToWPUR are ecologically valuable (Thorn et al., 2020) and an important carbon store (Russell et al., 2015). However, site managers face uncertainty regarding how visitors feel about them and whether a small number of vocal visitors who are negative about the presence of such ToWPUR are representative of wider feeling (pers. comm.).

A rapid literature review found a limited number of empirical studies investigating whether site visitors, and the public more generally, value dead and decaying ToWPUR. In a survey of 3,022 people in Switzerland, Frick et al. (2018) found an overall negative perception of deadwood, but this was not elaborated further. Rathmann et al. (2020) found mixed responses to deadwood from visitors to the Bavarian Forest National Park. It was associated with aesthetic and recreational value, but this depended on the type of deadwood and photographs of deadwood were rated relatively poorly in comparison to other forest elements. Arnberger et al. (2017) found that visitors to a State Forest Park in Colorado, USA, preferred healthy mature forest stands and disliked forests with substantial dead wood. However, it should be noted that this was in the context of an extensive bark beetle outbreak and so not typical of the majority of dead and decaying wood in landscapes in England. Pelyukh et al. (2019) in a survey of 308 Ukrainian members of the public from a region where forest resources are important to the local economy, found "that the majority of respondents consider deadwood as an important component of the forest, but generally they prefer

intensively managed forests without deadwood" (p171). They considered the most important positive effect of deadwood to be its contribution to stand dynamics and the most important negative effect to be its role in increasing risk of insects and diseases. Qui et al. (2020) found, in a China-based study, participants' preference scores for forest photos containing dead wood were significantly higher than those without dead wood, but that landscape context was important. In a Finnish study where respondents were asked to rate photographs showing different types of forest management, Tyrväinen et al. (2003) found the most preferred management style was where dead and decaying trees were removed from the forest stand. Gunderson et al. (2017) found that respondents' familiarity with the ecological role deadwood provides for forest biodiversity and natural forest dynamics improved the rating of photos of deadwood in an experimental setting.

The research team could draw no strong conclusions from the review. Given this and the lack of UK-based research, the research team concluded that it would be valuable to undertake empirical research in England with site visitors who were visiting sites across a gradient of landscape formality. The research investigated a range of values and attitudes relating to specific dead and decaying ToWPUR and those in the abstract.

The over-arching research question (RQ) was: **What social and cultural values do visitors hold in relation to dead and decaying trees in TOWPUR settings?**

**Sub-RQs:**

a. How do visitors respond to specific dead and decaying ToWPUR in a landscape?

b. How do the values visitors hold for dead and decaying ToWPUR compare to values held by the public in relation to trees and woodland more generally?

c. How does level of knowledge about ecosystem services derived from dead and decaying ToWPUR affect RQa?

d. Are responses affected by how formal the landscape is?

e. What are the primary concerns visitors have (if any) about such trees being left in landscape or disbenefits they confer?

f. Does the cause of death/ill health play a role in RQa?

## *Methods*

A pilot questionnaire survey was conducted by the research team at a semi-natural setting (wood pasture) near Rydal in the Lake District National Park (questionnaire in appendix V). Experience of delivering the questionnaire and analysis of the data was used to develop an improved questionnaire for the main survey. In addition, the use of a pilot survey questionnaire with a high number of open-ended questions enabled the development of category-based responses to a number of the questions for the main survey, thus enabling additional quantitative data analysis.

The main questionnaire survey (appendix VI) was delivered to visitors[3] across three locations in August 2024. The three locations varied in how 'formal' or 'natural' they were, from the landscaped Stowe Gardens in Buckinghamshire, to woodland pastures at Rydal in the Lake District, and the rewilding project at the Knepp Estate in West Sussex. All questionnaire interviews were undertaken on site, with dead and/or decaying trees visible to the respondent. When questions were asked about specific dead and/or decaying trees, the interviewer indicated that tree. The location of the tree was recorded and photographs taken. The sample was not required to be nationally or regionally representative, the interviewers were instructed obtain as representative a sample of the visitors they observed on site as possible (with regard to visible characteristics).

Informed consent was obtained for all participants. The data analysis plan can be viewed in appendix IX.

### Statistical analysis

All analysis was conducted in R software, version 4.4.2. Unless otherwise stated, n=1,177, and 5% is the significance level considered in all reporting.

Data visualizations include boxplots for assessing differences in distributions. The horizontal line in the middle of each box is the median, or middle, score. The top line of the box represents the 75th percentile (upper quartile) and the bottom line the 25th percentile (lower quartile). The lines emerging from the boxes

[3] By a sub-contracted Market Research Society accredited research company

represent the maximum and minimum scores given by respondents. Points outside the lines are 'outliers' – scores that are numerically distant from the rest of the data. Confidence intervals for proportions were calculated using a logit transformation and represented in bar plots.

Chi-squared tests have been run to assess statistically significant differences between response proportions. For Check-All-That-Apply (CATA) questions, Cochran's Q test statistics are reported.

Statistical models have been run to assess impacts of factors more widely. In general, for all statistical models, along with specific statements (where relevant), a range of different predictors were included in the models including gender, age, education, ethnicity, number of visits in the last 14 days and Nature-Relatedness score (NR5). Where statements were present, a two-way interaction was included between statements and each demographic to account for differences in responses per statement. For CATA questions, generalised linear mixed effect models (GLMM) were fitted, with individual respondents considered as random effects to account for the repeated measures per respondent. For ordinal responses (e.g. Likert data), ordinal logistic regression models (clm() function, Christensen, 2019) or multinomial logistic regressions for categorical responses were run (multinom() function, Venables and Ripley, 2002), with likelihood ratio chi-squared tests to determine significance.

For an explanation of how a Nature-Relatedness score (NR5) was derived for each participant and further details of the statistical analysis see appendix VIII.

For comparability reasons and given the low prevalence of other categories, descriptives according to gender in this report only considered female and male genders. For comparability reasons and given the low prevalence of ethnicities other than White, ethnicity was re-coded into two categories ('White', 'Not White') for further analysis according to ethnicity and respondents who did not prefer to say their ethnic group were be removed from said analysis. In relation to the responses relating to frequency of site visits, the category 'Other' was removed to ensure comparability in further analysis. In relation to educational attainment, categories 'Prefer not to say' and 'Don't know' were not considered in further analysis.

## *Results and discussion*

### Pilot survey

The full results can be viewed in appendix VII.

Sixty-five visitors responded to the pilot survey.

*Figure 1. A word cloud of responses to the open-ended question 'What are your thoughts about this dead/dying/damaged tree being here?'*

## Main survey

The full results, including tables and figures, can be viewed in appendix VIII.

### Sample description

There were 1,177 respondents: 464 from Rydal, 390 from Stowe and 323 from Knepp. Over all three sites, a third of respondents were visiting for the first time (33.39%), just over a third visited regularly (36.11%) and just under a third visit infrequently (29.91%). Most respondents were visiting to undertake a leisure walk (59.39%). The next most frequent category was for a holiday visit (27.61%), followed by dog walk (16.4%). Respondents were able to select more than one reason for their visit.

Just over half the sample identified as female (53.19%), with less than one percent identifying 'in another way' or preferring not to say. All age categories (above 16 years old) were represented, but the largest proportion of respondents were in the age range 55-64 (26.51%) and of White ethnicity (94.99%). The largest proportion of respondents held a Bachelor degree or equivalent as their highest educational attainment (29.84%) followed by those with Postgraduate qualification (25.49%) Respondents mostly identified as English (61.94%), followed by British (28.21%). Nearly a quarter of respondents (24.81%) had visited a green and natural space (not including their garden, work visits or abroad) once day in the last 14 days. With the next most populous category being twice in 14 days (12.06%).

In response to statements intended to assess their Nature Relatedness (Nisbet and Zelinsky, 2013):

- Nearly three quarters of respondents agreed strongly that 'I take notice of wildlife wherever I am'
- Whereas, less than a third (31.69%) agreed strongly that 'My ideal vacation (holiday) spot would be a remote, wilderness area' and just over a third (35%) that 'My connection to nature and the environment is a part of my spirituality'
- Just over a half (55.99% and 52.85%) agreed strongly that 'My relationship to nature is an important part of who I am' and 'I always think about how my actions affect the environment'.
- Just less than half (45.96%) agreed strongly that 'I feel very connected to all living things and the earth'.

A Nature Relatedness (NR5) score was created for each respondent (see appendix VIII) and the distribution of these scores is shown in Figure 2. The score is scaled and a value near zero indicates a neutral score or 'relatedness' and a positive value indicates a stronger 'relatedness' to nature. Along with demographic and other sample characteristics, outlined in this section, we considered the influence of Nature Relatedness in responses to questions about dead and decaying trees.

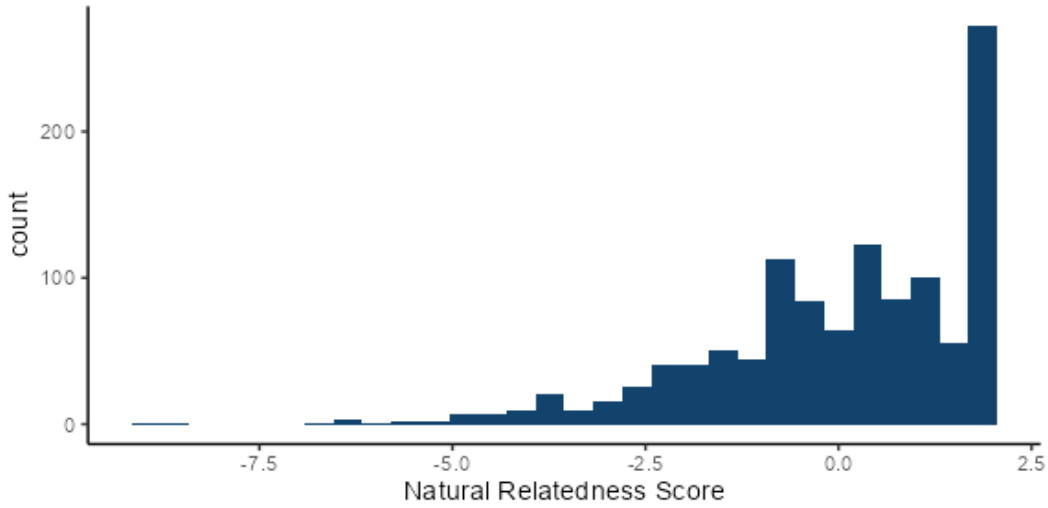


*Figure 2. Distribution of Nature Relatedness (NR5) scores among respondents.*

### How do visitors respond to specific dead and decaying ToWPUR in a landscape?

**Summary: The majority of visitors notice dead and decaying trees in the landscape and are more positive about them than might be expected and want them left in place. Indeed, nearly two thirds**

**want to see more in the landscape. Those with higher Nature Relatedness scores are generally more positive and those in the oldest age category (85+) generally more negative.**

The large majority (90.1%) of respondents notice dead wood, dead trees and decaying trees in the landscape (statistically significant difference, χ-squared (n,1) = 758.73, p-value < 0.001). Visitors were most likely to notice their shape, structure and patterns, regrowth and things growing on the trees, and how they contrast with living or healthy trees. Negative attributes were less likely to be noticed (figure 3). Nearly half of respondents agreed that such trees made them feel creative and inspired.

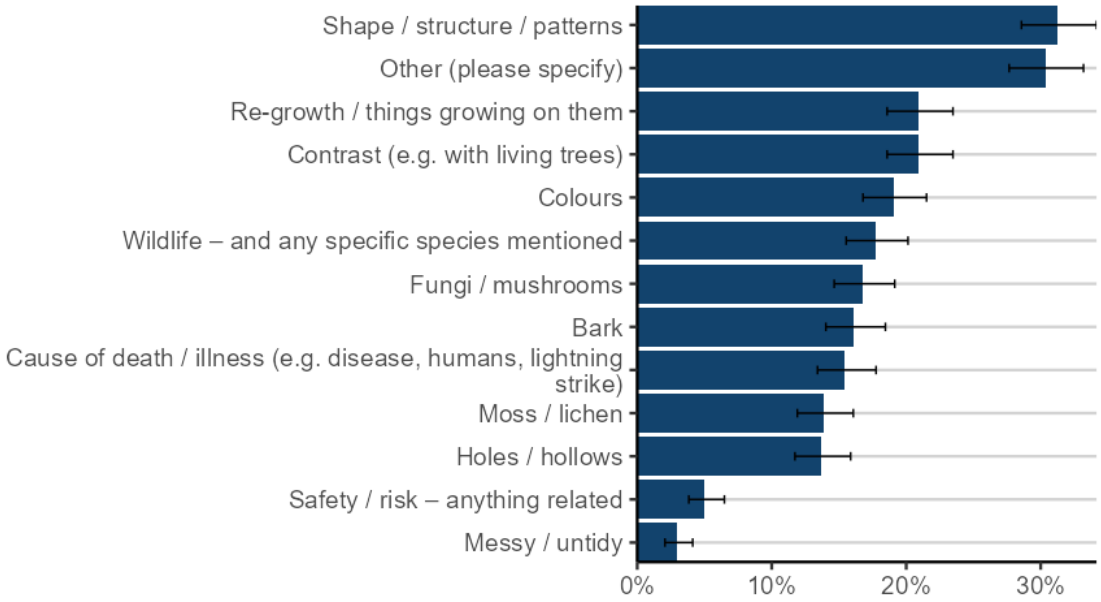


*Figure 3. What do you notice [about dead wood, dead trees and decaying trees in the landscape]? (n=1,061)*

Interviewers indicated a visible dead and/or decaying tree and respondents were asked to point to one of a series of faces to indicate how they felt about the tree (figure 4). Most people felt neutral or slightly happy when asked how the trees made them feel, with over three quarters (75.5%) neutral, happy or very happy. Differences between all 5 responses are statistically significant (χ -squared (n,4) = 313.18, p-value < 0.001). This indicates that site managers can be confident that the majority of visitors do not have negative responses to seeing dead and decaying trees in the landscape.

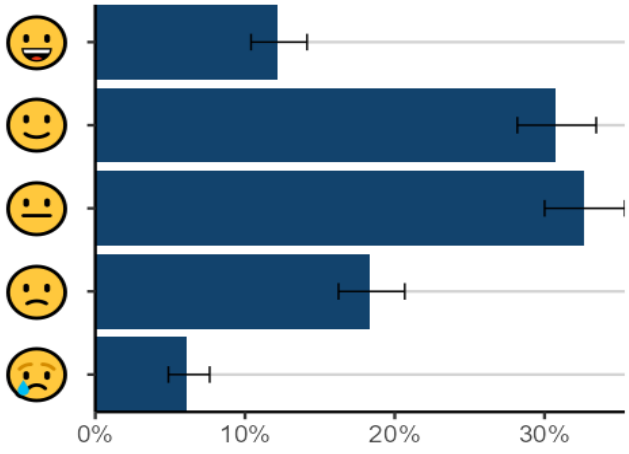


*Figure 4. Can you point to how this tree makes you feel?*

We looked at whether socio-demographic variables and site characteristics affected how respondents felt about the tree. There are statistically significant differences in the responses according to age group (p<0.001), Nature Relatedness (NR5) score (p=0.004), site (p<0.001) and frequency of visits to that site (p<0.001). Those who felt neither happy or unhappy were more likely to have lower NR5 scores and there's some evidence that those that felt unhappy were in the lowest NR5 quartile.

The majority of respondents (79%) said 'no' that landowners should not remove the tree, 16% said it depended on context and only 5% said 'yes' the tree should be removed. Differences between the 3

response categories were statistically significant (χ -squared (n,2) =1131.6, p-value < 0.001). This varied according to age group (p=0.002), frequency of visits (p=0.041), NR5 score (p=0.015) and site (p<0.001). Of those who thought the tree should be removed, the highest number of responses came from those aged 85+ and of those who thought the tree should not be removed, the highest number of responses came from those aged 65-74. Across all NR5 groups (level of knowledge of ecosystem services) respondents were significantly more likely to say 'no' (the landowner should not remove the dead/decaying tree). Overall, the groups with higher NR5 scores (more knowledge) were more likely to say 'no'.

Over three quarters of respondents stated that they were aware of reasons why landowners may decide to keep dead wood, dead trees, or decaying trees rather than removing them, compared to those who were unaware (24%). With significant difference between respondents that were aware vs not aware of any reasons (χ-squared (n,1) = 323.44, p-value < 0.001). This varied by age group and NR5 scores, with those with higher scores more likely to be aware.

Nearly two thirds (62.8%) of respondents think more dead and decaying trees should be left in the landscape to decay in place with a significant difference in comparison of responses 'yes', 'no' and 'it depends' to the question: 'Do you think more dead and decaying trees should be left in the landscape to decay in place?' (χ-squared (n,2) = 544.3, p-value < 0.001). Age group, gender and nature relatedness affect whether visitors think that more dead and decaying trees should be left in the landscape to decay in place. Those in the 85+ age group are less likely than other age groups to believe more dead and decaying trees should be left in the landscape to decay. Those with a higher NR5 score were more likely to agree that more dead and decaying trees should be left in the landscape to decay in place.

Figure 5 shows the frequency of responses against reasons respondents gave for keeping or removing the tree. There were statistically significance differences between categories, (χ -squared (n,16) =1897.687, p-value < 0.001). 'Biodiversity / wildlife' as a reason was the most commonly cited (as reasons to keep the tree) (41.8%), followed by for 'insects / bugs / invertebrates' (27%) and then more generically for 'nature / natural' reasons (25.4%). With regard to reasons to remove the tree, the most frequently cited reason was because it poses 'risk / hazard / safety / danger' (7.7%), followed by because of 'disease / pests' (5.1%).

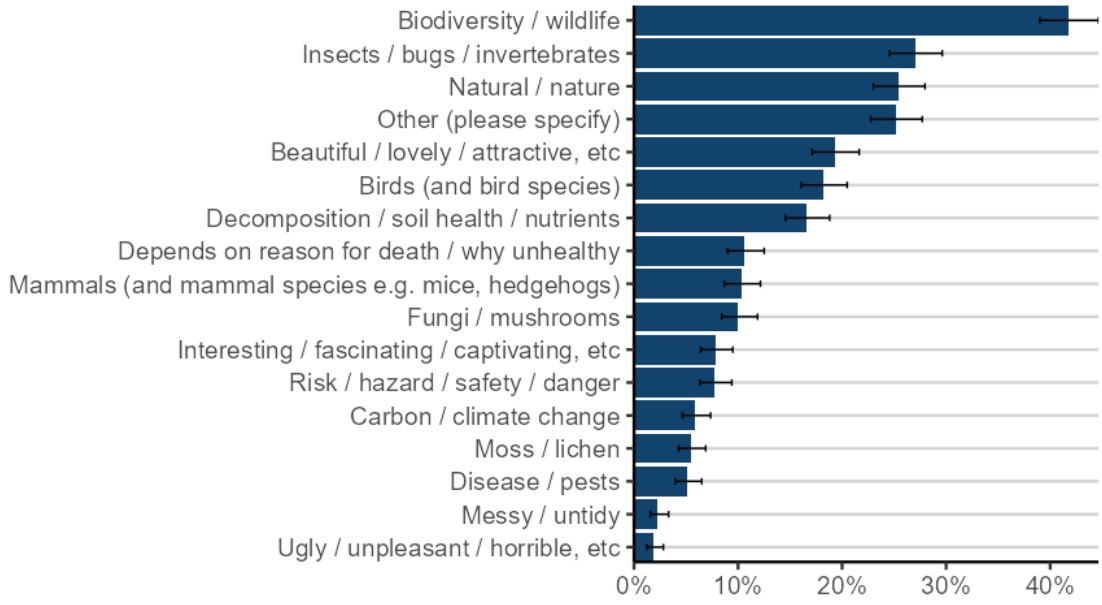


*Figure 5. Why do you say that? [Response to question asking if the landowner should remove the tree]*

Figure 6 illustrates the responses to the question 'What comes to mind if I say the words dead and decaying trees?'

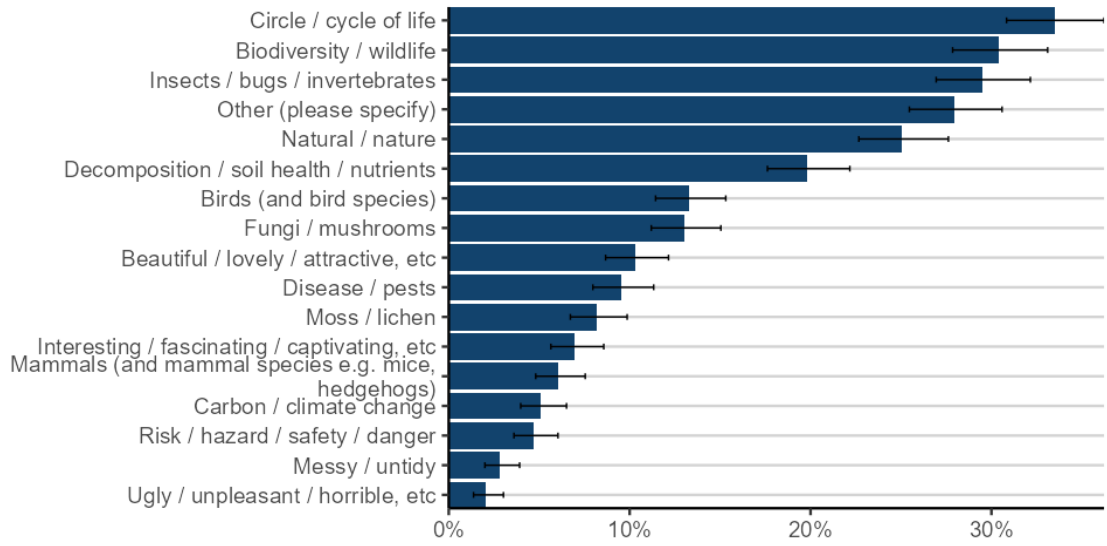


*Figure 6. What comes to mind if I say the words dead and decaying trees?*

**How do the values visitors hold for dead and decaying ToWPUR compare to values held by the public in relation to trees and woodland more generally?**

**Summary: There is some indication that dead and dying trees are less valued than trees and woodlands overall.**

We asked respondents to score how highly they valued (or did not value) dead and decaying trees in the landscape against 5 statements (table 1). We compared the scores with the scores of participants who were asked the same questions but in relation to trees and woodlands generally (O'Brien et al., 2024). Comparisons across the two datasets must be considered carefully given the different aims, sample sizes and data gathering modes. However, there is some indication that dead and dying trees are valued less overall (there are statistically significant differences between total scores (Wilcoxon rank sum test, W = 89160, p-value < 0.001).)

*Table 1. Value statements*

| | |
|---|---|
| 1 | I value dead and decaying trees because of their importance for wildlife |
| 2 | I value dead and decaying trees because they are good for my mental wellbeing |
| 3 | I value dead and decaying trees because they make me feel creative and inspired |
| 4 | I value dead and decaying trees because they can help me learn more about nature |
| 5 | I value dead and decaying trees because they provide places to spend time with friends and family (e.g. to sit on, climb, play around) |

Respondents are more likely to strongly agree that trees and woodlands generally are important for wildlife, for their mental wellbeing and providing places to spend time with their friends and family (compared to dead and dying trees). Both types of trees/treescapes scored similarly in relation to helping people feel creative and inspired and to learn more about nature.

**How does level of knowledge about ecosystem services derived from dead and decaying ToWPUR affect how visitors respond to them?**

**Summary: Generally, visitors are more knowledgeable about the benefits derived from these trees than might be expected. How knowledgeable people were affected how the tree made them feel, whether it should be removed, whether they noticed them, what they noticed and their concerns about such trees.**

We created a 'knowledge score' for each respondent which counted how many unique ecosystem services were mentioned by each participant across responses to two relevant questions. Sixteen percent of respondents did not mention any and nearly a quarter (24.2%) mentioned 3 or more (table 2). Education and NR5 score significantly affected how many unique ecosystem services were mentioned.

*Table 2. Number of ecosystem services mentioned by respondents -not including those who responded 'don't know of any', frequency table.*

| Number of Ecosystem Services | n | % |
|---|---|---|
| 0 | 154 | 15.67 |
| 1 | 324 | 32.96 |
| 2 | 267 | 27.16 |
| 3 | 130 | 13.22 |
| 4 | 66 | 6.71 |
| 5 | 23 | 2.34 |
| 6 | 11 | 1.12 |
| 7 | 6 | 0.61 |
| 8 | 2 | 0.20 |
| Total | 983 | 99.99 |

How knowledgeable participants were about the beneficial ecosystem services provided by dead/decaying trees significantly affected how the specific dead/dying tree made them feel. With those who were least knowledgeable more likely to feel unhappy or very unhappy about the tree. With a caveat that the majority of respondents had the lowest knowledge scores. It also affected their responses to tree removal ($p<0.001$). Those with a knowledge score of zero (no knowledge of the ecosystem service benefits of dead and decaying trees) were more likely to suggest that the tree should be removed. Knowledge score was nearly significant ($p=0.061$) regarding whether people noticed dead and decaying trees in the landscape and was significant ($p<0.001$) regarding what they noticed. Those with the lowest knowledge score were consistently most likely to report across all concerns about dead and decaying trees being left in the environment, except for 'Concern for the tree itself'.

**Are responses affected by how formal the landscape is?**

In general, visitors to Knepp (least formal) felt most positive about the trees relative to the other sites and those from Stowe (most formal) least positive (but still more positive overall).

Visitors to Stowe were relatively more likely than visitors to other sites to believe the landowner should remove the tree (although visitors across all sites were more likely to believe they shouldn't remove the tree). Visitors to Knepp were relatively more likely than visitors to other sites to believe the landowner shouldn't remove it.

Otherwise, site was not a significant variable in any of the other responses.

**What are the primary concerns visitors have (if any) about such trees being left in landscape or disbenefits they confer?**

Figure 7 shows how concerned respondents were about different risks or concerns. Respondents were most concerned about dead and decaying trees spreading diseases or pests to other trees (47.9% concerned or very concerned) and being a safety hazard (41.6%). They were least concerned about the trees being ugly (4.8%) or messy/untidy (5.5%).

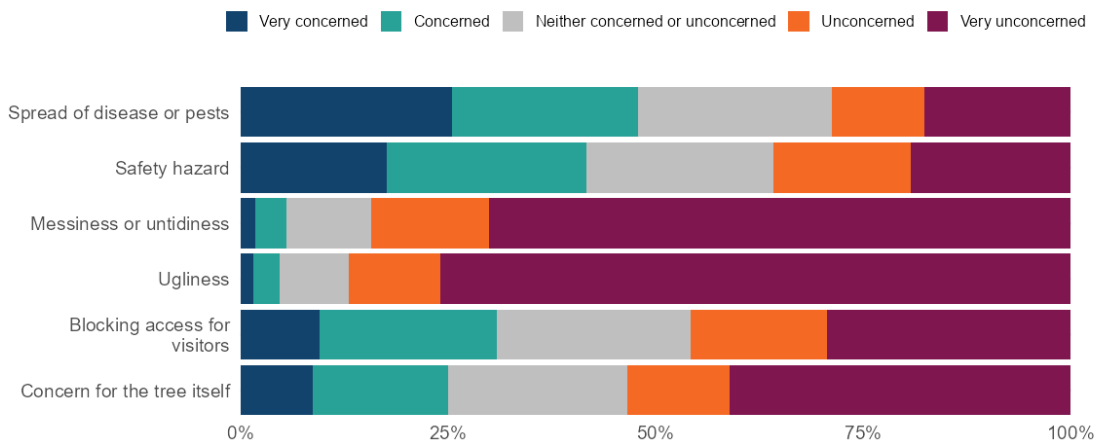


*Figure 7. How concerned are you about dead and decaying trees being left in the environment?*

**Does the cause of death/ill health play a role in how visitors respond to dead and decaying ToWPUR?**

**Summary: The cause of death/ill health does play a role in how visitors respond to dead and decaying ToWPUR.**

Most respondents (77.4%) reported their answer to the question 'Should more dead and decaying trees be left in the landscape to decay in place' would change depending on the reasons for the tree death/decay. There is a statistically significant difference between responses ($\chi$-squared (n,1) = 353.46, p-value < 0.001). In the pilot study the majority of respondents who used this caveat explained that this was because of concerns about pests/diseases spreading and figure 7 highlights that the highest levels of concern relate to spread of pests/diseases.

When asked about specific trees, 16.1% of respondents thought whether the landowner should remove the tree depended on the context. Those saying 'depends on the context' are most likely to be under 44 years old (specifically in the 25-34 age group). Females were more likely than males to say that 'it depends' when asked if more dead and decaying trees should be left in the landscape to decay in place

### Recommendations

Our results indicate that site managers should feel confident that leaving dead and decaying trees in place will positively contribute to visitor experience and that visitors would largely be receptive to sites highlighting and celebrating dead and decaying trees. Investing in communicating with those least knowledgeable about dead and decaying trees could be a good investment, potentially leading to higher visitor support overall for leaving trees to decay in place.

Visitors were generally concerned about tree pests and diseases, but there were indications that they were less aware of how such risks should be managed in relation to dead and decaying trees in the landscape. More education about this on-site or more generally could prove helpful for site managers.

There is some indication from WP4 that young people feel negative about dead and decaying trees. Similar research with young people and children (visitors to such sites and not) would test this. If so, it would be interesting to explore why this is.

## 5. WP4 – Understanding values around TOWPUR and landscape change with young people

Young people have not been well-represented in discussions about trees outside woodlands in peri-urban and rural areas (ToWPUR), resulting in their experiences, values, and attitudes being overlooked in both policy frameworks and management strategies for these landscapes. This work package addressed these gaps by examining young people's experiences of, and relationships with, TOWPUR, exploring both their sociocultural values (shaped by shared cultural practices and social experiences) and their specific value orientations as expressed during discussions about landscape change. The study employed a multi-site research design across three geographic areas (Cornwall, East Sussex, and the Peak District), conducting 12 participatory interactive and creative workshops with 48 young people aged 10-15. Informed consent was obtained for all participants. Ethical approval was granted by the University of Liverpool's Ethics Committee and included the creation of a distress protocol as a precaution.

**The research questions (RQs) were:**

- RQ1 How do young people experience and care for Trees Outside Woodland that are part of a specific peri-urban or rural landscape?
- RQ2 What values do young people hold around these TOWPUR?
- RQ3 What can we learn about how these values have formed, including the key influences on value formation?
- RQ4 How are these values activated and negotiated in discussions around landscape change, for example, the loss (whether by felling or by encapsulation through tree planting at scale) or addition of TOWPUR?

This research will be published in the form of a full report, a briefing note, and an animated video (see Section 9 for more information). The key findings and recommendations are summarised below.

***Young people's experience and care for TOWPUR and associated values***

Young people develop strong connections with trees through multi-sensory experiences, particularly through play and observing seasonal changes. Positive and negative experiences, such as falling, with these trees can be important sites of learning. While the young people attitudes did not explicitly articulate a difference between TOWPUR and other trees, TOWPUR were often the site and focus of their experiences and the young people demonstrated positive attitudes towards trees, valuing them for multiple purposes: as spaces for play and recreation, places of retreat with restorative value, and for their environmental and biodiversity benefits. Trees were also the site of cultural meaning and placemaking, as for example with the wishing trees some of the young people in Cornwall referred to. Other regional differences were also observed, for example, young people in the Peak District gave much greater consideration to the trees for fuel, which is to be expected in an area with many houses reliant on wood fuel for heating in the absence of mains gas connections.

***Value formation, influences, and development***

The development of these values is significantly influenced by three key factors: family and friends, who shape experiential engagement and foster positive attitudes towards tree preservation; school-based learning, which enhances understanding of environmental and biodiversity importance; and age-related transitions, where value orientations shift from play-focused to appreciating trees for socialising and retreat. Another age-related shift was recognised in the change from learning about trees experientially to a more fact-based understanding. The research suggests that intergenerational socialisation within families and with other individuals (such as teachers, youth group leaders and peers) is important in value creation and transfer. The young people drew on experiences with media much less frequently and the references to tree in media identified were often abstract and geographically distant. Fictional portrayals of trees often reinforced existing values acquired through socialisation.

***Values around loss and siting of trees***

Debate and voting on hypothetical local land use scenarios were used to engage young people's values in relation to tree removal and planting. The role of local context and micro-geographies in realising values was evident, particularly in regional differences between the three groups. Fairness and inclusion in terms of availability of service provision was another strong theme, as was the desire to maximise benefits for the broadest number of people. The young people were also concerned about the realities of long-term management or maintenance in terms of maintaining the provision of any benefits. The young people were also asked to rank preferences for tree types (avoiding species terminology) and siting. On the whole, they preferred flowering and fruiting trees as well as those suitable for play and had a strong preference for providing variety. The young people saw trees as adding value to a site and had a strong sense of "right tree, right place", for example, advocating for fruit trees in communal spaces such as schools or village greens where people would have easy access to their benefits. In discussions around tree removal, greatest concern was shown for mature trees and safety concerns, including where due to disease, were considered the most valid reason for tree removal. Road and house building were the lowest ranked reasons, with nuanced discussions around farming, particularly among Peak District participants.

***Young people's experience of the workshops***

Engaging in the workshops brought forward previously unarticulated ideas about TOWPUR and the young people co-created new understandings with their peers, emphasising the importance of peer-to-peer learning. The young people relished the opportunity to articulate and express their perspectives and opinions on these issues, even while recognising, as in the scenario voting, that the decision making was hypothetical.

## Recommendations

- The development and preservation of TOWPUR should be prioritised given the positive value-forming role they play for young people – this project has shown it may be easier for relationships to form with specific trees outside of woodland as opposed to woodland trees.
- Empowering young people through engagement in decision-making around TOWPUR can have clear benefits for community consent, value formation and nature connection.
- Targeted as well as more routine educational opportunities for young people to engage with trees should be encouraged and expanded. Where possible this will combine abstract learning with embodied experiences (such as with Forest Schools).
- There are opportunities to make use of age-appropriate platforms - such as YouTube and wider social media, as well as more virtual spaces such gaming and in films - as a productive route to messaging to young people about TOWPUR and trees more generally.
- Future research is needed to expand further on the observations of this research project – particularly seeking to look at regional variations and eliciting younger people's perspectives on specific, real world, planning and policy developments which impact TOWPUR.

## 6. Appendices

I. WP1 International Union of Forest Research Organisations conference poster (2024)
II. WP2 Full report 'Mapping values in professional settings: Sycamore as ToWPUR'
III. WP2 Interview guide
IV. WP2 Focus group guide
V. WP3 Pilot questionnaire
VI. WP3 Main survey questionnaire
VII. WP3 Pilot survey results
VIII. WP3 Main survey full results and additional statistical analysis details
IX. WP3 Analysis plan

## 7. Bibliography


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9. This section should be used to record links (hypertext links where possible) or references to other published material generated by, or relating to this project.

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### Waiting for publication approval

Lestari ().Trees outside of Woodland: An exploration of social and cultural values. An infographic.

Lestari (). Trees outside of Woodland: An exploration of social and cultural values. A scoping study focusing on the arts.

Brockett, B.F.T. (). Dead and decaying trees in the landscape: What do visitors think about them? A guide for site managers.

van der Wielen, G. and Brockett, B.F.T. (). Sycamore in future treescapes: attitudes and values of tree and woodland professionals in the UK. A research briefing.

Riley, M., Cheung Judge, R., Palmer, A.K. (). In brief: Young people's socio-cultural values in relation to Trees outside Woodland and landscape change.

Riley, M., Cheung Judge, R., Palmer, A.K. (). Young people's socio-cultural values in relation to Trees outside Woodland and landscape change. A report.

Riley, M., Cheung Judge, R., Palmer, A.K. (). Young people's socio-cultural values in relation to Trees outside Woodland and landscape change. A video.

# "it's good to lean against it and think, wow this tree was here before me and it'll be there when I'm gone[1]"

## The social and cultural value of trees during the COVID-19 Pandemic

### What are social and cultural values?

These are shared ways of thinking, feeling, behaving, responding to and communicating about, for example, the value of trees. They are often ignored in our valuations of nature, but in doing so we miss an important part of the fabric of human cultures and societies.

### Capturing social & cultural values

There is no single, all-encompassing approach which will capture the social and cultural values that people attach to trees, but different approaches can help us think how best to reveal values for specific purposes. For example, Cultural Ecosystem Services describes how natural systems acquire cultural value and significance for people in ways that benefit their wellbeing.

As part of a wider project which explores the social and cultural values of trees outside of woodland, this research, led by Dr Emma White[2], undertook analyses of data from an online, UK-representative survey (n=850), in-depth interviews (n=34), and 808 photographs of nature taken by interview participants.

**Research questions explored how people chose to engage with nature during the pandemic and included:**

1. **How important were trees and different tree-rich settings in participants' nature engagement experiences?**
2. **Were tree-rich places associated with greater wellbeing?**

### Select findings

Quantitative analysis showed that people who chose a 'tree-rich' place to get away to during the pandemic experienced significantly greater levels of wellbeing[3] compared with those who chose another type of outdoor place.

Analysis of the interview questions identified that tree-rich places supported emotional, physical, social and spiritual wellbeing.

Focusing on spiritual well-being, the research found this encompasses different aspects of self-transcendence, which for some participants was explicitly religious or faith-based, while for others it was not. Participants described how trees were associated with important memories, helped them connect with nature, and could be imbued with other-worldly qualities. People valued the changes they observed in tree-rich places and felt nourished by them. Trees also helped some to gain a sense of perspective in their lives, or a sense of their place in the universe and in time.

Gillian (White, female, 59) described hope at seeing the emergence of catkins in the late winter: *"It was bleak, there were no... leaves on the trees, but it was just hopeful indicator that you know, life was going to start coming back again."*

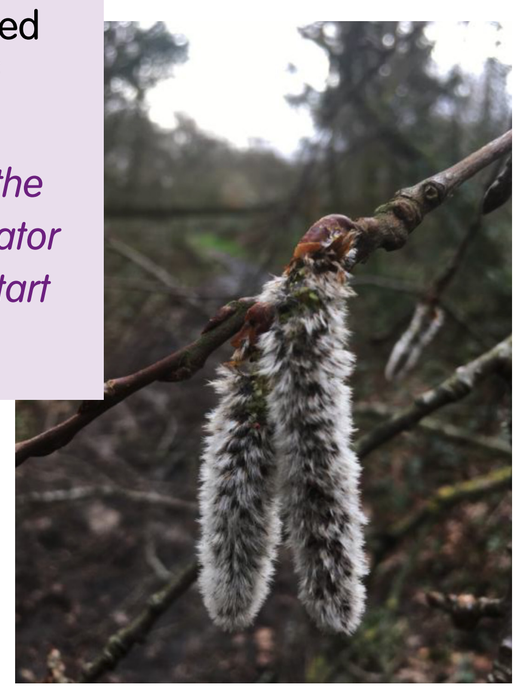

Photo credits: Gillian, Nishanth and Gemma

Tree-rich places helped participants experience gratitude and transcendence: *"I feel so grateful, like how nice the world is for us, a world which is prepared for us long before even we were born… Those trees were there for me. I think, God created that for me... it was a feeling of gratitude and wonder."* Nishanth (Asian, male, 28).

Some participants experienced a sense of feeling guided, comforted & nourished. Lorenzo (White, male, 47): *"Well maybe this is a bit [of a] hippy… expression but it's a different type of energy. I always say the sea is cleansing, woods and mountains are nourishing"*.

This is just a peek at how we can explore the social and cultural values of trees. Please visit our project page[4] or contact me to find out more.

[1] Participant quote - Judith (White, female, 50).

[2] The data were originally collected for a project looking at nature engagement and how people chose to 'get away' during the COVID-19 Pandemic. For more details see https://cdn.forestresearch.gov.uk/2024/01/Trees-wellbeing-during-the-Covid-19-pandemic.pdf

[3] Hedonic and eudaimonic wellbeing and restoration.

[4] www.forestresearch.gov.uk/research/understanding-the-public-value-of-trees-outside-woodlands-peri-urban-and-rural-towpur

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Forest Research

# Sycamore in future treescapes: attitudes and values of tree and woodland professionals in the UK

Research Report

Grace van der Wielen and Beth Brockett

Forest Research: Farnham

This research explores the social and cultural values and attitudes of professionals in the trees and woodland sector in relation to sycamore trees, particularly those trees outside of woodland. This project is part of a broader programme of research exploring the public value of trees outside of woodland and is funded by Defra through the Nature for Climate fund.

# Contents

## Introduction

Resilience to climate change, the threat of pests and diseases, tackling the biodiversity crisis and the implications of these issues for the future of the tree and woodland sector are necessarily being foregrounded in management discussions. Through our research, we explored sycamore's place in those discussions, as a naturalised, fast-growing and adaptable species with increasing evidence to support its ecological value and potential contribution to future forest resilience[1]. Despite these characteristics, sycamore has long been perceived as a controversial species in the UK, particularly among conservation professionals. A 1991 Forestry Commission Occasional Paper acknowledges 'the antagonism which [sycamore] traditionally arouses among conservationists' (p15) and, in a review of the natural history of sycamore within Britain, Taylor described how the species is 'reviled by conservationists' (1985, p2). More recently, Rackham (2006, p30) argued that the status of sycamore in Britain has become 'contaminated by value judgements', Morecroft et al. (2008, p60) conclude that 'sycamore remains a controversial species' in Britain, and Rotherham and Lambert describe sycamore as 'the most despised of exotic trees in England' (2012, p9). With the notable exception of Taylor's (1985) survey of British conservation practitioners' attitudes towards sycamore - which found attitudes to be generally negative – claims that sycamore is a controversial species are anecdotal and not based on empirical social science.

Alongside a small indicative shift in the way sycamore is considered in policy and practice discourse, there is anecdotal evidence that suggests professional attitudes to sycamore in the tree and woodland sector are changing[2]. Some believe this shift in attitudes is linked to the loss of ash *(Fraxinus excelsior)* trees in the UK landscape as a result of ash dieback (*Hymenoscyphus fraxineus)* and emerging evidence of sycamore's positive ecological value and potential to act as a host for many of the species associated with ash. However, there has been no empirical exploration of this nor how any shift in attitudes and organisational policies are translating into how sycamore is managed in different landscape contexts and by different professional groups. Given increasing pressures on the tree and woodland sector to plan for climate change, pests and diseases, address biodiversity loss and deliver multiple other ecosystem services, it is important to understand how our shared values influence how we think about and manage different tree species. This is particularly true when – as is the case with sycamore – these values may be based on contested science and incite particularly strong emotions.

This research sought to address this evidence gap by exploring the variety of attitudes and values associated with sycamore by different professional groups, how these translate into management practices and policies, and the implications of this for future consideration of sycamore in UK treescapes. This project was conducted in collaboration with ecologist colleagues who undertook a review of the current evidence in relation to the ecology of sycamore

[1] Sycamore (SY) - Forest Research

[2] See, for example: Ashwood | NatureScot; Managing woodland SSSIs and ancient woodland with ash dieback (Hymenoscyphus fraxineus) - GOV.UK; Guidance on dealing with the changing distribution of tree species (Natural England)

and the ecosystem services it provides. We began by reviewing the social sciences literature to ascertain what evidence exists to support anecdotal claims that sycamore is a controversial species amongst professionals in the tree and woodland sector. This was followed by empirical research with land managers and other tree and woodland professional communities of practice to understand the range of values and attitudes held in relation to sycamore and the future role it may play in the UK's treescapes.

This research set out to address the following questions:

1. What values and attitudes do different professional groups associate with sycamore?
2. Do these values and attitudes differ within and between professional groups?
3. Do these values and attitudes translate into professional practices?
4. How might these values be shaped by considerations of the future and regional and landscape contexts?

# Methods

## Scoping review of the social science literature

A scoping review was conducted to explore evidence relating to the social and cultural values associated with sycamore and to ascertain whether empirical evidence exists to support anecdotal claims that sycamore is a controversial tree species among tree and woodland professionals. Following Arksey and O'Malley (2005), the review followed five stages: Identifying the research question, identifying relevant studies, study selection, charting the data, and collating, summarizing and reporting the results.

The review aimed to gather information on the following research questions:

1. What does the literature say about a) attitudes and b) values associated with sycamore by specific publics (including landscape architects, policy colleagues, foresters, land managers, conservation practitioners, applied ecologists, among others)?
2. Does place context play a role in how sycamores are valued by these different publics (e.g. woodland, hedgerows, in-field, among others)?
3. Are there regional variations in how sycamores are valued by these different publics, particularly as a tree outside of woodland?

The search was conducted across Forest Science, Web of Science, and JSTOR using the following search strings:

Forest science: attitude* OR value* OR perception AND sycamore

Web of Science: (attitude* OR value* OR perception* OR perspective* OR preference* OR belief* OR experience* OR opinion*) AND (sycamore*)

JSTOR: (attitude* AND sycamore*)

The search returned a total of 413 results. After screening the results by title and abstract, only 16 studies were identified as relevant to the research questions. An additional 17 relevant studies were sourced from the bibliographies of the initial 16 studies. The search was broadened to include non-UK contexts given an initial lack of relevant results. However, the majority of studies identified as relevant are based in a UK context.

The results of the review were charted using Microsoft Excel and organised into four key themes which relate to the research questions: group identity, perceived benefits and disbenefits, classification and terminology, and regional and cultural context. These themes informed our lines of enquiry regarding professional groups, landscape context, and region, and the design of subsequent empirical research to explore these (interviews with land managers and focus groups with tree and woodland professionals).

## Ecological literature review

In parallel to our review of the available social sciences evidence, ecologist colleagues conducted a review of the existing ecological literature. For details please see Manicom-Smith et al. (2024). A previous review (Barsoum et al 2024) had found that sycamore was relatively understudied in the UK, in comparison to its land cover. We presented the preliminary results of this review within the focus groups as a prompt for discussions about the ecological value of sycamore and its future in the UK.

## Empirical methodology

Ethical approval was obtained through Forest Research's ethical approval process.

***Interviews with land managers***

We undertook interviews with five land managers to understand their values and attitudes relating to sycamore. This also served as a pilot study, to test our assumptions and research questions, given the paucity of the published evidence. We developed the interview guide to address the research questions and informed by the themes identified in the literature review and in work package 1 of the wider project[3]. Topics covered within the interview guide included: professional role and type of land management, experience of tree and sycamore management, specific sycamore trees on their land, perceptions and values of sycamores generally, and questions to support the ecological research (separate project, see below). The full interview guide is included in appendix III. As well as informing the project's overall findings (see subsequent sections), this data informed the discussion guide for subsequent focus groups with other tree and woodland professionals.

Interviewees were recruited from a sample of land managers already engaged with a sister ecology project (TWF-11) who had opted in to further research. Interviewees were all located in rural areas in the south of England. Ecology colleagues had found it difficult to identify sycamore ToWPUR for study in this region and so a focus in this location to explore possible causes related to land manager values was deemed appropriate. Interviewees were all land managers but came from a variety of professional backgrounds (farming, forestry, conservation, rural surveying, land agency, tree inspection, and local authority work) and their sites covered a range of management objectives (farming, woodland, parkland, common land, protected for biodiversity). Interviews were conducted over the phone or via video call. Informed consent was obtained for all participants.

[3] Understanding the Social & Cultural Value of Trees outside Woodlands: Peri-Urban and Rural (ToWPUR) - Forest Research

All interviews were professionally transcribed. The interview transcripts were analysed thematically and for content using NVivo 14 following Braun and Clarke's (2006, 2021) reflexive thematic analysis framework (six iterative stages: i) familiarisation; ii) open coding; iii) generating initial themes; iv) developing and reviewing themes; v) refining, defining and naming themes; and vi) writing up the analysis). The analytical approach was inductive, identifying both semantic and latent content to address the research questions. Two researchers developed a coding framework based on a mixture of inductive codes derived from the interviews and deductive codes derived from the literature review themes. This analysis was conducted by the 1st author supported by discussions regarding the efficacy of the codes in the developing and reviewing stage with the 2nd author. Coded data was organised and annotated in Microsoft Excel according to theme. The results have been incorporated into the full report (attached in the appendix II) and below.

***Focus groups with tree and woodland professionals***

Learning from the interviews with land managers indicated that professional group identity plays a significant role in shaping perceptions and management of sycamore. We therefore decided to explore this further through focus groups with other tree and woodland professionals, to enable collection of data on participants' shared understandings and the ways in which individuals are influenced by others in a group situation (RQ2).

The literature review and land manager interviews also highlighted the difficulty in eliciting values and the need for data collection to be able to account for tensions between values. For subsequent data collection phases, we decided to focus on gathering data on management practices and policies in relation to sycamore, on the basis that these would, to some extent, reflect how sycamore is (or isn't) valued by different professional groups.

We stratified our sample into three broad professional groupings based on the ways in which each professional group (or community of practice) conceptualises or interacts with sycamores in their role:

- **Strategic** – those who make decisions about sycamore (or that will indirectly affect sycamore) e.g. policy-makers.
- **Tactical** – those who view sycamore as an object of interest, who may 'absorb' sycamore into their work e.g. landscape architects, scientists, ecologists, ecology consultants.
- **Operational** – those who directly manage or otherwise 'deal with' sycamore e.g. land managers, arboriculturists/arborists (including hedge-layers), conservation practitioners, foresters.

This stratification was intended to facilitate analysis of differences in attitudes and values within and between professional groupings, as per the research questions. Participants were recruited through internal networks and by approaching relevant organisations directly. The focus groups were broadly recruited and organised into sessions according to the categories above (strategic, tactical and operational). Focus groups one (n=9) and two (n=7) consisted of a mix of professional groupings, though focus group one was largely tactical and two was largely strategic. Focus group three (n=9) only included operational participants. The focus groups were held online via video

call and facilitated by two social sciences researchers. Informed consent was obtained from all participants.

The focus group discussion guide was developed by the researchers with reference to the themes from the literature review and findings from the interviews with land managers. The full discussion guide is included in appendix IV. Topics included: distinctions in perceptions of sycamore inside versus outside of woodland, terminology and classification, how they encounter sycamore in their role, perceptions of sycamore's value, organisation and sector views on sycamore, experience of management or other practices in relation to sycamore, reflections on the ecological evidence presented and sycamore's future role in UK landscapes.

The sessions included a poll which asked participants to select the terms they would use to describe sycamore and a summary presentation of the ecological evidence review on the ecosystem services provided by sycamore (as described above). The latter was included on the basis that the new review provides additional information on the ecological value of sycamore, known to be particularly contested in discussions about the value of sycamore in professional circles. Its inclusion part way through the session was intended to explore participants' awareness of the evidence referenced and their reactions to it.

The focus groups were professionally transcribed. The data was analysed as for the interviews (described above). Prior to the focus groups, participants were asked to share any resources or policy documents that had shaped their perceptions of sycamore and how it should be managed. Analysis of these documents was incorporated into the findings of the research. Some participants preferred their quotes to be fully anonymised, and in these cases their organisations are not listed in the results below.

## Results from literature review: professional perceptions of sycamore

The literature review showed that there is little in the way of empirical evidence on professional values, nor social and cultural values, associated with sycamore in the UK, despite frequent references to negative cultural perceptions of the species, especially in the scientific literature. Aside from Taylor (1985) we were unable to source empirical evidence on professionals' (or any other groups') attitudes to sycamore (or values related to, perceptions of, etc.). Please bear this in mind when reading this review. We used the anecdotal evidence to suggest avenues which could be empirically explored within our research where the commentators were likely to have experience of the sector.

Several documents were returned within which authors anecdotally highlight controversy around sycamore and provide a variety of (unevidenced) explanations for this, these explanations included: sycamore's non-native status, the attitudes of conservation organisations, perceptions of its benefits and disbenefits, and an absence of robust ecological evidence about the species. Landscape context was considered a factor in shaping attitudes towards sycamore, primarily in terms of negative perceptions of its ability to invade and dominate ancient semi-natural woodland (Leslie 2005; Peterken 2011; Morton Boyd 1993; Taylor 1985). A small number of sources also suggest that there may be regional variations in attitudes to sycamore, based on factors like its historic distribution and its related suitability to certain geographical and climatic conditions (Green 2005).

Some authors commented that sycamore provokes strong emotions and reactions from conservation organisations in particular. Green (2005, p184) notes that 'Sycamore *Acer pseudoplatanus* has always excited strong emotions, especially in conservation circles', Good et al. (1991, p15) describe how 'sycamore is generally regarded as distasteful and is often strenuously discouraged by conservationists', and Leslie (2005, p19) notes sycamore's 'poor reputation amongst conservationists due to the perception that it supports only low levels of biodiversity, that it is not native and that it is invasive in ancient semi-natural woodlands'. Authors suggest that much of the controversy provoked by sycamore can be attributed to the threat it is perceived to pose to the values of conservation organisations, and that these perceptions are based on social and cultural values as opposed to scientific evidence alone. Taylor (1985) and Stern (1982) suggest that the negative attitudes of conservation organisations towards sycamore have shaped the attitudes of other professional groups towards the species (with Taylor's assertion based on empirical evidence). Taylor also describes how sycamore has been 'largely ignored by foresters' (1985, p2). However, Green (2005, p184) suggests 'most foresters find it valuable, especially outside the range of grey squirrels'. Likewise, Morton-Boyd described sycamore as 'one of the most valuable hardwoods grown in Britain' and predicted that the species would be 'increasingly favored [sic] by lowland timber growers, particularly in the north of England where grey squirrels are not a threat to the trees' (Morton Boyd 1993, p425)[4].

Peterken (2001, p40) claimed that 'the problem with *A. pseudoplatanus* is partly one of principle: it is a non-native and thus unwelcome in native woodlands'. Some respondents to Taylor's survey took this principle further, believing that 'sycamore is non-native and therefore has no place in British communities of any type' (1985, p7). Taylor concluded that management of sycamore has been 'based on very little evidence, and, no doubt, a good deal of misguided prejudice' (Taylor 1985, p41). In addition to Peterken and Taylor, several authors have argued that the classification of sycamore as non-native has shaped negative attitudes towards the species (Green 2005; Lundberg 2010). Sycamore's non-native status is understood to be a 'source of prejudice against the species' (Leslie 2005, p21) which informs attitudes and management practices that are not based on sound ecological evidence but, rather, a principle (Green 2005; Peterken 2001). Leslie (2005, p21) claimed that 'efforts to eliminate or reduce sycamore as a component of woodland' in British nature reserves were based on perceptions of it as an 'exotic tree species'. In his case study of the role of conservation values in the management of sycamore in Norway, Lundberg claims that 'the invasive character of sycamore in the study area is overestimated' (2010, p333).

A number of authors claim that negative attitudes towards sycamore are due to its perceived disbenefits, including: invasive regeneration (Peterken 2023; Morecroft et al. 2008; Leslie 2024; Taylor 1985), low value to wildlife or biodiversity value (Taylor 1985; Leslie 2024; Morton Boyd 1993), and heavy honeydew production (Leslie 2024). The authors contest the invasive potential and low biodiversity value of sycamore and Leslie (2024) notes that heavy honeydew production is only a nuisance and therefore should not be considered a major disbenefit. In 1985, Taylor explained that perceptions of sycamore as an 'ecological disaster' (p41) were, in part, being driven by an absence of scientific evidence on the species: 'The truth is that very little work has

[4] Note the date of the publication, grey squirrels are now known to be more prevalent in northern England (Spring Monitoring Programme).

been carried out on the ecology and status of sycamore in Britain…so no-one knows with any degree of accuracy to what extent it is likely to continue to invade woodland and other communities if left to its own devices. Even less evidence is available to support the view that sycamore is detrimental to wildlife.' (p3). This sentiment is reiterated by Binggeli in the 1990, speaking to the UK context: 'little scientific work has been carried out in order to compare the value of sycamore and associated tree species with different taxonomic groups in native and invaded ranges. Any statement on sycamore's wildlife value is therefore sketchy and possibly misleading' (1993, p143). The call for evidence is made again a decade later by Morecroft et al. (2008, p60) who describe how **'**the necessity for control [of sycamore] to protect conservation sites is still a matter for debate. Much information on the species is essentially anecdotal and there is a need for more detailed scientific study'. In 2024, Leslie describes how, from a forestry perspective, there is 'a paucity of strong experimental research, and silvicultural recommendations for sycamore are largely based on anecdotal observations' (p3). A recent review of the evidence available on the biodiversity of commercial plantations in the UK concluded that 'biodiversity studies were least common in larch, sycamore and Douglas fir' and that 'understudied woodland types in relation to cover included Sitka spruce, sycamore, larch and ash' (Barsoum et al 2024, p18). In addition to the lack of evidence, authors have also pointed to the misrepresentation of evidence and Taylor (1985) describes how evidence has been ignored.

## Results of empirical research

This section organises the results of the research according to key themes from the analysis. These themes will be explored in relation to the research questions in the discussion section.

Some participants preferred their quotes to be fully anonymised, and in these cases their organisations are not listed.

### Negative perceptions and shifting attitudes

Participants described hearing negative attitudes to sycamore in the past, particularly from conservation organisations. A number of participants had been involved in removal of sycamore from sites managed by conservation organisations earlier on in their careers. A strategic participant reflected that sycamore was something that, in the 90s, *'people would be spending a lot of money trying to get rid of'*. An operational participant, whose first job in the conservation sector was *'chopping out'* sycamore trees, described them as being *'highly undesirable'* at the time. Another participant, who had also spent time *'pulling out sycamore'* as a conservation volunteer in the 1980s described the time period as *'the very bottom of the curve for sycamore'* in terms of negative attitudes towards the species (Tactical, Forestry Commission).

Some participants explained that these attitudes were based on the understanding that sycamore was invasive and would come to dominate native habitats. One operational participant described how, as a 17-year-old working for the Nature Conservancy Council in the Chiltern Hills, *'we spent weeks, upon weeks, upon weeks, removing sycamores from our woodland because we all thought they were going to take over the world'*. Similarly, a strategic participant (Natural England) described how *'in my early career, we were still spending a lot of money removing sycamore from sites because of its non-nativeness. And because of its invasive behaviour'*. One operational participant (Natural England) thought that *'the dominance of the shade and the*

*impact on ground flora, particularly if they start over dominating in SSSI [Sites of Special Scientific Interest] has maybe historically coloured people's opinions about it'*. Some participants highlighted the lack of evidence around sycamore's perceived disbenefits; one strategic participant (Natural England) described how *'I think there is a view, there's a starting point in the sector, that's almost like, "Sycamore is bad." People just absorb that in their career…there is no evidence to back it'*. Similarly, another participant described a shift in his attitude towards sycamore once he had found that evidence of its perceived disbenefits was lacking:

> *Well, like others, in the '80s I was definitely part of the anti-sycamore "because it's non-native and it's highly-invasive and it doesn't support many species". Then you start to look at it and the evidence, actually, wasn't that strong on it being highly invasive. It wasn't that strong on it necessarily being bad for a range of species. Tactical, University of Oxford*

Participants described how attitudes to sycamores are changing and it is becoming more widely accepted in the UK's landscapes. An operational participant reflected how *'I was just thinking then, "Have I heard recently, in the conservation sector, people bemoaning the presence of sycamore in a wood?" and I don't think I have. It's much more widely accepted now than it used to be'*. Similarly, a strategic participant thought that *'things have changed'* since the late 1990s – '*I think, generally, the feeling then was that it was seen as a nuisance. I'm pretty sure the views of sycamore have changed since then'*. An operational participant (Woodland Trust) who had also done *'quite a bit of work in a SSSI [Site of Special Scientific Interest] in Essex removing sycamore'* twenty-three years ago reflected that *'whether that would be something that would be done now, I don't know. I think things have changed'*. While participants recognised this shift in attitudes towards sycamore, they were uncertain about how widespread this shift is and how it is translating into management practices. An operational participant reflected that *'I still think most ecologists I speak to would still have severe reservations about planting it extensively'*. A tactical participant (University of Oxford) described how there is still *'baggage'* that sycamore is in the invasive category. Similarly, a strategic participant (Natural England) emphasised that *'I still wouldn't plant sycamore into a site',* reflecting that, with regards to negative attitudes towards sycamore *'I don't think it's reversed entirely'*.

## Perceptions of ecological benefits and disbenefits

### *Ecological review summary of findings as presented to focus groups*

**Invertebrates**

Sycamore supports many species including leafhopper, aphid, butterfly, moth, lace bug, ladybird, scale bug, weevil and beetle species and supports the highest density of 'true bugs' compared with oak, birch, and hazel. The bark of sycamores provides an important overwintering site for some of these invertebrates. Sycamore flowers are an important source of nectar for bees and pollinators and the attractiveness of the species to aphids provides an important direct and indirect food source via honeydew production. Sycamore has also been identified as primary host for multiple invasive invertebrates, although a lack of research means it is hard to understand how notable this is relative to other tree species.

**Fungi, bryophytes and veteran attributes**

Sycamore provides habitat for an abundance and diversity of mosses and liverworts, is as species rich in fungi as oak, and is richer than ash and alder. The alkaline bark of sycamores provides a suitable habitat for lichens and bryophytes and supports communities similar to those found on elm and ash. Although a decline in diversity of broadleaved species overall will reduce biodiversity, the sycamore is able to support many of the species that live on ash and oak and so could be a possible partial replacement option in this regard. Mature sycamore trees have relatively lower abundance of veteran attributes, such as trunk rot and epiphytes, when compared to ash, alder, oak, birch and beech.

**Landscape contexts: farms and woodlands**

Sycamores do not tend to negatively impact agricultural output and can work well in silvopasture arrangements, offering nutritious food to sheep and cows. However, farmers may be deterred from planting or retaining sycamore trees as they host large aphid populations that could impact crop yields. Additionally, sycamore seedlings and seeds are known to be poisonous to equines and can cause serious illness and death.

At high densities, the continuous canopy of sycamore can shade out ground species and therefore impact the surrounding biodiversity (although also potentially reducing its own seedling success). However, while sycamore is highly opportunistic and will colonise disturbed land, it intrudes little into dense, undisturbed, tall woodland and therefore may not be a threat to ancient woodland.

**Risks and resilience**

Sycamores are a resilient tree that stand up well to a variety of common air pollutants, are able to weather major storms, and are relatively less impacted by Phytophthora. However, they are not particularly resilient to climate change. With increased drought stress, the impact of pathogens for Sycamore is likely to become more severe and it is vulnerable to a number of pests and diseases. This includes sooty bark disease which flares up in sycamores following long and dry summers. Grey squirrels are also a major pest for sycamores and can badly damage trees through bark stripping.

*Perceptions held by the participants*

Participants explained that their perceptions of sycamore's ecological benefits and disbenefits are largely context dependent. An operational participant articulated this in terms of how the traits which make sycamore valuable in the context of ecological restoration are the same ones which make it undesirable in other settings:

> *It'll grow anywhere, it seems, so it has pioneer species habits. It's a prolific seeder. It has a fair range of dispersal. So, I think the reasons why it's chosen for soil restoration, due to its resilience and ability to withstand difficult circumstances, I think, in all of the other environments where it pops up, it's those traits that people tend to take a dislike to. Operational*

Sycamore was perceived as a viable replacement for ash in the context of ash dieback. An operational participant (Forestry England) described sycamore as *'a natural replacement that could be definitely utilised'* and, similarly, a strategic participant (Defra) described how sycamore *'fulfils a similar place in the woodlands that elm did, and [has] potential to replace ash, I think, or*

*to make up for the loss of ash'*. Another strategic participant (Natural England) described how he often comes across sycamore being discussed in the context of its ecological similarity to ash, but caveated this by pointing out that '*ash was squirrel proof and sycamore is the opposite'*. Other participants also added nuance to this perception – a strategic participant (Woodland Trust) described how '*in larger trees, because the bark does flake, it can be not as good as ash but it still supports a good lot of ash species [species living on ash]'*, and another tactical participant (Future Trees Trust) emphasised that '*you need a suite of trees to fulfil that whole ecological function that ash did'*.

Participants identified sycamores as a useful habitat for other species, both as a living tree and as deadwood. Some participants explained that sycamores veteranize relatively quickly – one operational participant (Woodland Trust) described this as a '*useful'* feature, while another operational participant (Royal Parks) explained that '*as a deadwood habitat, it's quite decaying, it's phenomenal for a lot of generalist and invertebrate species'*. Participants observed that Sycamores are particularly attractive to pollinators. One operational participant (Woodland Trust, Operational) described how '*sometimes, when the flowers are out, you can just stand by and it's buzzing'*. Similarly, another operational participant observed that *'when you see a sycamore tree in flower and you look at what's on those flowers, it's not just honeybees, it's a whole host of different insects. That's fabulous'*. Growing up in Birmingham, another operational participant (Forestry England) remembers how '*it felt like [sycamore] was the sort of haven of life in these urban areas where you'd see bees and things all around it'*. A tactical participant (environmental consultancy) highlighted that sycamore is a particularly important habitat for native species, something which he felt was not recognised in how sycamore are currently considered within woodland quality assessments:

> *Sycamore is acting as a stronghold for native species. Whilst the species itself is not necessarily native, it is providing a home and habitat for species that are native, that would not necessarily still be there if the sycamores were gone. And I think that's the- one of the issues that I have with ranking sycamores as bad. Tactical, Environmental consultancy*

Similarly, in the context of '*depleted', 'over-grazed*' and '*over-burnt'* landscapes, an operational participant described sycamores as *'a reservoir for certain species until woodlands are re-established around them*'. The same participant had observed the way in which '*there are some species that seem to favour sycamore over other trees'* and that '*the sycamore has its own flora, I actually think it's quite important for that up here [in Scotland]'*. The perception of sycamore as a tree that encourages the establishment of other tree species was shared by an operational participant based at a Forestry England-managed arboretum, who highlighted the benefits of sycamore's fast growth habit: '*with it being a fast-grower, and that kind of stuff, it is really good for protecting some of the more vulnerable trees that we have on site* (Operational, Forestry England).

In addition to the ecological benefits outlined above, participants also mentioned a number of broader environmental benefits they associated with sycamore. Due to its large leaves, fast growth-rate, and ability to tolerate poor growing conditions, sycamore was perceived as a useful tree in terms of its ability to improve air quality in polluted areas – for example, adjacent to intensive agricultural environments (Operational, Natural England), or in urban settings

(Operational, Royal Parks). Highlighting the way in which this usefulness is not accounted for in '*conservation rules*', an operational participant (Royal Parks) described how '*for essentially what makes urban life better to live in, sycamore consistently ranks quite high for carbon absorption, air pollution filtration, etc. So, completely away from nature conservation rules, as an urban tree, in spite of the drought weakness, it has a lot of value there'.* Another operational participant also commented on sycamore's ability to store carbon: *'if you put it with the right mix of species, you actually get more carbon being stored in the soil. It hangs around for longer, which I guess would be a useful thing*'.

Participants also discussed the ecological disbenefits associated with sycamore, including its perceived invasiveness, dominance, shadiness, and low biodiversity value. The perception of sycamore as invasive was contested among participants. When participants stated that sycamore can be invasive, they tended to highlight that this invasiveness is context dependent. Some participants mentioned sycamore becoming invasive when growing in fertile soil; an operational participant observed that '*even up here [in Scotland], it can still be invasive in certain places where the soil is quite good'* (Operational). Overall, it was suggested that this invasiveness only becomes problematic in woodlands, particularly ancient woodlands (rather than as a ToWPUR). An operational participant (Woodland Trust) described how '*in the Southeast and Essex, it could still be a problem in some places because it's quite fertile land and, in ancient woodland, it can become a bit of an issue'*, while another operational participant (Natural England) described how, in woodlands, sycamores '*dominate'*. Similarly, a tactical participant (environmental consultancy) described how '*in certain situations, it can spread and it can dominate a small habitat',* acknowledging that *'I think we all agree that it can be a bit of a nuisance tree in woodland settings'*. Reflecting on negative attitudes towards sycamore, one strategic participant had observed that '*the more of the woodland was towards the ancient woodland type, the more [sycamore] was perceived to be as a nuisance'*. Contrary to the perception that sycamore will dominate the woodland it colonises, one strategic participant (Defra) had observed that:

> *You see [sycamore] finding its place in oak wood and beech wood, and establishing there, but it's not often that I've seen it outcompeting and overtaking and dominating. It dominates open, disturbed, land…but I rarely see it bullying its way into established native woodland. Strategic, Defra*

One tactical participant (Future Trees Trust) explained how '*I don't think of [sycamore] as an invasive species*', commenting that she hadn't come across the idea of sycamore as an invasive species at all: '*I'm coming at a forestry perspective, not an ecology perspective, but I've never come across sycamore as invasive. Is that just my ignorance?'.* One tactical participant (University of Oxford) explained that perceptions of sycamore's invasiveness are not well-evidenced: '*there isn't actually that much evidence. There are sites where it will spread very rapidly but it's not as invasive as people have often thought of it'.*

Participants observed that, in a woodland context, sycamore can create a dense, shady canopy which can in turn lead to low levels of ground flora. One strategic participant (Defra) reflected that '*I think, maybe, part of the reason it's so disliked in woodland, as well, is because it's often a big, dark tree and shades out a lot of the herb layer*'. Likewise, an operational participant observed

that '*there's not a lot that grows underneath [sycamore] in woodlands'*, another described sycamore in woodlands as 'shady' (Operational, Natural England), and another described how sycamore has '*a denser canopy and you wouldn't have as much, I guess, forest-floor herbaceous growth, compared with ash'* (Operational). Some participants pointed out that lower levels of associated ground flora and the ability to prolifically regenerate are not unique to sycamore, nor do these traits correspond to native versus non-native status. An operational participant (Woodland Trust) argued that '*all sorts of other species'* can also be disruptive to ancient woodlands, including native species like beech *(Fagus sylvatica)*, aspen *(Populus tremula)* and white poplar *(Populus alba)*, and an operational participant (Natural England) reflected that *'I find beech more problematic than sycamore in terms of the dense shade'*. A tactical participant (environmental consultancy) hinted that sycamore is subject to different (more negative) perceptions than trees with similar status: '*I know for a fact that there are plenty of native trees that if planted just a little bit around in a range that they weren't naturally in, can act as the same problem'*. Addressing claims that sycamore reduces the biodiversity of woodlands, one tactical participant (University of Oxford) argued that the biodiversity of the woodland *'will change but it's not necessarily meaning that it's a decline in biodiversity. It's just a shift in biodiversity'*.

## Implications of classification as non-native

Participants expressed a lack of consensus about how they would classify sycamore and highlighted that sycamore's status as a non-native species is contested. In response to a poll which asked participants to select any number of terms they would use to describe sycamore, 'naturalised' received the most votes out of a total of 59 votes cast (39%), though 'advancing or honorary native' (19%), 'non-native' (15%) and 'invasive' (13%) also received significant shares of the vote. 'Neophyte' received 7%, 'native' received 5%, and 'exotic' received 2%. An operational participant (Royal Parks) pointed to the existence of various *'schools of thought',* and that *'there are a lot of people who do class it as a native'*. Conversely, a strategic participant (Natural England) expressed that *'I find it Orwellian to say, "When is it going to be described as native?" Because unless I had evidence that it was originally here, I wouldn't describe it as native'*.

Several participants questioned the logic behind sycamore's classification as a non-native species. One strategic participant (Natural England) described how *'in some ways, this isn't a scientific, it's almost a philosophical question around it, I think... Which is why it's so difficult, because there isn't a right or wrong answer, is there?'*. Several participants (Strategic, Defra; Tactical, Woodland Trust; Tactical, University of Oxford) pointed out that sycamore is a natural component of European woodlands: *'It's evolved in that situation in Europe so to say it doesn't belong here or it's not compatible with our woodlands, I think, is a bit simplistic'* (Strategic, Defra). Relatedly, participants also highlighted that the proximity of sycamore in Europe to the UK means that it could have made its own way to the UK: *'whether it would've blown over and a seed would've landed on the Kent coastline by now, you know, and it would've worked its way up, you could probably make a case that that's likely to have happened*' (Strategic, Defra).

Throughout the discussions, participants gave examples of how the classification of sycamore as a non-native species impacts how it is considered and managed. Several participants suggested that the classification of sycamore as non-native has shaped wider attitudes towards the species. They posited that non-native species are perceived to be less culturally desirable than

native ones and that non-native species are often perceived as posing a threat to native species and habitats. A strategic participant (Defra) reflected that *'I think that a lot of the negative attitude to [sycamore] centres around it being non-native. If it was native, would we have a different view on it?*'. Similarly, an operational participant (Natural England) expressed that *'sometimes I think it's just a cultural thing…It's, culturally, seen as not native and maybe like a less desirable species'*. Reflecting on shifting attitudes to sycamore among foresters, an operational participant described how *'10 years ago it was kind of untouchable. It was kind of, "No, we just don't plant it. It's not native, we're not going to stick it in our woods"'.* In addition to the association between classification and negative perceptions, participants also pointed out the ways in which being a non-native species excludes sycamore from consideration in various contexts. A tactical participant (environmental consultancy) reflected that sycamores have been an *'enigma'* throughout her career as a landscape architect and that *'[sycamores] don't tend to come up in mixes that we would propose or put forward'* because her organisation errs *'towards more native mixes'*. As a result, sycamores *'slip through the net a little really'* or are *'ignored'* (Tactical, environmental consultancy). Another tactical participant (environmental consultancy) observed that *'some [within a named botanical society, are] more prone to dismiss sycamore just because of its view as a non-native tree'.* An operational participant had observed that there is a *'certain amount of demand'* for sycamore in the northern Highlands of Scotland, but that the exclusion of sycamore from grant schemes means that *'it's not really going into the bigger woodland schemes'* and *'it doesn't always fit in with the grant schemes that people are using'.*

The classification of sycamore also has implications for how it is valued in various conservation metrics. A tactical participant (environmental consultancy) described how within current woodland condition assessment metrics (UK habitat mapping system), woodlands with high amounts of sycamore *'score very badly'*. This participant highlighted how this metric is not based on the actual ecological value that sycamore may bring to a habitat and so does not account for contexts in which sycamore is an important source of biodiversity:

> A *lot of the woodlands I look at tend to be small little scrappy woodlands along the edge of industrial parks…So, when people ask me why it's so poor quality, I said, "Well, comparatively to a rich natural woodland, yes. However, for the area, because of how matures quickly, and how it creates habitats for invertebrates, how it creates coverage for other species, you can't underestimate it." Tactical, environmental consultancy*

Participants highlighted the way in which sycamore is negatively regarded in conservation metrics has implications for the restoration of protected sites affected by tree loss to disease. One strategic participant (NatureScot) pointed out that the criteria involved in the notification of a SAC (Special Area of Conservation) also evaluate sycamore negatively on the basis of its non-native status. The participant pointed to the implications of this criteria for a SAC woodland that had been affected by the loss of ash and elm to disease and where sycamore would naturally regenerate in their place. The participant emphasised that such examples don't fit into the *"'native is good, non-native is bad"'* framework he perceived the criteria to be based on and which, he suggested, seem to support the de-notification of protected woodlands should they become dominated by sycamore:

> *This summer, the last elm died. The ash are at least 50% down and declining rapidly. That ash-elm wood is going to become a sycamore wood, and that's a huge challenge to the way we define success. Is that alright? Is that not alright? What are the wider implications when we're faced with something else? Strategic, NatureScot*

In a similar vein, another strategic participant described experiences with land managers in which the SAC restoration criteria had not allowed for the planting of sycamore on such sites. The participant explained that '*it would be fantastic if we were able to say that sycamore would be an acceptable replacement to plant in those sites, to meet the SAC restoration criteria'*. The participant pointed out that indecision around 'acceptable replacement' species is impacting restoration targets:

> *We're not going to be able to do much more restoration until we've decided what trees we're happy with replacing things like ash with. So, it means that that work isn't being done, which means we're failing on those targets. Strategic*

## Resilience to environmental change

Across all professional groups, participants described how climate change adaptation, mitigation and uncertainty is informing their perceptions of sycamore and how they value it in professional contexts. They highlighted the importance of species diversity for enhancing forest resilience to environmental change, particularly pests and diseases, and made a case for the place of sycamore within that. An operational participant described how *'we don't know what's going to happen with climate change, and you have to plant woods centuries before they mature, you're having to just kind of hedge your bets, if you don't mind the pun, and just plant as many different things as you can'*. Similarly, a tactical participant (Forestry Commission) argued that *'the elephant in the room is the perfect storm between climate change and pests and diseases. There is not one solution to this, there are many solutions'*. Another operational participant argued that *'diversity is the key to resilience, in terms of climate change and the general establishment of treescapes, and the more we can incorporate in the right place, then the better the results are going to be'*.

Sycamore was also perceived as a strategic species choice in itself, in that: it has resilient traits including being relatively disease-free (Strategic, Defra; Operational, Forestry England) and is tolerant to harsh environmental conditions, including exposed areas, salt spray off the coast, storms (Operational, Natural England), and poor and polluted soil (Operational). Although this was caveated with the species' susceptibility to grey squirrel damage and sooty bark disease *(Cryptostroma corticale)*. The way in which participants framed the value of sycamore's tolerance and adaptability had regional and landscape dimensions; for example, locations that have exposed or poor growing conditions provide a context in which these traits become more necessary and therefore valuable. An operational participant described how there is a demand for sycamore from the Western Isles in the Outer Hebrides of Scotland: '*the sycamore is just bomb-proof, you can plant it in really exposed coastal positions, it'll grow fairly straight, it'll provide protection and actually give you an opportunity to establish other trees in behind it'*. Similarly, another operational participant (Woodland Trust) observed how *'I definitely see it as a useful landscape tree towards the West of the country, all the way from, I suppose, Scotland down to the Southwest. It, particularly, seems to do very well where other trees don't'*. Likewise, another

operational participant reflected that, because of its salt tolerance, sycamore is *'useful in coastal situations'*. Emphasising sycamore's ability to grow in poor soils, one operational participant described how sycamore would do well on a landfill site with 'soil that had been made out of crushed brick, and silt from lake beds, and clay that had been scraped out of building sites, all mixed up together'. Another operational participant (Forestry England) described how this trait makes sycamore an important tree on a community site in the northwest of England: *'we've got a lot of old collieries and that's generally, again, very, very, poor soil. [planting sycamore] actually enables us to get some trees away'*. Participants described sycamore as a relatively disease-free tree (Strategic, Defra; Operational; Forestry England), with the notable exception of its susceptibility to sooty bark disease in the South and South-East of England (Operational, Royal Parks). One strategic participant (Defra) describes how *'compared to others, they're relatively free of anything that's likely to decimate them'*. Likewise, an operational participant (Forestry England) argued that, given the growing threat of pests and diseases, sycamore's resilience to disease would shift attitudes towards the species:

> *When you look into the future, trees for the future, sycamore is bomb-proof. I think, in terms of considering what we have in the future when you can see stuff struggling, sycamore is one of those that will stand the test of time. I think that, naturally, will change the attitude towards it. Yeah, hopefully anyway. Operational, Forestry England*

However, the impacts of sooty bark disease and sycamore's susceptibility to grey squirrel damage mean that some participants saw planting sycamore in the South/South-East of England as unviable. One operational participant (Royal Parks) described that *'the rate at which we're starting to lose and develop symptoms of city bark disease and how quickly the tree can go from perfect health to dead is scary...I wouldn't recommend planting it in the parks I'm in'*. This participant anticipated that the changing climate would increase the geographical reach of sooty bark disease within the UK, causing more issues in the future. Likewise, another operational participant argued that *'you're not going to plant sycamore in the southeast of England, or southern England generally because it's not going to survive until we address the grey squirrel problem, and potentially sooty bark disease as well now'*.

Participants highlighted a tension between the drive towards species diversity and existing conservation policy and value metrics which exclude or negatively evaluate sycamore as a non-native species. Some participants emphasised the need to move away from the native/non-native framework where it is creating barriers to planting the 'right tree in the right place', particularly in light of the pressures of climate change, pests and diseases. One operational participant described how 'w*ith climate change and managing adaptation, we've got to get away a little bit from this native/non-native argument and look at, again, the general benefits that trees might provide to the site or where you're planting'* (Operational). Another participant (Tactical, Future Trees Trust) accepted that sycamore is not a native species but argued that *'it's barking nonsense not to consider it naturalised. It grows extremely well here. When so many of our native species are struggling, so many pests and diseases, we need to be augmenting the species that we plant and promote, not narrowing that restriction because of this quasi, "Is it naturalised, is it native?" argument'*. Similarly, a strategic participant (NatureScot) argued that:

> *The world is changing. It's hard to predict how it's going to change. It's hard to predict what new pests and pathogens are coming through…I tend to use the phrase 'natural woodlands' these days, rather than 'native woodlands', for exactly this reason, because we need a level of diversity in our woodlands to cope with the losses that are likely to happen. Otherwise, we face catastrophe as the whole woodland structure comes apart. Strategic, NatureScot*

## Most participants describe the need to approach sycamore with a 'right tree, right place' attitude

Most participants suggested that decisions about how to manage Sycamore should be done on a site-by-site basis. Summarising this approach, a tactical participant (Forestry Commission) described how '*there are some very sensitive sites from a nature conservation point of view. And there are sites in the wider rural environment which are less sensitive. So, actually, a detailed knowledge of your site, along with the landscape context, are really key in terms of how we view sycamore'*. An operational participant explained that '*it's the right tree in the right place. [Sycamore] is opportunistic and it has certain situations where it's not the best tree in the world'*. Similarly, another operational participant (Woodland Trust) described how management '*depends on the site, I suppose, whether it is a potential issue or not or whether, actually, just accepting regeneration is part of the good management of the site'*. On an organisational level, an operational participant described how their organisation's approach to sycamore is site-dependent: '*if you're managing a herb-rich grassland or a raised bog or something then you've probably got zero tolerance to sycamore seedlings popping up. Whereas more established mature woodland, they might be more tolerant'*. Likewise, an operational participant (Woodland Trust) described how '*the Woodland Trust is fairly agnostic to sycamore…It is in our planting guide and design guide, as a tree that can be a component of woodland. I think it's nuanced, though, in that it can be problematic in some woodlands, so it's not a black-and-white thing where there is relatively pristine habitat'*.

The place of sycamore on protected sites was contested within the discussions and conservation professionals expressed a range of attitudes towards the species in those contexts. Some of these attitudes have already been covered in the previous section on 'Classification of sycamore as non-native', where some participants advocated for the inclusion of sycamore on protected sites where there is a case for its benefits (e.g. where there has been a loss of trees to disease). Regarding the acceptability of sycamore on protected sites, one strategic participant (Natural England) put forward that: *'I think that's still a decision that needs to be made on a site-by-site basis'*. He went on to describe how *'I wouldn't plant it, and in some sites, I would actively manage it out'*. Another strategic participant (Natural England) explained how, on SSSIs, sycamore is regarded as '*part of the problem*' and concurred that she wouldn't actively plant sycamore on such sites. The participant went on to say that she would take '*a similar line if the objective of the new woodland creation was to create native woodland, I would say let it in seed in. But I don't want you to put it in',* in situations where sycamore was put forward as a proposed planting species. Similarly, an operational participant described how '*I don't think I've spoken to an ecologist who would encourage planting it. If it arrives you manage it, but probably not planting it'*. Many participants saw sycamore as '*problematic'* (Operational, Woodland Trust) in contexts in

which they perceived sycamore to be a potential threat to the integrity of existing habitat. Referring to some hazel woods he had recently visited off the west coast of Scotland, an operational participant (Woodland Trust) reflected that '*somewhere like that you'd probably want to think twice about allowing sycamore, or rhododendron or anything, really, getting a hold in those sorts of woodlands'*. Similarly, a strategic participant (Defra) reflected on a sycamore he had come across in an ancient pine wood in the Cairngorms, which he described as '*one of our most valuable woodland habitats'*:

> '*Out of nowhere, there was this sycamore. I just found it quite striking that all around it there was nothing, it's completely supressed all of that acid vegetation that you see in the pine woods. That's certainly a situation where it's undesirable'. Operational, Defra*

Participants with arboricultural backgrounds described how sycamore tends to be perceived as a '*weed'* in the profession (Strategic, Defra) because they '*grow wherever'* (Operational, Woodland Trust) and is '*such a prolific self-seeder'* (Strategic, Defra), explaining how much of their contact with sycamore involved removing them from places where they are unwanted. Two participants involved in hedgelaying described how sycamore are not generally viewed as a good hedgerow tree within the hedgelaying community. Both highlighted that sycamore are difficult to prune and one explained that sycamores are 'going to be throwing seeds all over the place' and will subsequently dominate the hedge, leaving 'nothing really much underneath them'. To this, the other added that '*we come across them and we see the shade problems'* and that *'from the angle of hedge-laying, it's a bit of a feeling of a fight against them'*, so that generally hedgelayers don't want to see sycamores in hedges, and certainly not plant them.

While there were a mixture of views expressed about sycamore from a forestry perspective, several participants involved described sycamore as '*underutilised'* by the sector (Tactical, Future Trees Trust; Operational, Forestry England; Tactical, Edinburgh Napier University). One tactical participant (Forestry Commission) explained this as being due to a focus within the sector on Sitka spruce: '*there's a lot of inertia in forestry. We can be following, kind of, the business plan that we had in the '70s and '80s in terms of species choice. Basically Sitka spruce, you know'*. Another tactical participant (Edinburgh Napier University) reflected on the sector's shift towards other species due to the impacts of pests and diseases: '*for a long time, we were just looking at Sitka spruce because that's what the industry wanted us to look at… then Phytophthora [disease] came along and I think that opened up people's minds to the possibility that we might need to do research on other species just in case'*. A strategic participant thought that the forestry sector had approached sycamore *'on a pragmatic basis, as a potential useful tree that can give you a half decent crop quite quickly'*. From an operational perspective, one participant described how, in the context of managing a forestry plantation, sycamore is considered to be a '*labour-intensive tree'*. This participant thought that some of this perception is based on '*preconceived ideas of [sycamore] being just this invasive species'*. He went on to observe how these perceptions have shaped management of the species: '*I think my colleagues just really don't consider it. It's considered on the really poor sites, only the poor sites, and it's planted and forgotten about…You know, it's under-utilised and it's sort of just thrown in and leave it…It's very overlooked, from our colleagues'*. Several participants (Strategic; Tactical, Edinburgh Napier University; Tactical, Future Trees Trust) highlighted the cross-sectoral role that sycamore could play as both a resilient and commercially valuable tree species. One strategic participant described how, in her

experience, sycamore could be a *'good compromise species in some applications for productive forestry'*. A tactical participant (Future Trees Trust) argued that '*I do think there's a big role for sycamore in productive woodlands but also in native woodlands, maybe production isn't necessarily the objective, just because we're facing so many pest and disease issues'*. She went on to add that the incorporation of sycamore in our woodlands is '*crucial'*, given that '*we know this species is adapted well to growing in the UK and it yields valuable timber'*. One strategic participant echoed this perception of sycamore's multifunctionality, but anticipated that the strategic drive to include more sycamore in the landscape wouldn't be accepted by some commercial foresters:

> *In some ways, sycamore is one of – would be one of – those species that could fill that gap. It's broadleaf. It has some productive capacity. It grows pretty well in many different places, particularly exposed places. It's a pretty tough tree, but any commercial forester in Scotland would only think to see that as the fluffy bit on the edge, to be honest. Strategic*

## Organisational and sectoral positions on sycamore

Participants described how attitudes to sycamore vary within organisations. One operational participant (Natural England) explained that *'I wouldn't say there is a set position, even within my area team, about sycamore*'. She went on to describe how *'I think there're the newer people, like me, who are probably a lot more relaxed about sycamore but it's so regionally dependent and site-specific'*. Similarly, a strategic participant (Natural England) described how *'we probably broadly agree at the centre, with a bit of noise around the edges, but I think, as you then drift out into an organisation, individuals on the front line, in a big organisation like ours, will carry their own personal views'*. Some participants identified that this gap between practitioners and those in strategic roles creates a sense of uncertainty about how policy is translating into practice. In the context of forestry, one strategic participant expressed uncertainty about how the move towards resilience and species diversity as objectives within commercial forestry is translating '*on the ground' …* '*so, we are doing a lot more work with [sycamores]. I'm not entirely sure it's making any difference practically, on the ground, just yet, but the foundations are being laid for trying to encourage a wider range of tree species to be planted in Scottish forests'*. Speaking to this concern from a conservation angle, another strategic participant (Natural England) expressed uncertainty about the implications of the Forestry Commission's shift towards resilience for the management of protected sites:

> *There's an increasing demand to plant sycamore, and I have to respond to that…In SSSI terms, we would not encourage planting sycamore into a site that does not already have sycamore. And if a site already does have sycamore, I would be encouraging natural regeneration, but not planting. So, that's the position that I've taken. I don't know whether it's right or not. Strategic, Natural England*

As referenced in earlier sections, several participants emphasised the way in which ash dieback, in particular, is driving the shift in attitudes towards sycamore. A strategic participant (NatureScot) noted that '*the value of sycamore [is] changing from being something we want to remove to something we at least tolerate, if not want to keep and expand because we are losing ash. We're losing elm, and it's the most obvious, easy, default replacement'*. Similarly, another strategic participant (Defra) described how '*especially with ash dieback, now, [sycamore] can be*

*an important tree'*. Another strategic participant (Natural England) described how ash dieback has *'been something of a caution*' on the removal of sycamore, and her colleague (Strategic, Natural England) concurred that on sites that have been impacted by ash dieback, sycamore is '*possibly more accepted than it used to be'*. Referring to changing management practices within an organisation he had previously worked for, a participant highlighted that sycamore's ecological benefits are being recognised more now:

> *The recommendation from 10 years ago was, if the sycamore was there, it was always a case of we were to eradicate sycamore. It was undesirable, full stop. I think, yeah, the short-sightedness of that in some situations, I think, has been realised more. It does have benefits and it occupies a niche. Strategic, Defra*

Despite this broad shift in attitudes towards sycamore, participants – like the one quoted above (Strategic, Natural England) – expressed uncertainty about how to interpret existing guidance relating to the inclusion of sycamore on sensitive sites. Participants pointed to guidance from Natural England, NatureScot, and the Woodland Trust that advises practitioners not to plant sycamore where it does not already exist, but to manage the species if it arrives '*naturally'* (Strategic, NatureScot). '*The idea is that, with sycamore, if it's already there, that's okay. If it's not there, don't introduce it*' (Strategic, Natural England). Some participants found the distinction between natural colonisation versus planting arbitrary, particularly if sycamore may present a valuable replacement for trees lost to disease. One strategic participant (NatureScot) argued that this distinction '*makes no sense in terms of woodland ecology or the practical outcomes'*. Reflecting on Natural England's guidance, another strategic participant (Natural England) queried its logical basis and highlighted the lack of clarity: '*I've just flicked through a document and not worked out the difference, but it's, 'Don't allow it to go above 15 [percent cover], or don't allow it…We have this position on that, on the basis of something, and I don't know. Where do you get a figure of 15% from?'*. For some participants, this uncertainty about existing guidance was symptomatic of broader uncertainty around how the sector perceives and values sycamore. One strategic participant (NatureScot) highlighted the implications of this for our ability to respond to tree loss, particularly in Scotland where they are '*simultaneously losing elm and ash. It's all happening now, at once, because the glen here is full of dead elm that I remember from Somerset, 50, 55 years ago. So, the focus on tree loss is acute in these kinds of places'*.

## Regional and cultural values

Participants highlighted that sycamore is valued as an important historical, cultural and aesthetic feature of certain landscapes, particularly in the north of England and Scotland. A tactical participant (Forestry Commission) described how he associated sycamore trees with the '*Yorkshire Dales and isolated farmhouses, usually on limestone, with these sycamores on the skyline'*. The participant went on to reflect that sycamore are '*a real feature of the Pennine Spine. And without them, probably wouldn't have the kind of landscape that we would, that we expect actually, in parts of the Pennines'*. A strategic participant (NatureScot) described how '*certainly around the north and west of Scotland, it's quite a characteristic tree of crofting communities, some clearance villages, that kind of thing'*. Another strategic participant reflected that in '*Northumberland, where I live, we have quite a lot of veteran trees, and a good handful of them are sycamores. They have been there as cornerstones of the community, for the people living*

*here, for generations, and generations, and generations'*. Participants emphasised the landscape value of sycamores as trees outside of woodlands, particularly in open-grown or parkland settings. One strategic participant (NatureScot) highlighted how the Sycamore Gap tree demonstrates how sycamores (because of their resilience to harsh, exposed conditions) can become '*a large tree where others won't'*, and therefore become important and characteristic features of certain landscapes as trees outside of woodland. While he didn't think sycamores were '*the ideal tree for hedgerows'*, one operational participant expressed '*absolutely love them in parkland and open-growing trees. They're gorgeous'*. Another operational participant (Royal Parks) felt similarly: '*I love sycamores as a park tree, I think it's a phenomenal landscape feature'*. A different operational participant (Woodland Trust) described how *'when they become big trees, I think they're just fantastic. I think they're just great. I love massive sycamore'*. Another operational participant reflected that sycamore is *'a much more interesting tree outside woodland. I mean mature. I mean like the Sycamore Gap tree. A mature sycamore is fantastic. Inside woodlands, I was thinking, was rather boring'*.

Some participants expressed personal connections to specific trees and to sycamore as a species in general. A strategic participant (Defra) expressed that *'I think big open grown sycamores in the Lake District are just fantastic things. It's such an important part of the landscape. Certain sycamore trees that I grew up near, I feel a sentimental attachment to it'*. He added that sycamores are '*so nice to climb as well'*. An operational participant also reflected on a childhood familiarity with sycamores: '*You know, I was brought up in the suburbs of Birmingham and it was there then. It was a great inner-city tree. It felt like it was the sort of haven of life in these urban areas where you'd see bees and things all around it. Growing up, it was something that I always, sort of, loved about it'*. Likewise, a tactical participant (environmental consultancy) also expressed a personal fondness for sycamores '*from a personal point of view, I think they're great trees actually…As I say, there's something very synonymous with my childhood around them I think. I don't quite know why'*. An operational participant (Royal Parks) identified himself as '*a sycamore enthusiast and defender'*, reflecting on his familiarity with the species: '*I get up in the morning, look out my window, there's a big mature sycamore'*. Another operational participant (Forestry England) highlighted how his familiarity with sycamore growing up in Mid-Wales has shaped his perception of the species:

> *You know, seeing sycamore all the time. I grew up in Mid-Wales and I didn't really count it as an invasive species. You know, it's been there for my whole lifetime and actually it's just one of the many trees that we have here. Forestry England, Operational*

Some participants felt that the way that sycamore is perceived and managed by professionals does not reflect how trees are valued by members of the public. Participants used the example of the public response to the felling of the Sycamore Gap tree as an indicator of 'what matters' to the public with regards to trees: that people value specific trees based on landscape context, familiarity, age and size, rather than whether a species is native or not, or even its relative ecological value. Reflecting on the public expression of sadness about the felling of the sycamore gap tree and the views of some ecologists that he had observed, an operational participant (Royal Parks) argued that '*the Sycamore Gap thing to me epitomised what is quite a substantial failure, in my view, amongst the professional sector to completely fail to understand the public's views on trees over and over again. How the public view trees in a very, very different way to we do'*. In a

similar vein, another strategic participant (Natural England) argued that *'a lot of this discussion around whether sycamore is the right tree is a slightly esoteric discussion among ecologists, and arboriculturalists and so on. Bluntly, I suspect the vast majority of people who engage with and get value from them don't give a monkey's, as long as it's a big, good-looking tree'*. Similarly, a tactical participant (Environmental consultancy) argued that '*the British public don't necessarily care as much as we do whether a tree is native or not'* and that after a tree reaches a certain age:

> *It's viewed by the public as something that should be there. Because if it has lasted this long, then by definition, it has gained the right to be classified as part of that area. So, if you'd asked anybody, I think, the general public, if the Sycamore Gap tree was native, I think 90% of people would have said yes because, in their mind, it's been there such a long time that it deserves to be there. Tactical, environmental consultancy*

In contrast, an operational participant described how *'I would say the majority of the enquiries that I get from parishioners is, "Can you help me get rid of this horrible thing growing at the end of my garden?" and it's inevitably a sycamore'*.

Participants expressed conflicting views about how the public value sycamores in an urban setting. Some thought that the familiarity the public would have with sycamore as urban trees would stand sycamore in good stead: '[*The public] want to imagine very big trees, in very wide areas. And in urban settings, they want to see very big trees, and sycamore have often been those trees'* (Tactical, environmental consultancy). However, others thought that sycamore would be unpopular with the public in urban areas due to the association of sycamores with honeydew getting stuck onto cars: *'I think the amount of complaints, they'd have to cut them down because of all of the cars, I would gather'* (Strategic, Defra). Similarly, a strategic participant thought that sycamore would be '*vilified'* in an urban context, because '*people hate the sap'*.

## Discussion

This section will discuss the results in relation to our research questions. While many participants were advocating a 'right tree, right place' approach to managing sycamore, it is clear that there is inconsistency within the sector related to how the species is considered in tactical, strategic and operational settings. This in turn can lead to confusion and tensions in practice. The results detail a number of instances where professionals were uncertain about how to proceed with regards to sycamore. This indicates that more sector-wide (and internal organisational) discussion is required about when sycamore is the 'right tree in the right place', with complex real-world examples considered. Findings from this research indicate that these discussions should attend to ecological evidence alongside the history and geography of species and the wider values and attitudes held in relation to the species.

### RQ1 What values and attitudes do different professional groups associate with sycamore?

Having initially approached this topic by making a distinction between attitudes and values, our empirical research demonstrated that these are difficult to disentangle in practice. As outlined in the introduction to this report, values are sometimes framed as attitudes (Stålhammar 2021), and the nature of the relationship between the two concepts is a grey area. While stratification of the

sample by professional group (strategic, tactical, operational) was useful for recruitment and research design, analysis of the focus group results did not reveal a correlation between our assigned professional groupings and values/attitudes recorded. The relationship between the values/attitudes of professional groups versus individuals and wider social and cultural values proved to be complex and differences between professional groups could not be comprehensively distinguished.

Participants described how conservation organisations, or those in a conservation role, have historically expressed negative attitudes towards sycamore. They explained that these attitudes were largely based on the understanding that sycamore was invasive and posed a threat to native habitats. Some argued that there was little evidence to support these claims. Participants had observed that attitudes towards sycamore within conservation were shifting to become more accepting, but they were uncertain about the impacts of historical negativity towards the species. In other professions, sycamore was described in positive and negative terms. In negative terms, the species was described as a weed (arboriculture), difficult to work with (hedgelaying and forestry), ignored (landscape architecture, forestry), and dominant and undesirable (hedgelaying). Participants involved in forestry gave a mixed picture of attitudes to sycamore within the sector. In some regions it was seen to be more desirable recently. One participant thought, on the whole, forestry had a 'pragmatic' attitude towards sycamore. Conversely, other forestry participants described how sycamore is either 'ignored' or negatively regarded due to its status as an invasive non-native species.

As individuals, participants expressed a variety of ways they value sycamore: as a resilient tree with unique ecological and environmental benefits; an important aesthetic and cultural feature of certain landscapes; and a tree with strategic potential to mitigate tree cover loss to disease and contribute to resilient and multifunctional woodlands of the future. Participants highlighted sycamore's value as a habitat and to wildlife, particularly pollinators, and to other plant species including lichens. Sycamore was valued as a resilient tree that contributes to various ecosystem services (including carbon absorption, shade, shelter, pollution filtration) particularly in urban or degraded environments. While none of these ecological and environmental benefits were directly disputed within the focus groups, the level of agreement and shared awareness of them appeared to be variable. In contrast, there was near consensus across participants that sycamore was valued as one species (among others) which could contribute to species diversity objectives in relation to striving for forest resilience to environmental change. Some participants expressed positive personal values in relation to specific sycamore trees, as well as affinities for the species in general. These were often framed in terms of a familiarity with the tree (sometimes from an early age), a recognition of its cultural and historical importance in certain landscapes, and a sense of the intrinsic value of trees. Participants also described what they saw as the relational value ascribed to sycamore trees by members of the public who, in their experience, valued trees that they are familiar with, for their age, historical presence, contribution to landscape aesthetics and provision of ecosystem services.

## RQ2 Do these values and attitudes differ within and between professional groups?

We found that site and management context (e.g. in a forestry plantation, in a hedge, on a site protected for biodiversity, on farmland, in a peri-urban area lacking tree cover, on an ash-depleted site) was more likely to affect participants' attitudes to sycamore and its acceptability than membership of professional group. 'Right tree, right place' can act as a barrier to stakeholders recognising and reflecting on their preferences regarding sycamore. Thus, differing approaches to managing or researching sycamore in similar contexts can be divorced from understanding of why conflicting approaches and subsequent tensions might occur (and how to address them).

The research highlighted some points of tension between the values associated with sycamore (detailed above) and what can broadly be understood as the priorities and norms of certain professions. In this sense, sycamore could be considered as a proxy for some of the tensions inherent in multi-functional treescapes. Participants explained that sometimes the traits of sycamore (e.g. prolific natural regeneration, difficulty to work with in hedge-laying, as a 'labour-intensive' plantation tree) conflict with the objectives of their role, profession or organisation.

Sycamore's non-native status is commonly the basis for assessing its value and some participants expressed frustration that this means the holistic, context-specific value of sycamore is not fully accounted for. While this conceptualisation originates from within the conservation sector, evidence from both our empirical research and the available literature suggests that the negative associations accompanying the classification of sycamore as non-native have also influenced how sycamore is perceived within other professions.

We observed a diversity of attitudes and values relating to sycamore within professional groupings and that individuals can hold what could be seen as conflicting attitudes and values. It is therefore unsurprising that a variety of values and attitudes towards sycamore can exist within an organisation. This becomes problematic when there is a lack of organisational clarity in relation to sycamore and how it should be considered in practice, particularly in the context of forest resilience.

## RQ3 Do these values and attitudes translate into professional practices?

Historically, negative attitudes towards sycamore within the conservation sector corresponded to a significant investment in their removal from sites managed for biodiversity or conservation. Changing attitudes towards sycamore by conservation professionals has corresponded with various organisations publishing guidance indicating when and how sycamore can be included on sensitive sites. However, some participants expressed uncertainty about how to interpret this guidance in practice, some continued to remove it, and some were taking the approach that they would allow sycamore to 'seed in' to native woodlands or sensitive sites but were opposed to the idea of planting it 'on purpose'. Other participants, particularly those who were responsible for the management of sites affected by tree loss due to disease, found the distinction between planting and natural colonisation arbitrary (i.e. not evidence-based) and pointed to cases in which it would be ecologically beneficial and, in their view, a priority, to plant sycamore. This scenario relates to a broader tension (referenced above) between sycamore's ecological/environmental value and its position within some current conservation value metrics and classification which inhibit recognition of its ecological/environmental value (and

relational/landscape value) and the 'realisation' of its ecological/environmental value on sites where there may be a case for its benefits (e.g. restoration of ash or elm-depleted sites). Participants also highlighted a tension between what they saw as professional or scientific perceptions of the (lack of) value of sycamore (because it is a non-native species) and the way in which members of the public perceive the value of sycamore. By extension, they felt that public (social and cultural) values are not currently being translated into professional practices.

There appears to be an absence of up-to-date evidence within guidance and policy documentation about the ecological/environmental benefits and disbenefits of sycamore in different contexts.

### RQ4 How might these values be shaped by considerations of the future and regional and landscape contexts?

This research has shown that a range of values and attitudes have historically influenced and continue to influence how sycamore is perceived by tree and woodland professionals. However, uncertainty and tensions in how sycamore is valued are now being foregrounded as the sector feels the impacts of and the need to adapt-to and mitigate-for rapid environmental change (i.e. increasing prevalence and impact of tree pests and diseases, changing climate, biodiversity loss). Some of the professionals we spoke with are observing and experiencing the consequences of such uncertainty and tension; in terms of tangible impacts on the capacity-for and speed of tree and woodland habitat restoration and adaptation, but also in relation to a broader question about the efficacy of current metrics of conservation value and success in the face of environmental change. In a forestry context, participants highlighted the growing pressures on woodlands to deliver multiple benefits (i.e. productive forestry and other public goods) and related uncertainty and tensions around the role of sycamore in this.

This research has highlighted the role regional and landscape contexts play in shaping values and attitudes in relation to sycamore. Sycamore trees are valued as important aesthetic, cultural and historic features of certain landscapes, particularly in Scotland and in the west coast and north of England. Participants described how sycamore are 'often the only tree growing' in harsh or exposed environmental conditions and are ascribed particular value as mature trees outside of woodlands. Regional and landscape contexts are also significant determinants of where sycamore will be considered 'useful' or viable to plant now and in the future. For example, participants highlighted the impacts of sooty bark disease and grey squirrel damage in the south and southeast of England. In contrast, other participants highlighted the acute tree loss of both ash and elm and the absence of grey squirrels in Scotland, alongside different climatic conditions to the south and southeast of England.

## Recommendations

- Acknowledging the diversity of values that sycamore has in different professional contexts will allow for better and more strategic decision-making about where it should be included and why. This could include a review of current assessment systems associated with tree species classification as native/non-native, which often don't account for the value of sycamore in a holistic, context-specific way.

- Participants spoke about the need for cross-sectoral discussions about the role of sycamore in treescape resilience and articulated a need for a more 'joined-up' approach to managing trees in the landscape for multiple benefits. There were also calls for a more consistent approach to sycamore across organisations in the sector.
- More up-to-date evidence about sycamore in different UK settings is needed, including something which addresses the range of terminology used to describe the species (e.g. naturalised, non-native, invasive, advancing native). Participants also called for 'philosophically coherent' guidance about the inclusion of sycamore on sensitive or ash-depleted sites.

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# Sycamore interview guide

Thank you for offering to take part in this research. My name is Grace and I will be interviewing you today, please feel free to ask questions any time or stop me if you need a break. I have allocated 60 minutes for this interview, although I am fine to run over a bit if needed and you have time. Is this ok? You are free to decline to answer any questions or ask for more explanation at any point. I will explain about the voucher incentive at the end of the interview.

*Include anything about uncertainty around timing and bearing with us, as you think necessary.*

**We are interested in understanding how people feel about and act towards Sycamore. Particularly Sycamore as a tree outside of woodland but also to understand if there is any difference in people's perceptions and actions in comparison with Sycamore in woodland.**

The reason we are interested is because there is anecdotal evidence that people in the UK value Sycamore less than other dominant species in the landscape. There is also less ecological research on it and the ecosystem services it delivers, which may be related to how the species is more broadly valued in society.

**In this interview we will ask you about your thoughts on Sycamore generally but also ask you about specific Sycamore trees on your land.**

As indicated in the consent form you completed, I would like to record this interview to help me remember accurately what you said. Is it ok for me to turn the recording device on now and proceed with the questions?

**Section 1: Professional role & land management - ~5/10 mins**

**Objectives:** *their role; land and management approach, inc role of trees*

- **Can you tell me a bit about yourself, your role and the land you own and/or manage?**
    - Optional prompt - Do you own/manage the land, or both?
    - Optional prompt – if they are not the main land manager can they explain who is (many be a number of people)
    - Optional prompt – can you describe your relationship to the land/place?
    - How long have you owned/managed the land?
    - If not covered, **can you give me an overview how the land is managed and for what purpose?**
        - Optional prompts: size of holding; livestock only?; management approach e.g. intensive, low input; produce own hay or silage?
- **Do trees play a role in your approach to land management/the business?**
        - Optional prompt to expand on how, if needed
    - How would you describe your relationship with the land?

**Section 2: Tree and Sycamore management – up to 25 mins**

**Objectives:** *To understand what trees are on their land, their management approach and practices in relation to trees and Sycamore specifically.*

- **Can you tell me about the trees on your land?**
    - Optional prompts: rough size of woodland, are there many/any hedges, many trees outside of woodland, in what configuration?
- **What is your approach to tree management? *(They may not have one/have thought about it)***
    - *Optional prompts:* **do they carry out management or does someone else**/what is their role? **Do they take an income from trees?** Do they have a written management plan? If so, for woodland or all trees? Do they traditionally lay any hedges on their land? Are they actively planting trees or allowing them to naturally colonise?
    - *Optional prompt* - Is any of this related to government schemes, grants or other conservation initiative?
- **What is your approach to managing Sycamore – if it differs from other species?**
    - *Optional prompt – if they don't think they have a specific approach,* ask if they allow Sycamore to naturally colonise in woodlands and outside of woodlands? Do they allow them to grow as in-hedge trees? Would they ever plant Sycamore?

    - *If relevant* What are the objectives of your management approach in relation to Sycamore? (e.g. eradication, control)
    - *If relevant* Do you have a different management approach to those Sycamore growing inside versus outside of woodland?
- **Do you believe that your approach to managing Sycamore is similar to: [if time]**
    - Your neighbours and other land managers in your area?
    - Others from your sector/profession?
    - Any conservation/related organisations you are part of/align with?
- ***If they manage or are part of a land management team -*** **Are there any conflicts around managing Sycamores?**
    - If yes, can you explain a bit more?
- ***For each practice listed relating to Sycamore If time***
    - Why this practice (if not already covered)?
    - Where did you learn about it? (e.g. advised, word of mouth, read about it, learnt through experience, policy of certain organisation)
    - How long have you been taking this approach? Does it work? Has your approach changed over time? If so, why?
    - Size, landscape features, land-uses, **trees**
- **Have you had any formal or informal training in tree or woodland management?**
    - Optional prompt/wording: where do you think your knowledge about trees has come from?
    - Do you have any professional qualifications or affiliations with arboriculture or other tree or hedge related organisations?

### Section 3: Specific Sycamores – up 15 mins

**Objectives:** *explore the variety of management practices relating to Sycamore (inside/outside of woodland), including where these approaches have come from*

- **Can you please describe where there are Sycamores trees on your land?**
    - Prompt - Inside and outside woodland?
        - *Optional prompt Hedgerows, in-field etc.*
    - Do you have a sense of how long some of those the Sycamores have been there? I am particularly interested in the ones outside of woodland.
- **Are there any Sycamores that are noticeable or significant to you?**
    - Where are they? Optional prompt – position in the landscape rather than a precise location, can they be viewed from their house or garden?
    - What do they look like?
    - Do you have a sense of how long they have been there?
    - What makes them noticeable/significant?
    - What do you feel about them? *Optional prompt* – Do they contribute to how you feel about the place?
    - How do you think other people view these Sycamore? Optional prompts – the public if they are visible or colleagues, family members (i.e. do they matter to others)
    - Have you any particular memories relating to these Sycamore?
- **Do you think there are any benefits of having Sycamore trees on your land?**
    - Do these differ depending on whether in/outside of woodland?
    - Optional – ask for more information on each benefit, including how they know about this benefit (if relevant)
- **And any disadvantages?**
    - Do these differ depending on whether in/outside of woodland?
    - Optional – ask for more information on each disadvantage, including how they know about this (if relevant)

### Section 4: Sycamore generally – perceptions and values – up to 15 mins

**Objectives:** *explore their perception of Sycamore more generally, its benefits and disbenefits, and where these perceptions come from*

- **How would you describe Sycamore trees as a species?** *Anything goes here. If they struggle – suggest they imagine they are being asked by someone from a different country who doesn't know about them.*

    - Do you believe, in general, that Sycamore trees have value? *Optional prompt:* to your land management approach/to the business/financially; environmentally/ecologically; regional significance, landscape value or other cultural or social benefit; because they are a living thing? Because they're a mature tree? Etc.
- **Do you think Sycamore trees are more or less acceptable in certain places?**
    - E.g. roadsides, suburban, hedgerow, farmland, wood pasture, silage field, upland, coastal areas
    - Within the region?
    - Within the UK more generally?
    - What about in the future, do you think there will be more or less Sycamore, in different places?
- Do you believe that you share these views with: [if time]
    - Your neighbours and other land managers in your area?
    - Others from your sector/profession?
    - Any conservation/related organisations you are part of/align with?
- *If not come up* - What do you think of the idea of Sycamore as an 'invasive' species?

### Additional section for ecology study

**My ecologist colleagues have asked us to include a few additional questions relating to their research, if you have time? I think it will take about 5-10 minutes.**

- Do you know which specific lone trees our ecologist colleagues are studying?
    - *If yes*, in relation to the fields where the lone study trees stand - do you know how they have been managed historically?
    - *Optional prompts* - Always been pasture?
- Do you know which woodland trees our ecologist colleagues are studying? (Roughly)
        - *If yes* Do you know how old the woodlands are?
        - Are there any available records that they would willing to share regarding how the woodland have been managed historically?
- Are there nearby sources of nutrient addition (the lone trees or woodland) - such as agricultural fields having regular nutrient additions or animal rearing (pigs, chickens, cows).
- Recent management activities re the fields containing the lone trees:
    - Do you add nutrients to the fields? What type? How much and often? What time of year?
    - Do you add herbicide or pesticide treatments to pasture: how often? What time of year? What herbicide/pesticide? *They are sampling the soil invertebrates and fungi under trees so will be interested to know what may be affecting communities*
    - When are fields mown: how often? What time of year?
    - Livestock present and for how long?
- Recent management activities re the woodlands:
    - Is the woodland subject to any management activity esp where the sample tree is positioned? E.g. thinning?, control of squirrels/deer?

**Even if already asked in consent form – confirm if they are happy to receive an e-vouche**r – in which case you will need to supply their email address to the voucher company and to our Finance Dept. If not, would they prefer to receive a hard copy voucher – in which case we will need to provide our Finance Dept with their postal address. Take down email or postal address.

Ask if they would like to receive a copy of the transcript and/or notice of the publication of any outputs – in which case confirm email address (if needed).

Thank them for their time. Do they have any final questions?

# Sycamore focus group discussion guide

## Section 1: Introduction to project (settling down time) (10 mins but try and keep shorter) Beth 14.30-14.40

Welcome and thank you.

Introduction Beth and Grace.

Does anyone need to leave early?

Won't be doing intros due to time constraints, but have circulated bios and photos. There will be chance to describe your role in relation to Sycamore later on.

We are interested in starting to understand what environment sector thinks of sycamore and how it is valued, or not – if that has changed over time and if it might change. We are particularly interested in understanding if views differ depending on whether we are talking about Sycamore as a tree inside woodland or outside of woodland (*definition*[1]*:* such as hedgerows, scrub, parkland/wood pasture, orchards, copses, groves, linear treelines, and lone trees).

This is not about coming to a consensus, there are no wrong answers. It is about what you think and have observed and experienced. Please feel free to respond each other.

Rules:

- This is a live policy area
- We want people to be able to share their views freely – so we ask you to keep the views of others in confidence and not pass on information shared within the focus group further
- We would prefer you to keep your cameras on during the discussion – but if you need to turn them off in order to attend to something that is okay,
- Please let us know if you need to leave for any length of time
- We will try and ensure that everyone has chance to contribute. Apologies if we move on before you have said all you wish to say. Please use the chat if you wish to add anything at any point and we would be delighted if you wanted to follow up with an email.

Will have a short break half way through.

[1] From Forestry Commission (Definition of trees and woodland - GOV.UK )
To be considered "woodland", the site must meet all the following:

- a minimum area of 0.5ha
- a minimum width of 20m
- a potential tree canopy cover of at least 20%
- a canopy consisting of specimens that meet the definition of trees (see Section 3)

## Section 2: Initial questions to get people talking (20 mins) Beth 14.40-15.00

We will start with some initial questions to get everyone talking and then we will provide a bit more context to the project.

To start, please share with us what words come to mind when you think of Sycamore

Do these words change if you think of Sycamore as a ToW?

Last few mins - Out of the following (naturalised, invasive, non-native, native, neophyte, exotic, advancing or honorary native - how would you classify Sycamore? Grace share multi response poll via Microsoft forms: Microsoft Forms

## Section 3: The social science evidence (<10 mins) Grace 15.00-15.10

### Explain rationale for project – gathering evidence around social/cultural values, lots anecdotal, very little evidenced.

- *Provide overview of evidence on attitudes and values from lit review*

A bit more context. This is part of a broader project on understanding people's values relating to ToW.

In the course of scoping this work we realised that we needed to think about how values differ by species. And there is anecdotal evidence that Sycamore is not highly valued in the UK[2], especially by professionals in the environment sector[3].

However, there is a lack of current and rigorous social sciences evidence which tests these assumptions about how people perceive Sycamore and how these perceptions translate into action.

SLIDE 2 We decided we wanted to better understand the diversity and strength of values placed on Sycamore by different professional groups.

To explore how these values may differ within and between groups

...and how they might be shaped by regional and landscape context

[2] These claims give particular attention to the classification of Sycamore as non-native/exotic in shaping perceptions of it as an undesirable species. With management of Sycamore being based on negative perceptions, for example, about its poor biodiversity value, its weediness, invasiveness and its negative effects on certain ecosystems.

[3] (Taylor 1985, Peterken 2001, Mabey 1996, Leslie 2005)

SLIDE 3 This is what we have done to date – brief reflection on interviews with land managers wrt to the need to 'check in' with other groups ..... [may need to be clear won't have time to discuss this, but will be inc in report]

The value you place on Sycamore as a professional will be influenced by a mix of things, including scientific evidence, organisational and sectoral priorities, but also social and cultural values.

These focus groups are complementary to current research by ecologist colleagues, who are reviewing the literature on the ecological benefits of Sycamore in a UK context – more on that later - and have a current study looking at biodiversity value of sycamore and oak as trees inside and outside woodland.

More questions for you after short break.

SHORT BREAK 5 mins back at xxx. Share poll results

## Section 4: More questions and discussion – in breakout rooms? (20 mins) Beth and Grace 15.15-15.35

Can you describe how you might encounter Sycamore in your professional life? *Prompt - as a tree inside or outside of woodland? In different contexts?*

Do you think Sycamore has value? In what ways? *Prompt for specific contexts and values. Ecosystem services, aesthetic, sense of place, relational. As a tree inside and outside of woodland? Is Sycamore more acceptable or valued in some landscapes? Why?*

What about disbenefits?

Are you aware of your organisation or sector taking a 'view' on Sycamore? Can you summarise it? *Encourage discussion. As a tree inside and outside of woodland? Other variables? Any tensions within professional community or between communities? How about customers?*

How does this view play out in practice? For example, do you see variation in how colleagues and clients consider Sycamore? If time

Does your organisation's or profession's view match your own? If time *Prompt around where this view has come from – inc professional background?* [4]

[4] Too difficult and artificial to ask to differentiate between personal and professional views and values - look during analysis to see if it comes up naturally.

## Section 5: Present ecological review findings (10 mins) Beth 15.35-15.45

*The ecology of Sycamore is relatively understudied in the UK*

1. *This includes a lack of research into what biodiversity or other ecological benefits it confers*
2. *In light of changing policy, land pressures, climate change and associated impacts such as tree pests and diseases, FR decided it was time to review the evidence and the potential ecological role of Sycamore in the UK.*
3. *Although the focus of this project is ToW, much of the research they found relates to Sycamore in woodland settings. They have extrapolated these findings with regard to ToW, where it makes sense to do so, but also paid attention to research in woodland settings as the two habitats are obviously interconnected and some of the research findings apply to both settings.*
4. *Whilst studies comparing the relative richness of invertebrate communities on sycamore compared to other trees are sparse, Sycamore has been found to support the highest densities of 'true bugs' compared with oak, birch and hazel. There is evidence that Sycamore support many species including: leafhopper, aphid, butterfly, moth, lace bug, ladybird, scale bug, weevil and beetle species. Sycamore bark provides an important overwintering site for some of these invertebrates. The sycamore aphid is particularly prevalent and provides an important direct and indirect food source via honeydew production. Furthermore, the dense flowers are important nectar sources for bees and other pollinators, earning sycamore the reputation of a 'major honey plant'.*
5. *Sycamore has also been identified as the primary host for multiple invasive invertebrates, although, due to lack of research, it is hard to understand whether the role of sycamore as a host to invasive species is relatively high or not.*
6. *Sycamore is as species rich in fungi as oak, and richer than ash and alder.*
7. *Sycamore can provide habitat for an abundance and diversity of mosses and liverworts, similar communities to those found on ash and elm. Rare Golden Hair lichen and the moss Pseudanomodon attenuates have been found on sycamore. Sycamore's alkaline bark provides a suitable habitat for some lichens and bryophytes, similar to the bark pH of Ash and Elm*
8. *Although a decline in diversity of broadleaved species overall will reduce biodiversity, the sycamore is able to support many of the species that live on ash and oak. And so could be a possible partial replacement option in this regard.*
9. *However, old sycamore trees have relatively lower abundance of veteran attributes, such as trunk rot and epiphytes, when compared to ash, alder, oak, birch and beech*
10. *Sycamore do not tend to negatively impact agricultural output and can work well in silvopasture arrangements, offering nutritious food to sheep and cows. However, sycamore seedlings and seeds are known to be poisonous to equines and can cause serious illness and death.*

*11. Famers may also be deterred from planting/retaining sycamore trees as they host large aphid populations that could impact crop yields.*

*12. At high densities, the continuous canopy of sycamore can shade out ground species and therefore impact the surrounding biodiversity (although also potentially reducing its own seedling success). Although sycamore is highly opportunistic and will colonise disturbed land, it intrudes little into dense, undisturbed, tall woodland and therefore may not be a threat to ancient woodland.*

***13. Must be seen in context of risks to Sycamore and also its resilience –***

*Sycamores are a resilient tree that stand up well to a variety of common air pollutants.*

*It is relatively less impacted by Phytophthora. However, they are not particularly resilient to climate change. With increased drought stress, the impact of pathogens for Sycamore is likely to become more severe and it is vulnerable to a number of diseases and pests. e.g. Sooty bark disease flares up in Sycamore following long and dry summers.*

*Evidence it is resilient to major storms*

*Grey squirrels are a major pest for sycamores and can badly damage trees through bark stripping.*

## Section 6: Reflections and future (15 mins) Grace 15.45-16.00

Does this change whether you think Sycamore has value? Why / why not?

What do you think about Sycamore's place in UK landscapes?

**What do you think Sycamore's future role is within the UK?** *As a tree inside and outside of woodland? Are there opportunities and barriers to this?*

Do you have any recommendations for future policy or practice regarding Sycamore?

And any for future research?

Thanks. Provide links to project page. Welcome to provide additional thoughts. Will be in touch to share findings in spring.

**Extra slides – optional**

SLIDE 4 So far, participants have highlighted the value of Sycamore as…

- A resilient species in the context of climate change, and a tree which should be considered as an element of diverse woodland ecosystems
- A replacement for Ash
- An adaptable tree that can grow in poor or harsh conditions (with the potential to protect other species e.g. as a windbreak)
- A valuable timber tree

Concerns regarding Sycamore include…

- Threats to tree health – including grey squirrel damage (particularly in commercial context) and diseases (SBD, others?)
- Lack of inclusion in grant schemes
- Lack of provision in tree nurseries
- Prevailing perceptions of weediness and conflicting views on classification (native, non-native, invasive etc.)
- Lack of awareness of ecological (and other) benefits influencing organisational policy and/or view of sector more broadly (e.g. Sycamore not considered in landscape design)

While we were not aiming for a consensus, most participants agreed that management and policy relating to Sycamore should be context-specific and that its future place in the UK's landscapes should be considered as important.

**Introduction:** Hello, my name is XXXX and I work for Forest Research, a Government Agency. We are undertaking some research to understand people's views on dead and dying trees in the landscape and I wonder if I could ask for 10 minutes of your time to ask some questions? *If yes, ask them to read over the below and sign or we can offer to read out the statements.*

**Consent**

- This project is funded by Defra and implemented by Forest Research. The data will be collected, analysed and reported by Forest Research.
- Once the interview starts you are under no obligation to answer all of the questions, and you may end the interview at any time without providing an explanation.
- With your agreement, I will audio record the conversation in order to have an accurate record of what was said. You are under no obligation to agree to audio recording.
- Further details (including our statement of research ethics and how we use and store your data) can be found in the accompanying information sheet.
- The information sheet also has the contact details of the project researchers (Grace van der Wielen and Beth Brockett) in case you have any questions or concerns about the project.

| | | |
|---|---|---|
| 1. | I understand that my participation is voluntary. | ☐ |
| 2. | **OPTIONAL**: I agree to the conversation being audio recorded. The audio-recording will be securely stored and then destroyed at the end of the project (April 2026). | ☐ |
| 2. | I understand that I can withdraw my consent from the study if I inform a researcher or project manager within 14 days of the survey date, and that this means that my data will not be used in the final outputs of the project. | ☐ |
| 3. | I understand that my research data will be anonymised during analysis and reporting, which means I will not be identified. | ☐ |
| 4. | I understand that the information collected will be treated, stored and analysed in line with the requirements of the Data Protection Act (2018) and the Society and Environment Research Group's Statement of Research Ethics. | ☐ |

**By entering my name below, I show my consent to participate in this study.**

| Your name: | Your signature: | Date: |
|---|---|---|
| | | |

## Relationship/familiarity with site (tree)

1. Why are you visiting this site today?

*Probe into how regularly they, visit, how well known, how local they are, motivation/activity, on holiday?*

*Answer:*

_____

## Environmental attitudes and behaviours

2. How many times have you visited a green and natural space in the last 14 days, not including your garden, work visits or abroad?

*Answer:* _____

3. How much do you agree or disagree with the following statements – with 1 being completely disagree and 7 being completely agree – *show card*

    a. I feel part of nature

*Answer:* _____

    b. Being in nature makes me very happy

*Answer:* _____

*4.* How important is protecting the environment to you personally? Very important, Important, Neither important nor unimportant, Not very important, Not at all important - *Show card*

*Answer:* _____

## Awareness and recognition of dead/dying trees

5. What comes to mind if I say the words dead, dying or hollow trees and trees with holes?

*Probe into interactions (climbing, drawing, cultural). Probe distinctions between the types e.g. do they see hollow trees as dying?*

*Answer:*

6. Do you notice dead wood, dead trees, dying or damaged trees in the landscape?

   *Y/N with space to note any elaboration e.g. what do you notice? Where do you tend to notice them?*

*Answer:* Yes / No

_____

7. Are you aware of any reasons why land owners may decide to keep dead wood, dead trees, dying or damaged trees rather than removing them?

   *Y/N with space to note any elaboration – why might that be?*

*Answer:* Yes / No

_____

8. What are your thoughts about this dead/dying/damaged tree being here?

*Answer:* _____

   a. What would you think about this dead/dying/damaged tree if it was in an urban park?

*Answer:* _____

## Cultural ecosystem services & wellbeing

9. How does this tree make you feel?

*Prompts could be – good? Bad? Could refer back to answer to Q6. Prompt - would you ever get up close to it? Spend time looking at at? Avoid it?*

- *If negative feelings inc sadness, anxiety – probe into why? (e.g. disease, wider environmental concerns, etc)*
- *If positive feelings – why? (e.g. creativity, curiosity, benefits, etc)*

*Answer:* _____

## Awareness of other ecosystem services

10. Do you think the land owner should remove this tree?
    a. Yes / No
    b. Why/why not?

*Answer:* _____

    c. Do you think more dead, dying and damaged trees should be left in the landscape to decay in place?

*Answer:* _____

11. Are you aware of any benefits this tree brings to the environment? *May have already mentioned some previously – acknowledge this.*

*Answer:* _____

12. Do you have any concerns about dead or dying trees being left in the environment?

*Answer:* _____

13. The following statements are about some of ways in which you might value (or not value) dead and dying trees in the landscape. Thinking about these trees, please respond to each statement by stating whether you 'strongly disagree', 'somewhat disagree', 'neither agree nor disagree', 'somewhat agree' or 'strongly agree'. Your responses should be based on whether or not you personally value these trees for these reasons. *As per S&C values work O'Brien et al.*

I value dead and dying trees because of their importance for wildlife

*Answer:* _____

I value dead and dying trees because they are good for my mental wellbeing

*Answer:* _____

I value dead and dying trees because they make me feel creative and inspired

*Answer:* _____

I value dead and dying trees because they can help me learn more about nature

*Answer:* _____

I value dead and dying trees because they provide places to spend time with friends and family *Not sure this works here but makes up the 5 statements in the O'Brien paper*

*Prompt if respondent can't think of any (and make a note which prompt used) e.g. to sit on, climb, play around, as landmarks/meeting points*

*Answer:* _____

## Demographic information

I am going to ask you a bit about yourself as it can help us to explore how opinions vary across different groups of people. **As with all these questions, just let us know if you prefer not to answer.**

14. Do you identify as male, female or in another way?

*Answer:* _____

15. What was your age last birthday?

*Answer:* _____

16. Which ethnic group or groups do you belong to? *Show card*

*Answer:* _____

17. What is your highest level of qualification?

*Answer:* _____

## Thank you & closing questions

Please tick the boxes if you would like to opt in to any of the below. These are all optional. Thank you very much for your help.

| | | |
|---|---|---|
| 1. | I would like to receive information about this research, including links to our privacy policy.<br>Email address to contact me on: _____ | ☐ |
| 2. | I would like to receive a summary of the results of this research. This is likely to be in about a year's time.<br>Email address to contact me on: _____ | ☐ |
| 3. | I would be willing to be contacted by a researcher to take part in further stages of the research process (e.g. a more detailed questionnaire, a phone interview, or online focus group)<br>Email address to contact me on: _____ | ☐ |

# Questionnaire:

| | |
|---|---|
| **Client name:** | Forest Research |
| **Project name:** | Decaying Trees |
| **Job number:** | 9899 |
| **Methodology:** | Face to face |
| **Version** | 3 |

**Notes on this document**

- Instructions in CAPS are for computer programming
- Instructions in *italics* are for telephone interviewers
- **Bold** or underlined words are for emphasis within a question
- Different question types have different numbers:
  - Screener questions are labelled S01, S02, S03 etc.
  - Main survey questions are labelled Q01, Q02, Q03 etc.
  - Further demographic / classification questions are labelled C01, C02, C03 etc.
  - Number codes are included on each question for data processing purposes

## Questionnaire quality checklist

Please use this list to check your script before it is sent to data for set up. Speak to your PM if you are unsure about any of these checks.

| | | |
|---|---|---|
| | Are quotas or sampling requirements clearly specified? | |
| Labelling | Is the script labelled with the client name, job, project code and version? | |
| | Do all questions have a unique number? | |
| | Are all questions numbered consistently with proper conventions for screener (S0X) and classification (C0X) questions? | |
| | Have all information pages been entered correctly as 'INFO1', 'INFO2'… | |
| | Have all notes to data (which aren't questions) been entered onto one line starting with 'DP NOTE:'? | |
| | Is each question to one of the specified question types? (See 'labelling_questionnaire.xls' in your project file if you aren't sure). | |
| | Have all grid questions been entered into separate tables with the grid label (column) first then a separate table for grid item (row)? | |
| Routing, ordering | Does each question have a base description which begins 'Base:'? | |
| | Are routing instructions easy to understand, do they reference the correct questions earlier in the survey? | |
| | Are exclusive and fixed codes identified where necessary? | |
| | Are answer lists ordered or randomized appropriately? | |
| Language | Is the phrasing of each question complete, simple and easily read on screen and aloud? | |
| | Is the phrasing of each question appropriate for its delivery mode (self-completion or interviewer led)? | |
| | Do the answer codes of closed questions relate directly to the question? | |
| NR | Have options for 'other, don't know etc.' been deployed appropriately? | |
| | Do all sensitive or personal questions include 'Prefer not to say'? | |
| Code labels | Are answer options coded correctly (Unique, sequential order 1~79) | |
| | Are all DK/PNTS options coded correctly? (80~99)<br>• Other (80 - 82)<br>• Don't know (85)<br>• Prefer not to say / refused (86)<br>• None of the above / not applicable (87)<br>• Can't remember (88)<br>• Not stated / not answered (89) | |
| Quality | Does this survey require any of the following? Include if appropriate<br>• Contact collection for further research<br>• Contact collection for interviewer validation<br>• Attention or data quality check questions | |
| **Have you proof-read the questionnaire for spelling and grammatical errors?** | | |

Please confirm that you have checked this script against these criteria:

| **Initials** | | **Date** | |
|---|---|---|---|

## QUOTAS –TOTAL XX INTERVIEWS

| AUDIENCE | QUOTA LIMIT | TAKEN FROM WHERE? |
|---|---|---|
| Age | Xx | DO2b |
| Gender | xx | DO1 |
| Site | | RO2 |

**R04.**

**Base: All respondents**

Please record the Date and time of the interview

OPEN RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Day | OPEN | |
| 2 | Date (dd/mm/yy) | OPEN | |
| 3 | Time (hh:mm) | OPEN | |

**DP NOTE: Please add time stamps to each section so we can work out the LOI from start to finish in the end data)**

**Introduction**

Hello,

my name is <SURVEYOR NAME> from DJS Research Ltd and I am carrying out a project for Forest Research, a Government Agency.

We are undertaking some research to understand people's views on dead and decaying trees in the landscape. Please could I have up to 10 minutes of your time to ask some questions about the topic?

*Note to interviewer: if happy to continue, ask them to read over the next page and confirm they are happy or we can offer to read out the statements.*

**INTRO1.**

**Base: All respondents**

· This project is funded by Defra and implemented by Forest Research. The data will be collected by DJS Research and analysed and reported by Forest Research.

· Once the interview starts you are under no obligation to answer all of the questions, and you may end the interview at any time.

· Further details can be found in the accompanying information sheet. This includes our statement of research ethics and how we use and store your data.

· The information sheet also has the contact details of the Forest Research project staff (Grace van der Wielen and Beth Brockett) in case you have any questions or concerns about the project.

- Your participation is voluntary
- The research data will be anonymised during analysis and reporting which means you will not be identified
- All information collected will be treated, stored and analysed in line with the requirements of the Data Protection Act (2018) and Society and Environment Research Groups Statement of Research Ethics and Privacy Policy

Are you happy to continue with the survey?

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Yes | | CONTINUE |
| 2 | No | | THANK AND CLOSE |

## Demographics

**D01.**

**Base: All respondents**

I am going to ask you a bit about yourself as it helps us to explore how opinions vary across different groups of people. **As with all these questions, just let me know if you prefer not to answer**

Do you identify as male, female or in another way?

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Male | | |
| 2 | Female | | |
| 3 | In another way | | |
| 86 | Prefer not to say | | |

**D02a.**

**Base: All respondents**

What was your age on your last birthday?

NUMERIC RESPONSE

*DP NOTE: ACCEPT NUMBERS BETWEEN 18 and 100*

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | | NUMERIC | |
| 86 | Prefer not to say | | |

**DATA: automatically code into band at D02b**

**D02b.**

**Base: All respondents who won't give a specific age (D02a/86)**

Would you mind telling me which of the following age bands do you fall into?

***Note to interviewer:*** *allocate to appropriate band*

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Under 16 | SCREEN | |
| 2 | 16-24 | | |
| 3 | 25-34 | | |
| 4 | 35-44 | | |
| 5 | 45-54 | | |
| 6 | 55-64 | | |
| 7 | 65-74 | | |
| 8 | 75-84 | | |
| 9 | 85+ | | |
| 86 | Prefer not to say | | |

**D03.**

**Base: All respondents**

Which ethnic group or groups do you belong to?

***Note to interviewer:*** *show respondent choices listed below*

MULTI RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | White | | |
| 2 | Mixed | | |
| 3 | Asian or Asian British | | |
| 4 | Black or Black British | | |
| 5 | Any other ethnic group or background | | |
| 86 | Prefer not to say | EXCLUSIVE | |

**D04.**

**Base: All respondents**

What is your highest level of qualification?

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | GCSEs or equivalent | | |
| 2 | A-Levels or equivalent | | |
| 3 | Vocational qualification (e.g., NVQ, BTEC) | | |
| 4 | Apprenticeship | | |
| 5 | Higher National Certificate (HNC) / Higher National Diploma (HND) | | |
| 6 | Bachelor's degree or equivalent | | |
| 7 | Postgraduate qualification (e.g., Master's degree, PhD) | | |
| 8 | Professional qualification (e.g., Chartered Accountant, Solicitor) | | |
| 9 | No formal qualifications | | |
| 85 | Don’t know | | |
| 86 | Prefer not to say | | |

**D05.**

**Base: All respondents**

What is your nationality?

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | English | | |
| 2 | Welsh | | |
| 3 | Scottish | | |
| 4 | Irish | | |
| 5 | Northern Irish | | |
| 6 | British | | |
| 80 | Other (please specify) | OPEN | |

| | | | |
|---|---|---|---|
| 86 | Prefer not to say | | |

## SECTION 1: Relationship and familiarity with the site

**Q01.**

**Base: All respondents**

How regularly do you visit here?

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | This is my first time | | |
| 2 | I visit regularly | | |
| 3 | I visit infrequently | | |
| 80 | Other (please specify) | OPEN | |

**Q02.**

**Base: All respondents**

Do you live locally?

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Yes | | |
| 2 | No | | |

**Q03.**

**Base: All respondents**

What is the reason for your visit today? Please select all that apply.

***Note to interviewer:*** *show respondent choices listed below*

MULTI RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Leisure walk | | |
| 2 | Dog walk | | |
| 3 | On route to a destination | | |
| 4 | Holiday visit | | |
| 5 | Day trip | | |

| | | | |
|---|---|---|---|
| 6 | Bicycle ride | | |
| 80 | Other (please specify) | OPEN | |
| 86 | Prefer not to say | EXCLUSIVE | |

## SECTION 2: Environmental attitudes and behaviours

**Q04.**

**Base: All respondents**

How many times have you visited a green and natural space in the last 14 days, not including your garden, work visits or abroad?

***Note to interviewer:*** *use numeric whole number, (can be more than 14 if multiple visits per day). If struggling to answer, ask for 'best guess'.*

NUMERIC RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | | OPEN | |

**Q05.**

**Base: All respondents**

How much do you agree or disagree with the following statements. Please use a scale from 1 to 5, where 1 is disagree strongly and 5 is agree strongly.

***Note to interviewer:*** *show respondent choices listed below, read out each statement, select one response for each statement.*

SINGLE GRID

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Disagree strongly | - | |
| 2 | Disagree a little | - | |
| 3 | Neither agree nor disagree | - | |
| 4 | Agree a little | - | |
| 5 | Agree strongly | | |

| Statement number | Statement | Scripting notes | Routing |
|---|---|---|---|
| 1 | My ideal vacation (holiday) spot would be a remote, wilderness area | | |
| 2 | I always think about how my actions affect the environment | | |

| | | | |
|---|---|---|---|
| 3 | My connection to nature and the environment is a part of my spirituality | | |
| 4 | I take notice of wildlife wherever I am | | |
| 5 | My relationship to nature is an important part of who I am | | |
| 6 | I feel very connected to all living things and the earth | | |

## SECTION 3: Cultural ecosystem services & wellbeing

**Q06a.**

**Base: All respondents**

Using the emotional scale below, can you point to how this tree makes you feel?

*Note to surveyor: show image and record corresponding number from scale*

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 |  | | |
| 2 |  | | |
| 3 |  | | |
| 4 |  | | |
| 5 |  | | |

**Q06b.**

**Base: All respondents**

Can you explain why you feel this way?

***Note to interviewer:*** *if respondents feel mixed emotions (e.g. neither/nor), please also probe to explore why this might be.*

OPEN RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | | OPEN | |

## SECTION 4: Awareness and recognition of dead and decaying trees

**Q07.**

**Base: All respondents**

What comes to mind if I say the words dead and decaying trees?

***Note to interviewer:*** *no prompting/do not show list, responses listed in alphabetical order. Check all response categories to match as close to what's mentioned by respondents and note any additional responses in 'other'*

MULTI RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Beautiful / lovely / attractive, etc | | |
| 2 | Biodiversity / wildlife | | |
| 3 | Birds (and bird species) | | |
| 4 | Carbon / climate change | | |
| 5 | Circle / cycle of life | | |
| 6 | Decomposition / soil health / nutrients | | |
| 7 | Disease / pests | | |
| 8 | Fungi / mushrooms | | |
| 9 | Insects / bugs / invertebrates | | |
| 10 | Interesting / fascinating / captivating, etc | | |
| 11 | Mammals (and mammal species e.g. mice, hedgehogs) | | |
| 12 | Messy / untidy | | |
| 13 | Moss / lichen | | |
| 14 | Natural / nature | | |
| 15 | Risk / hazard / safety / danger | | |
| 16 | Ugly / unpleasant / horrible, etc | | |
| 80 | Other (please specify) | OPEN | |

**Q08.**

**Base: All respondents**

Do you notice dead wood, dead trees, and decaying trees in the landscape?

***Note to interviewer: We're asking about landscapes in general in this question, not just the area where you're interviewing.***

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Yes | | Q09 |
| 2 | No | | Q010 |

**Q09.**

**Base: All respondents who notice dead and decaying trees (Q08/1)**

What do you notice?

***Note to interviewer:*** *no prompting/do not show list, responses listed in alphabetical order. Check all response categories to match as close to what's mentioned by respondents and note any additional responses in 'other'*

MULTI RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Bark | | |
| 2 | Cause of death / illness (e.g. disease, humans, lightning strike) | | |
| 3 | Colours | | |
| 4 | Contrast (e.g. with living trees) | | |
| 5 | Fungi / mushrooms | | |
| 6 | Holes / hollows | | |
| 7 | Messy / untidy | | |
| 8 | Moss / lichen | | |
| 9 | Re-growth / things growing on them | | |
| 10 | Safety / risk – anything related | | |
| 11 | Shape / structure / patterns | | |
| 12 | Wildlife – and any specific species mentioned | | |
| 80 | Other (please specify) | OPEN | |

## SECTION 5: Awareness of other ecosystem services

**Q10.**

**Base: All respondents**

Are you aware of any reasons why land owners may decide to keep dead wood, dead trees, or decaying trees rather than removing them?

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Yes | | Q11a |
| 2 | No | | Q11b |

**Q11a.**

**Base: All respondents who are aware of reasons land owners keep decaying trees (Q10/1)**

Why might they decide to keep them?

***Note to interviewer:*** *no prompting/do not show list, responses listed in alphabetical order. Check all response categories to match as close to what's mentioned by respondents and note any additional responses in 'other'*

MULTI RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Because the government / council / other encourages them to keep them (including payment) | | |
| 2 | Biodiversity / wildlife | | |
| 3 | Carbon / climate change | | |
| 4 | Circle / cycle of life | | |
| 5 | Decomposition / soil health / nutrients | | |
| 6 | Fungi / mushrooms | | |
| 7 | Insects / bugs / invertebrates | | |
| 8 | It's expensive / difficult to get rid of them | | |
| 9 | Moss / lichen | | |
| 10 | Prevent soil erosion | | |
| 11 | Shelter for livestock / animals | | |
| 12 | The landowner likes having them (or similar answers) | | |
| 80 | Other (please specify) | OPEN | |

**Q11b.**

**Base: All respondents**

Do you think the land owner should remove this tree?

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Yes | | |
| 2 | No | | |
| 3 | Yes and No (depends on the context) | | |

**Q11c.**

**Base: All respondents**

Why do you say that?

***Note to interviewer:*** *no prompting/do not show list, responses listed in alphabetical order. Check all response categories to match as close to what's mentioned by respondents and note any additional responses in 'other'*

MULTI RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Beautiful / lovely / attractive, etc | | |
| 2 | Biodiversity / wildlife | | |
| 3 | Birds (and bird species) | | |
| 4 | Carbon / climate change | | |
| 5 | Circle / cycle of life | | |
| 5 | Decomposition / soil health / nutrients | | |
| 6 | Depends on reason for death / why unhealthy | | |
| 7 | Disease / pests | | |
| 8 | Fungi / mushrooms | | |
| 9 | Insects / bugs / invertebrates | | |
| 10 | Interesting / fascinating / captivating, etc | | |
| 11 | Mammals (and mammal species e.g. mice, hedgehogs) | | |
| 12 | Messy / untidy | | |
| 13 | Moss / lichen | | |
| 14 | Natural / nature | | |
| 15 | Risk / hazard / safety / danger | | |
| 16 | Ugly / unpleasant / horrible, etc | | |
| 80 | Other (please specify) | OPEN | |

**Q12.**

**Base: All respondents**

Do you think more dead and decaying trees should be left in the landscape to decay in place?

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Yes | | |
| 2 | No | | |
| 3 | Depends | | |

**Q13.**

**Base: All respondents**

Would your answer change depending on why the tree was dead/decaying?

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Yes | | Q13a |
| 2 | No | | Q13a |

**Q013a.**

**Base: All respondents**

Why is that?

OPEN RESPONSE

**Q14.**

**Base: All respondents**

Are you aware of any benefits this tree brings to the environment?

***Note to interviewer:*** *no prompting, responses listed in alphabetical order. Check all response categories to match as close to what's mentioned by respondents and note any additional responses in 'other'*

*If queried about repetitiveness, acknowledge that they may have already mentioned some previously but ask them to list all they can think of even if repeating themselves*

MULTI RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Beautiful / lovely / attractive, etc | | |
| 2 | Biodiversity / wildlife | | |
| 3 | Birds (and bird species) | | |
| 4 | Carbon / climate change | | |
| 5 | Circle / cycle of life | | |
| 6 | Decomposition / soil health / nutrients | | |
| 7 | Disease / pests | | |
| 8 | Fungi / mushrooms | | |
| 9 | Insects / bugs / invertebrates | | |
| 10 | Interesting / fascinating / captivating, etc | | |
| 11 | Mammals (and mammal species e.g. mice, hedgehogs) | | |
| 12 | Messy / untidy | | |
| 13 | Moss / lichen | | |

| | | | |
|---|---|---|---|
| 14 | Natural / nature | | |
| 15 | Risk / hazard / safety / danger | | |
| 16 | Ugly / unpleasant / horrible, etc | | |
| 17 | Shelter for livestock | | |
| 80 | Other (please specify) | OPEN | |
| 85 | Don't know | EXCLUSIVE | |

**Q15.**

**Base: All respondents**

How concerned are you about dead and decaying trees being left in the environment, in relation to the following things?

Please use a scale of 1 to 5 where 1 is very concerned and 5 is not concerned at all.

***Note to interviewer:*** *read out the statement and then show respondent choices listed below.*

SINGLE GRID

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | - Very concerned | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | - is not concerned at all | | |

| Statement number | Statement | Scripting notes | Routing |
|---|---|---|---|
| 1 | Spread of disease or pests | | |
| 2 | Safety hazard | | |
| 3 | Messiness or untidiness | | |
| 4 | Ugliness | | |
| 5 | Blocking access for visitors | | |
| 6 | Concern for the tree itself | | |
| 80 | Other (please specify) | OPEN, ALLOW TO BE LEFT BLANK | |

**Q16.**

**Base: All respondents**

The following statements are about some of ways in which you might value, or not value, dead and decaying trees in the landscape.

Thinking about these trees, please respond to each statement using a scale where 1 is strongly disagree and 5 is strongly agree.

Your responses should be based on whether or not you personally value these trees for these reasons

***Note to interviewer:*** *show respondent choices listed below, read out each statement, select one response for each statement.*

SINGLE GRID

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Strongly disagree | - | |
| 2 | Somewhat disagree | - | |
| 3 | Neither agree nor disagree | - | |
| 4 | Somewhat agree | - | |
| 5 | Strongly agree | - | |

| Statement number | Statement | Scripting notes | Routing |
|---|---|---|---|
| 1 | I value dead and decaying trees because of their importance for wildlife | | |
| 2 | I value dead and decaying trees because they are good for my mental wellbeing | | |
| 3 | I value dead and decaying trees because they make me feel creative and inspired | | |
| 4 | I value dead and decaying trees because they can help me learn more about nature | | |
| 5 | I value dead and decaying trees because they provide places to spend time with friends and family (e.g. to sit on, climb, play around) | | |

**Q17a.**

**Base: All respondents**

Please confirm if you would like to receive an email containing a link to Forest Research's privacy policy and a summary of the results of this research (likely to be available from April 2025) – this is optional, but if you agree it would mean DJS Research would hold your contact details until the date the summary of results is available so that we can forward on the relevant information.

Thank you very much for your help today

MULTI RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Yes, I would like to receive an email containing a link to Forest Research's privacy policy | | |
| 2 | Yes, I would like to receive an email containing a link to Forest Research's summary of results of this research | | |
| 3 | No, I do not wish to receive any further information | EXCLUSIVE | |

**Q17b.**

**Base: All respondents who agree to receive further information (Q17a/1,2)**

Please confirm your name and email address.

Please note that these will be the only details DJS Research will keep in order to send out the participant information document and, later, a summary of the results and will be deleted from our system once the information has been sent out (31st May 2025).

These details will not be used for anything else

Once again, thank you very much for your help today

OPEN RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | NAME | OPEN | |
| 2 | EMAIL (Interviewer – please read back and confirm details are correct) | OPEN | |

*Note to interviewer: next section can be filled out after completing the survey with the respondent (they do not need to be present)*

**SECTION 6: Records**

**INFO1** – NEXT SET OF QUESTIONS ARE FOR INTEVERVIWER TO RECORD, RESPONDENT DOES NOT NEED TO BE PRESENT

**R01.**

**Base: All respondents**

Please record the site

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | Knepp | | |
| 2 | Rydal | | |
| 3 | Stowe | | |

**R02.**

**Base: All respondents**

Please record your What3words location – If you're unsure please refer to your briefing notes or use your phone to check your what3words location via their website

SINGLE RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|
| 1 | ///clings.unwound.jogged | SHOW FOR STOWE (R01/3) | |
| 2 | ///outbursts.shepherds.endearing | SHOW FOR STOWE (R01/3) | |
| 3 | ///stems.shell.crisps | SHOW FOR STOWE (R01/3) | |
| 4 | ///demanding.festivity.tangible | SHOW FOR STOWE (R01/3) | |
| 5 | ///premature.oven.swung | SHOW FOR STOWE (R01/3) | |
| 6 | ///smoker.everyone.grad | SHOW FOR STOWE (R01/3) | |
| 7 | ///loafing.union.padding | SHOW FOR STOWE (R01/3) | |
| 8 | ///slopes.entitles.charging | SHOW FOR RYDAL (R01/2) | |
| 9 | ///director.interests.brotherly | SHOW FOR RYDAL (R01/2) | |
| 10 | ///below.directly.chuck | SHOW FOR RYDAL (R01/2) | |
| 80 | Other (Please specify your What3words) | Open – SHOW FOR ALL | |

**R03.**

**Base: All respondents**

Please record the weather condition during this survey

MULTI RESPONSE

| Code | Answer list | Scripting notes | Routing |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1 | Sunny | | |
| 2 | Cloudy | | |
| 3 | Rainy | | |
| 4 | Windy | | |

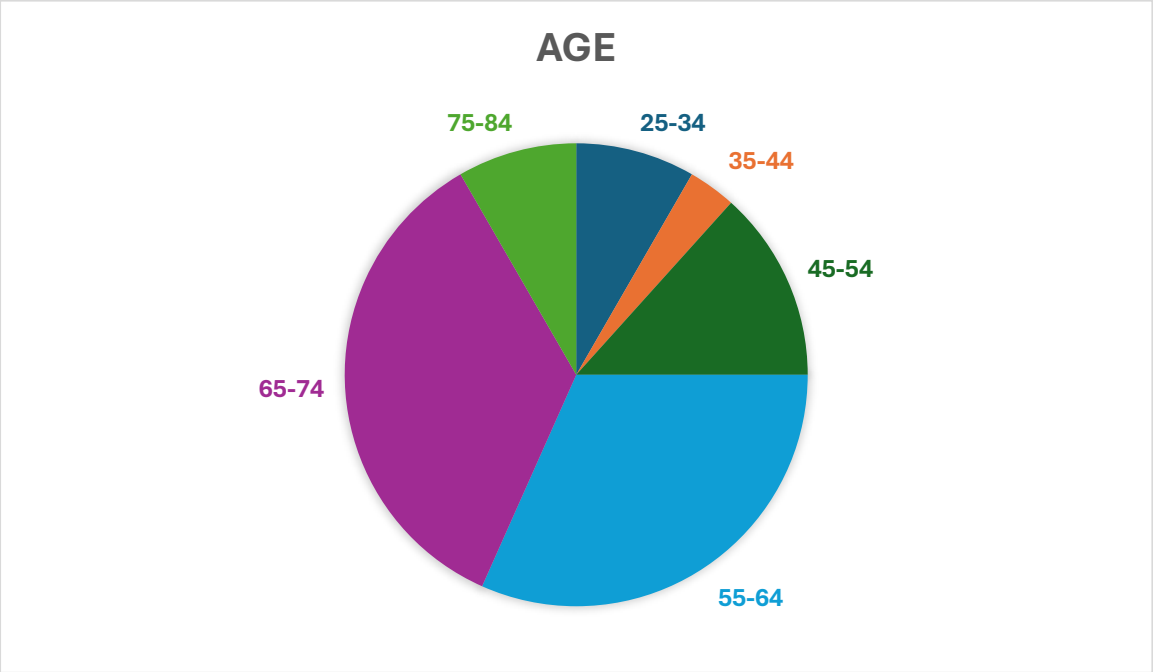
CLOSING SCREEN TEXT – Please don't forget to take a photo of your position/nearest tree and all dead/decaying/dying trees in your view on your phone and email or WhatsApp to Aoife at the end of every shift - only one pic of the tree is required per shift.

## Descriptive stats analysis of pilot survey results

### Table format/bar chart for demographics

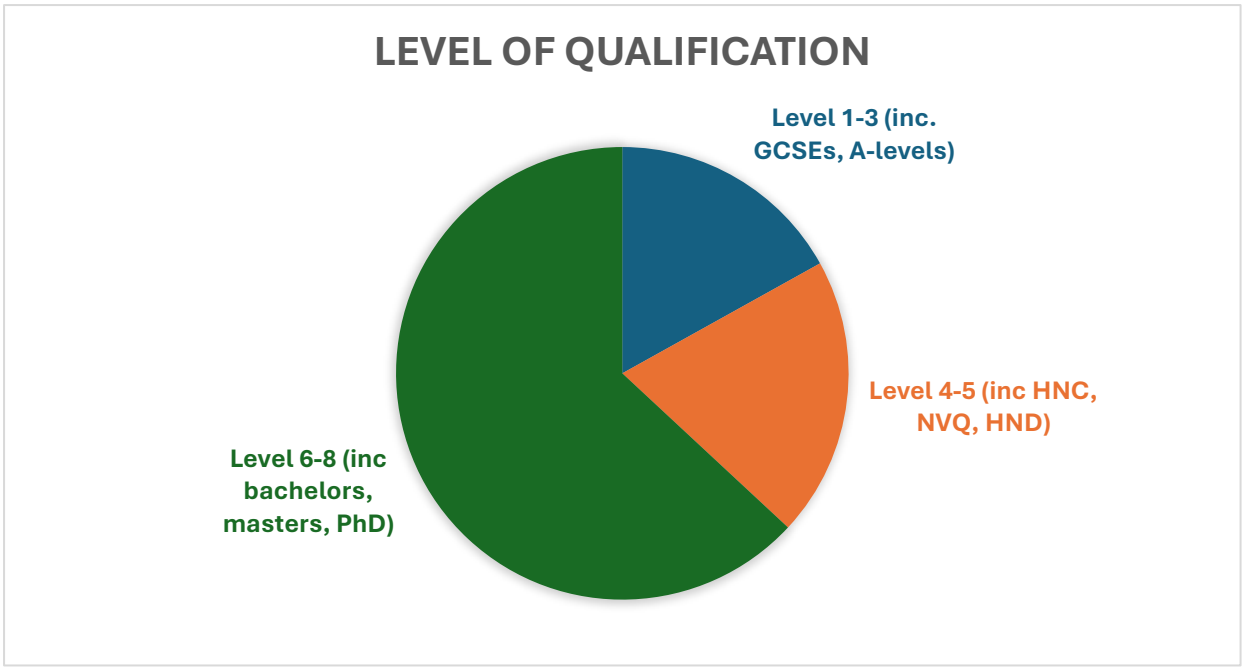
| Gender | Number of participants |
|---|---|
| Male | 32 |
| Female | 33 |
| Another way | 0 |

| Age band | Number of participants |
|---|---|
| 25-34 | 5 |
| 35-44 | 2 |
| 45-54 | 8 |
| 55-64 | 19 |
| 65-74 | 21 |
| 75-84 | 5 |



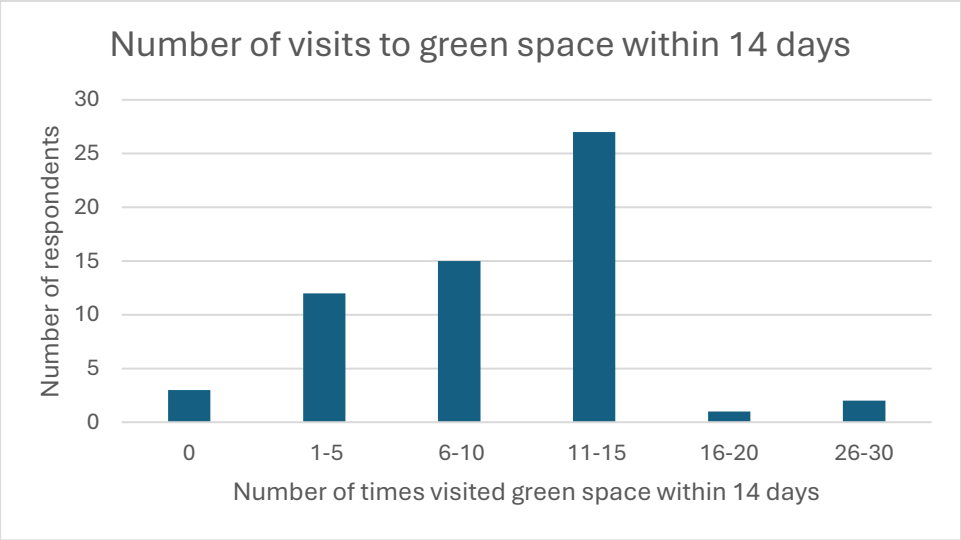

| Ethnic group | Number of participants |
|---|---|
| White | 64 |
| Black/Black British | 1 |
| Mixed | 0 |
| Asian/Asian British | 0 |
| Any other ethnic group/background | 0 |
| Prefer not to say | 0 |

| Level of qualification | Number of participants |
|---|---|
| Level 1-3 (inc. GCSEs, A-levels) | 11 |
| Level 4-5 (inc HNC, NVQ, HND) | 13 |
| Level 6-8 (inc bachelors, masters, PhD) | 41 |



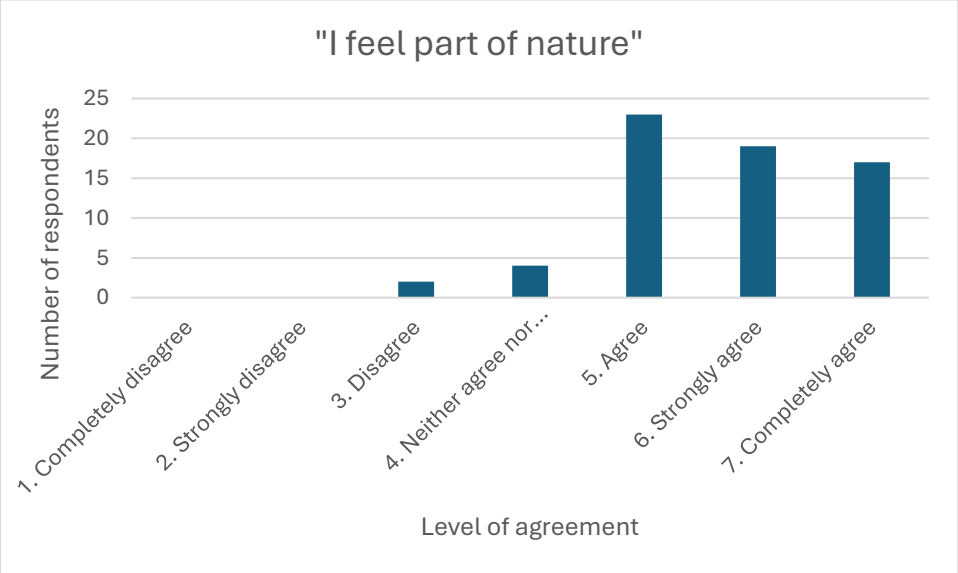

**Q1. Why are you visiting this site today? (open text)**

**Q2. Number of times visited green space (num)**

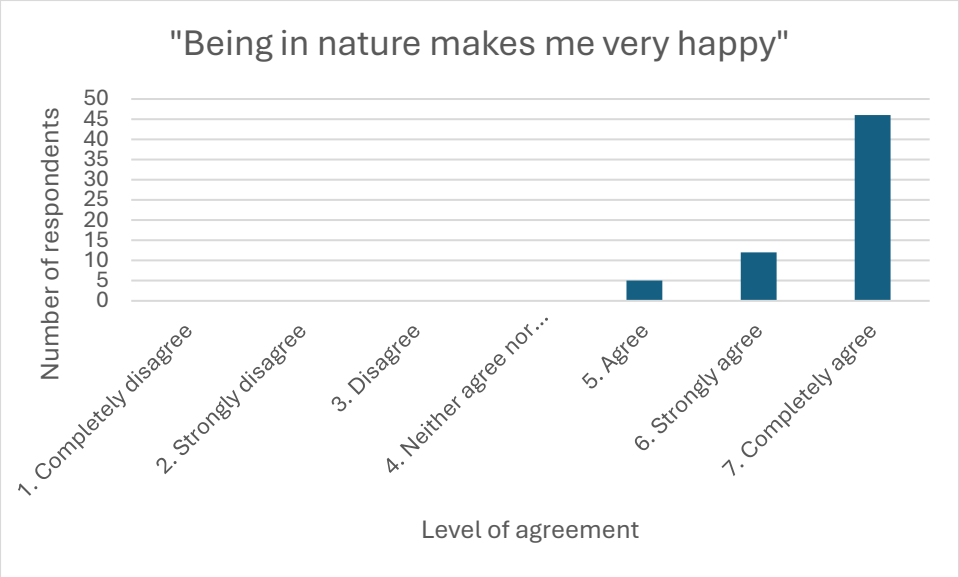


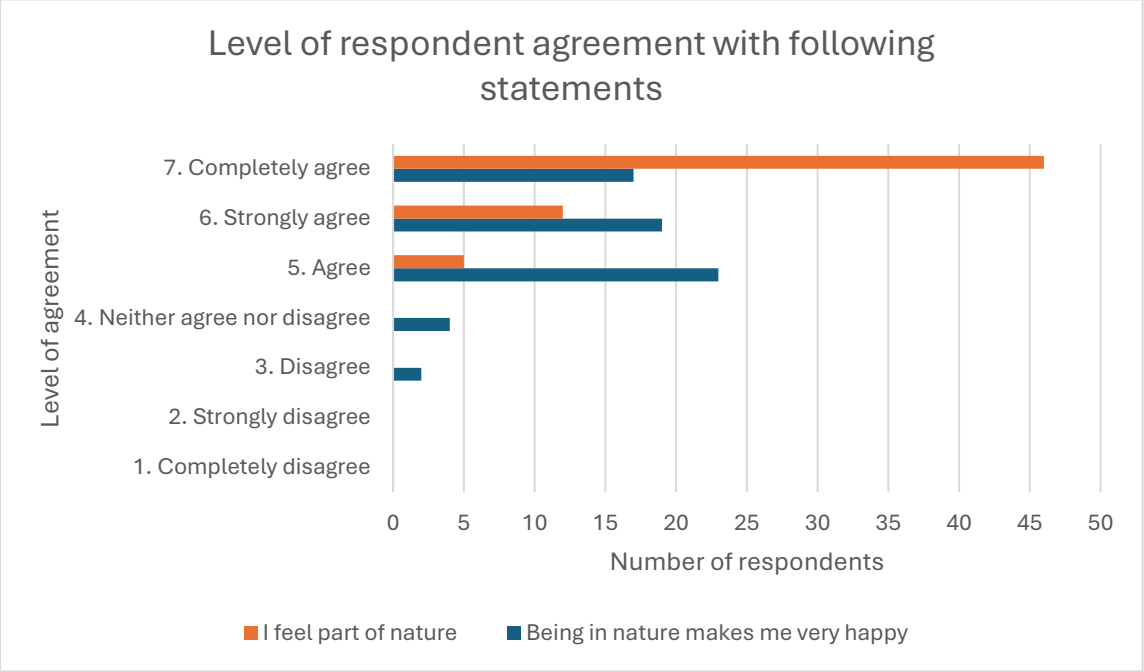

**Q3. How much do you agree or disagree with the following statements – with 1 being completely disagree and 7 being completely agree**

**Q3.a) I feel part of nature (num) SCALE 1-7**

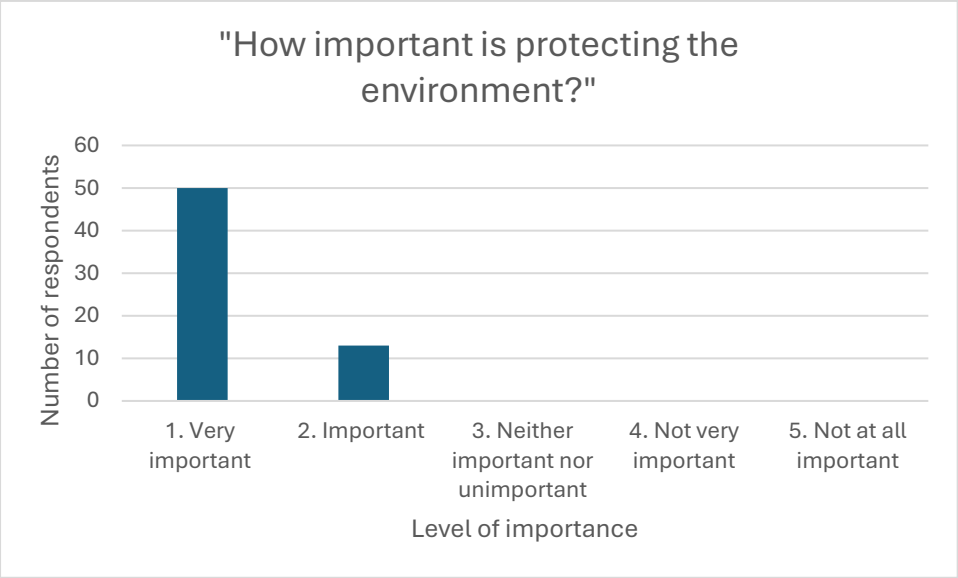


**Q3b) Being in nature makes me very happy (num) SCALE 1-7**



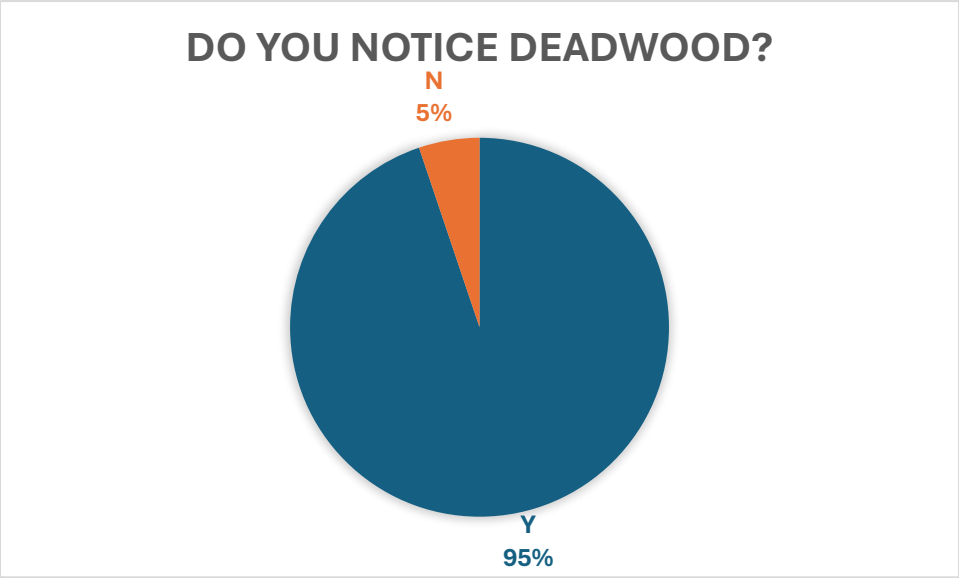
**Q4. How important is protecting the environment (num) SCALE 1-5**



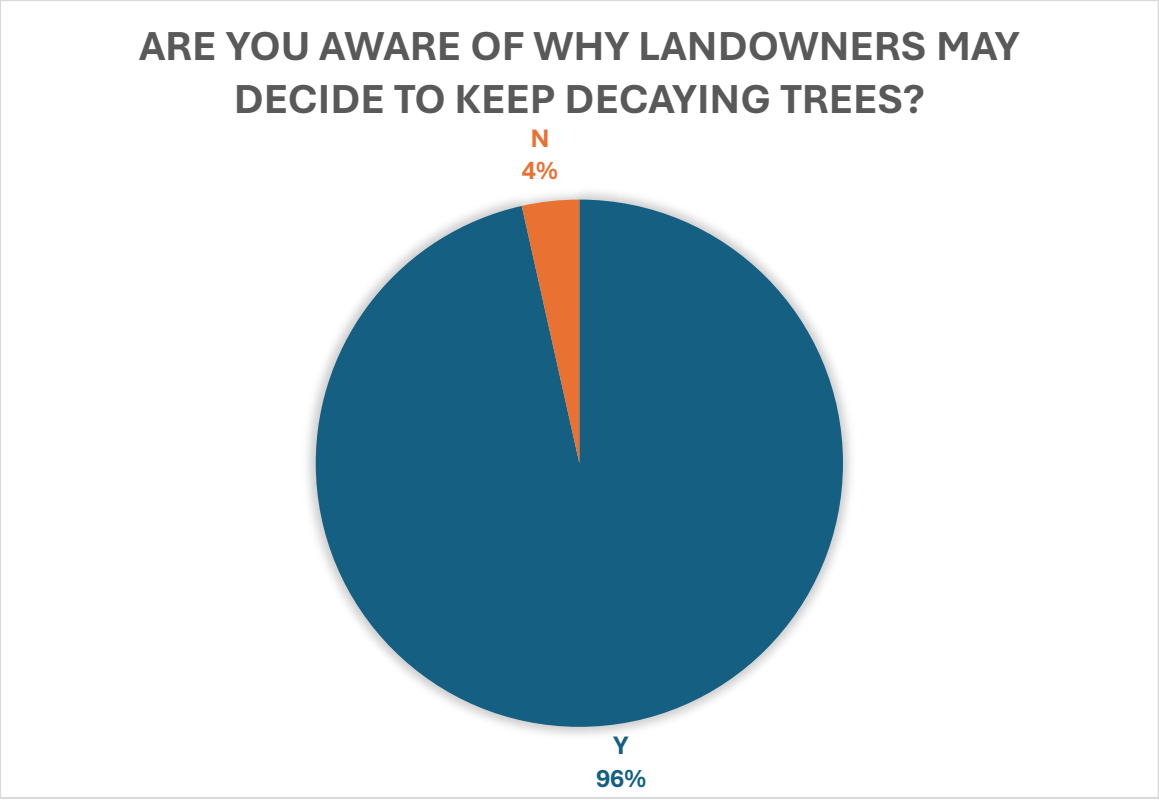

**Q.5, 6 & 7: Open text answers to questions 5, 6 and 7 were used to create the following categories as options within the expanded survey:**

- Decomposition / soil health / nutrients
- Disease / pests
- Fungi / mushrooms
- Insects / bugs / invertebrates
- Interesting / fascinating / captivating, etc
- Mammals (and mammal species e.g. mice, hedgehogs)
- Messy / untidy
- Moss / lichen
- Natural / nature
- Risk / hazard / safety / danger
- Ugly / unpleasant / horrible, etc
- Shelter for livestock
- Other (please specify)
- Don't know

**Q6. Do you notice deadwood? Plus explanation above re categories**




**Q7. Are you aware of any reasons why land owners may decide to keep dead wood, dead trees, dying or damaged trees rather than removing them?**



**Q8. What are your thoughts about this dead/dying/damaged tree being here?**

*NB. Excluded some words via Nvivo stop words list. This list can be found in the Nvivo file: Rot_Pilot survey word clouds.nvp*


**Q8a. What are your thoughts about this dead/dying/damaged tree being in an urban park?**

*NB. I have summarised the key range of positive/negative/neutral views by reading through the responses and summarising into categories as I went. Process documented here: Q8a., Q9 & Q10.c free text analysis.docx*

As the wordcloud above demonstrates, respondents had mixed opinions on the idea of the dead/decaying tree being in an urban context. Those who had negative opinions were mainly concerned about the safety risk a dead/decaying tree would pose. They were particularly worried about the risk posed to children, who they imagined would try and play on them. The other main concern related to aesthetic preferences – respondents didn't think that dead/decaying trees 'belong' in an urban park context, which they expect to be tidy, neat and full of 'live trees' rather than 'dead' ones. A few people also had concerns that deadwood might be an obstruction to access, paths and activities in the park.

Those with positive opinions highlighted that dead/decaying trees are 'natural' – they used this term to highlight the inherent goodness of the benefits that deadwood might bring in terms of its habitat value for other plants and animals, as something interesting for children to play on and explore, and also as an aesthetic preference for a landscape which is not 'manicured'.

Some respondents expressed balanced or neutral opinions – they said their opinion would depend on the use of the park, the location of the deadwood within the park, and that the

presence of deadwood would be fine (or good) as long as it is safe and the risks (particularly to children playing) were managed.

**Q9. How does this tree make you feel? (open text)**

*NB. I have summarised the range of views by reading through the responses and summarising into categories as I went. Process documented here: Q8a., Q9 & Q10.c free text analysis.docx*

- **Sadness**
- **Part of the natural cycle of life and death**

  *It's part of the cycle. Allows regrowth. Old trees create variety.*

  *What might live in it, sprout out.*

  *Natural part of life, process, nature*

  *Part of the natural cycle, like storms, how it should be*

  *Circle of life. Brits aren't good at death. Makes me feel insignificant and I am ok with that*

  *Fascinated that it is dying but something is growing out of it. It supports life.*

- **Neutral – or depends on why it died**

  *Don't think about it*

  *Depends on why it died*

- **Respect/awe for tree and its long life/history**

  *That a very old tree has fallen is sad - it's history also gone, but part of the circle of life, "if trees could talk"*

  *Think of its age. How long it has been there. What it has seen.*

  *Been allowed to grow old gracefully*

  *The history it will have seen.*

- **Aesthetic interest**

  *Quite like it sculpturally - take photos*

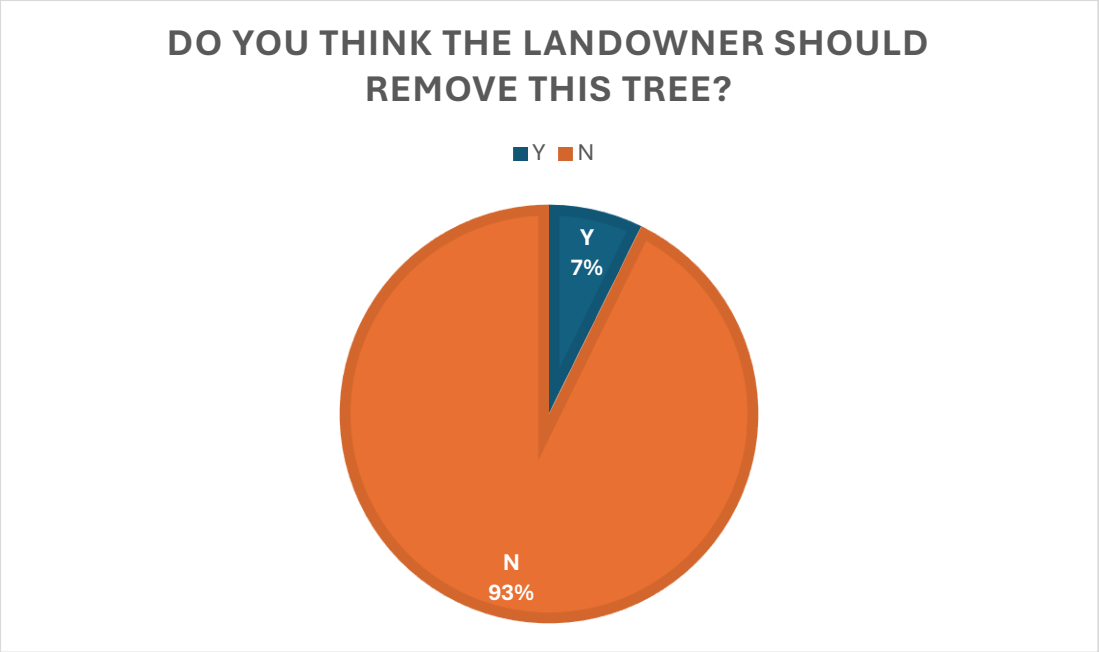
  *Beautiful in its own way*

- **Concern/curiosity**

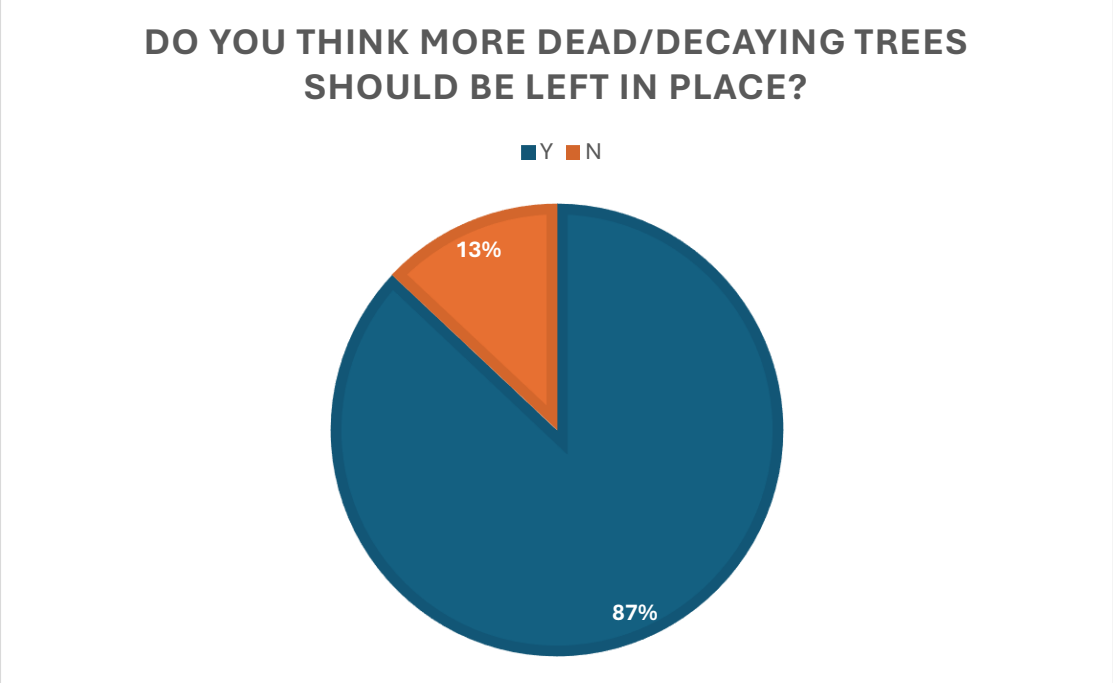
  *Intrigued, natural cause for death?*

  *Storms are getting more frequent and fierce*

**Q10. a. Do you think the landowner should remove this tree?**




**Q10. c. Do you think more should be left in place? (open text)**




*NB. I have summarised the range of views by reading through the responses and summarising into categories as I went. Process documented here: Q8a., Q9 & Q10.c free text analysis.docx*

- **Concerns about aesthetic impact – messiness, not attractive**

*Too many of them, wouldn't look nice - "messy"*

*Not attractive to public - public might not accept more.*

- **Concerns about access to paths**

*Storms can fell trees and lead to issues around access to paths*

*As long as not obstructing path*

- **Concerns about safety risk**

*Need to be safe for animals and people.*

*Trees on streets - when they are considered dangerous, they should go*

*As long as not a danger*

- **Affirmation that it's 'natural'**

*Part of nature cycle*

*Back to nature*

- **Affirmation of environmental value**

*these trees are homes*

Shelter for animals, insects, nutrients

- **Acceptability dependent on location (e.g. less acceptable on roadside or in urban areas)**

*if in the right and safe place*

*Don't know - in countryside yes, in urban space no*

*Yes, but in right place, if doing good*

- **Acceptability dependent on why it has died (concerns about disease)**

*Depends - if it is diseased, take it out.*

*Not if has Dutch Elm disease. Or ash die back. damage the earth and leave a mess*

**Site description & photos**

**Rydal Park, Ambleside**

Ambleside Cricket Club car park, A, Ambleside LA22 9PL

What3words: ///disengage.reviewed.defensive

**Glencoyne Park, Ullswater**

Glencoyne car park, CA11 0QT, grid ref: NY386188

What3words:

///feasts.tones.reshaping

# Statistical analysis & Results: Dead and Decaying Trees

## Methods statement statistical analysis

All analysis was carried out in R software, version 4.4.2. Unless otherwise stated, n=1,177, and 5% is the significance level considered in all reporting.

Data visualizations include boxplots for assessing differences in distributions. The horizontal line in the middle of each box is the median, or middle, score. The top line of the box represents the 75th percentile (upper quartile) and the bottom line the 25th percentile (lower quartile). The lines emerging from the boxes represent the maximum and minimum scores given by respondents. Points outside the lines are 'outliers' – scores that are numerically distant from the rest of the data. Confidence intervals for proportions were calculated using a logit transformation and represented in bar plots.

Chi-squared tests have been run to assess statistically significant differences between response proportions. For Check-All-That-Apply (CATA) questions, Cochran's Q test statistics are reported.

Statistical models have been run to assess impacts of factors more widely. In general, for all statistical models, along with specific statements (where relevant), a range of different predictors were included in the models including gender, age, education, ethnicity, number of visits in the last 14 days and Nature relatedness score (NR5) (see below). Where statements were present, a two-way interaction was included between statements and each demographic to account for differences in responses per statement. For CATA questions, generalised linear mixed effect models (GLMM) were fitted, with individual respondents considered as random effects to account for the repeated measures per respondent. For ordinal responses (e.g. Likert) data, ordinal logistic regression models (clm() function, Christensen, 2019) or multinomial logistic regressions for categorical responses were run (multinom() function, Venables and Ripley, 2002), with likelihood ratio chi-squared tests to determine significance.

Further detail of the analysis is included with the specific results reported.

## Analysis details of how the Nature Relatedness score was derived

The Nature Relatedness scale (NR6) (Kövi et al. 2023) consists of the six following statements, from which we aimed to create a score (or proxy) (Table 1).

*Table 1. Nature relatedness scale (NR6) statements*

| Variable | Statement |
|---|---|
| envhabit_1 | My ideal vacation (holiday) spot would be a remote, wilderness area |
| envhabit_2 | I always think about how my actions affect the environment |
| envhabit_3 | My connection to nature and the environment is a part of my spirituality |
| envhabit_4 | I take notice of wildlife wherever I am |
| envhabit_5 | My relationship to nature is an important part of who I am |

| Variable | Statement |
|---|---|
| envhabit_6 | I feel very connected to all living things and the earth |

Based on Kövi et al. (2023), a score for NR6 was obtained using Principal Component Analysis (PCA) (Table 2). NR6 corresponds to the first principal component and 51.7% of variance is explained by said component.

*Table 2. PCA results, importance of components.*

| | Comp.1 | Comp.2 | Comp.3 | Comp.4 | Comp.5 | Comp.6 |
|---|---|---|---|---|---|---|
| Standard deviation | 1.762 | 0.913 | 0.808 | 0.801 | 0.663 | 0.574 |
| Proportion of Variance | 0.517 | 0.139 | 0.109 | 0.107 | 0.073 | 0.055 |
| Cumulative Proportion | 0.517 | 0.656 | 0.765 | 0.872 | 0.945 | 1.000 |

The corresponding loading values are as follows (Table 3):

*Table 3. PCA results, loadings.*

| | Comp.1 | Comp.2 | Comp.3 | Comp.4 | Comp.5 | Comp.6 |
|---|---|---|---|---|---|---|
| Statement 1 | 0.280 | 0.936 | 0.181 | | | |
| Statement 2 | 0.380 | -0.138 | 0.436 | -0.799 | | |
| Statement 3 | 0.422 | | -0.623 | -0.162 | -0.617 | 0.157 |
| Statement 4 | 0.401 | -0.255 | 0.551 | 0.504 | -0.354 | 0.303 |
| Statement 5 | 0.479 | | -0.105 | 0.275 | 0.150 | -0.808 |
| Statement 6 | 0.457 | -0.167 | -0.271 | | 0.683 | 0.469 |
| Sum Squared loadings | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Proportion of Variance | 0.167 | 0.167 | 0.167 | 0.167 | 0.167 | 0.167 |
| Cumulative Proportion | 0.167 | 0.333 | 0.500 | 0.667 | 0.833 | 1.000 |

Statement 1 “My ideal vacation (holiday) spot would be a remote, wilderness area” presented the lowest loading for Component 1 (under 0.3) and therefore we considered the possibility of a score using only the 5 other statements via PCA (NR5). We proposed a scaled score based on Statements 2 to 6. By removing Statement 1 the variance explained increased to 58%, with the first principal component being the only one having a eigenvalue greater than 1 (Table 4). In addition, weights are quite balanced among statements (Table 5).

*Table 4. PCA results for reduced NR scale, importance of components.*

| | Comp.1 | Comp.2 | Comp.3 | Comp.4 | Comp.5 |
|---|---|---|---|---|---|
| Standard deviation | 1.710 | 0.812 | 0.801 | 0.665 | 0.576 |
| Proportion of Variance | 0.585 | 0.132 | 0.128 | 0.088 | 0.066 |
| Cumulative Proportion | 0.585 | 0.717 | 0.845 | 0.934 | 1.000 |

*Table 5. PCA results for reduced NR scale, loadings.*

| | Comp.1 | Comp.2 | Comp.3 | Comp.4 | Comp.5 |
|---|---|---|---|---|---|
| Statement 2 | 0.396 | 0.341 | 0.848 | | |
| Statement 3 | 0.435 | -0.643 | | -0.600 | -0.177 |
| Statement 4 | 0.421 | 0.649 | -0.427 | -0.350 | -0.310 |
| Statement 5 | 0.496 | | 0.289 | 0.142 | 0.804 |
| Statement 6 | 0.479 | -0.215 | | 0.705 | -0.468 |
| Sum Squared loadings | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Proportion of Variance | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Cumulative Proportion | 0.2 | 0.4 | 0.6 | 0.8 | 1.0 |

The distribution of the proposed Natured Relatedness score is as follows (**Error! Reference source not found.**):

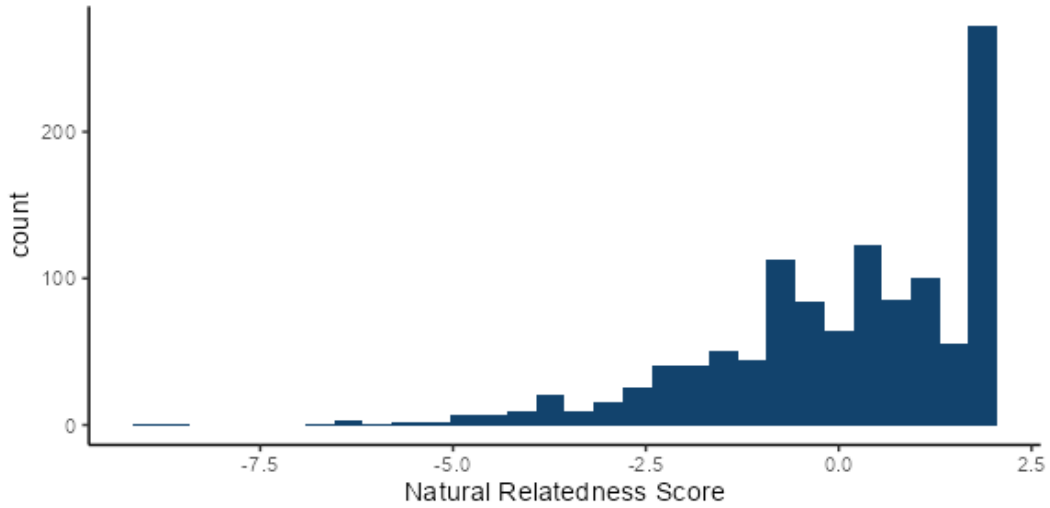



*Figure 1. Distribution of Nature Relatedness scores among respondents.*

This Nature Relatedness score is scaled, so a value near zero indicates a neutral attitude towards nature. The correlation between average score of the six statements and score NR5 is 0.924. **Error! Reference source not found.** shows that many respondents have a high nature relatedness.

*Table 6 Statistics summary of Score NR5*

| Min | 1st quartile | Median | Median | 3rd quartile | Max |
|---|---|---|---|---|---|
| -9.050 | -0.9188 | 0.322 | 0 | 1.4203 | 1.7916 |

# Results

## Respondents – sample description

The population surveyed were visitors to three natural sites: Rydal in Cumbria, Knepp in Sussex and Stowe in Buckinghamshire. We therefore did not require the sample to be nationally or regionally representative. We instructed the interviewers to try and obtain as representative a sample of the visitors they observed on site as possible, with regard to visible characteristics.

The survey had 1,177 respondents. Four hundred and sixty four from Rydal, 390 from Stowe and 323 from Knepp. Over all three sites, a third of respondents were visiting for the first time (33.39%), just over a third visited regularly (36.11%) and just under a third visit infrequently (29.91%). The category 'Other' was removed to ensure comparability in further analyses (0.59%). Most respondents were visiting to undertake a leisure walk (59.39%) (Figure 2, Table 7). The next most populous category was for a 'holiday visit' (27.61%), followed by dog walk (16.4%). Respondents were able to select more than one reason for their visit.

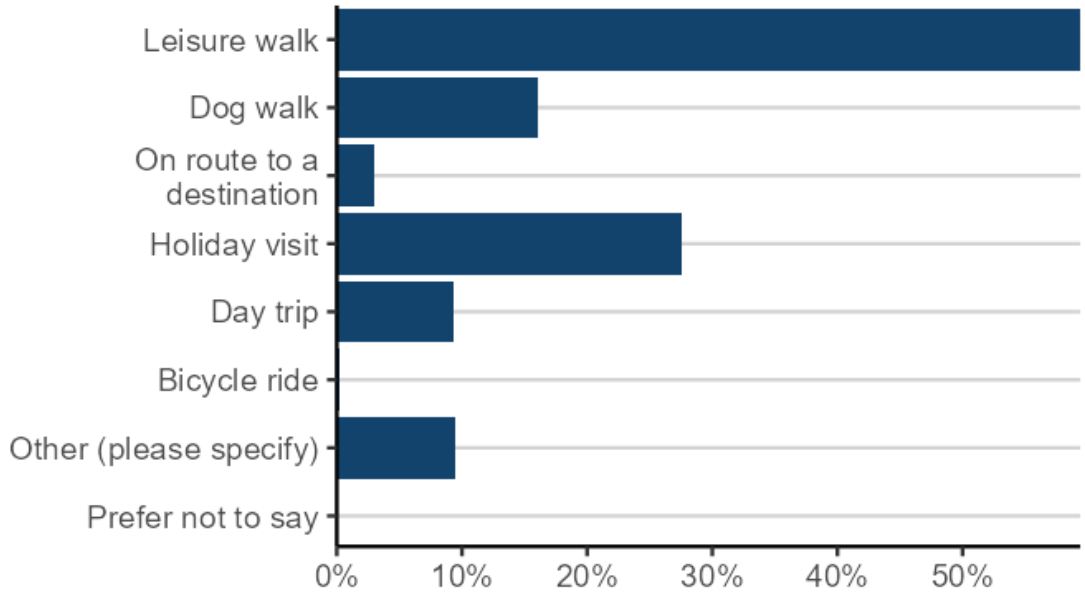



*Figure 2.Reasons for visit (% of total). Total sums to more than 100% as respondents could choose more than one reason.*

*Table 7. Reasons for visit (% of total). Total sums to more than 100% as respondents could choose more than one reason.*

| Activity | n | % |
|---|---|---|
| Leisure walk | 699 | 59.39 |
| Dog walk | 190 | 16.14 |
| On route to a destination | 35 | 2.97 |
| Holiday visit | 325 | 27.61 |
| Day trip | 110 | 9.35 |
| Bicycle ride | 2 | 0.17 |
| Other (please specify) | 112 | 9.52 |
| Prefer not to say | 1 | 0.08 |

Just over half the sample identified as female (53.19%), with less than one percent identifying 'in another way' or preferring not to say. For comparability reasons and given the low prevalence of other categories, analysis according to gender in this report will only consider female and male genders. Most respondents were in the age range 55-64 (26.51%) (Figure 3, Table 8) and of White ethnicity (94.99%) (Table 9). For comparability reasons and given the low prevalence of ethnicities other than White, ethnicity was re-coded into two categories ('White', 'Not White') for further analysis according to ethnicity and respondents who preferred not to state their ethnic group were be removed from such analysis. Most respondents held a Bachelor degree or equivalent as their highest educational attainment (29.84%) followed by those with

Postgraduate qualification (25.49%) (Table 10, Figure 4). Categories 'Prefer not to say' and 'Don't know' were not considered in further analysis. Respondents mostly identified as English (61.94%), followed by British (28.21%) (Table 5).

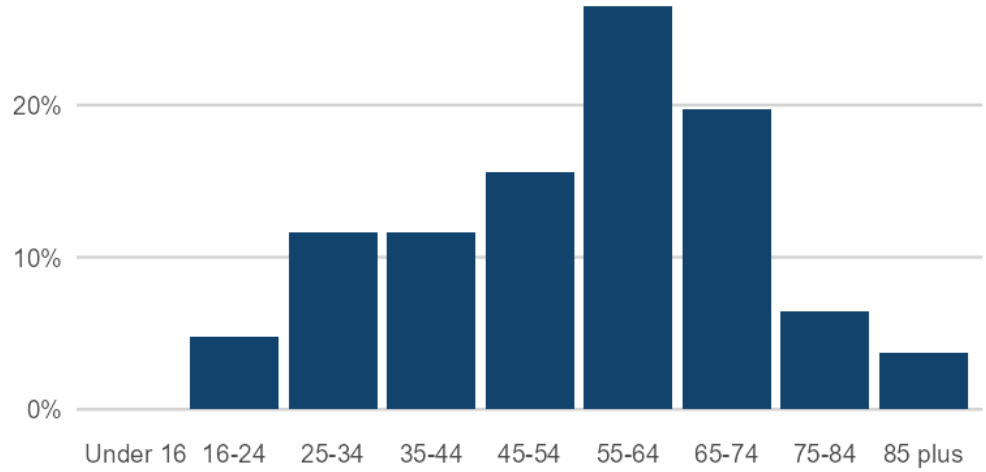



*Figure 3. Age of respondents*

*Table 8. Age group frequency table.*

| Age group | n | % |
|---|---|---|
| 16-24 | 57 | 4.84 |
| 25-34 | 137 | 11.64 |
| 35-44 | 137 | 11.64 |
| 45-54 | 184 | 15.63 |
| 55-64 | 312 | 26.51 |
| 65-74 | 232 | 19.71 |
| 75-84 | 75 | 6.37 |
| 85 plus | 43 | 3.65 |
| Total | 1,177 | 99.99 |

*Table 9. Ethnic group frequency table.*

| Ethnic group | n | % |
|---|---|---|
| White | 1,118 | 94.99 |
| Mixed | 12 | 1.02 |
| Asian or Asian British | 29 | 2.46 |

| Ethnic group | n | % |
|---|---|---|
| Black or Black British | 6 | 0.51 |
| Other ethnic group | 10 | 0.85 |
| Prefer not to say | 2 | 0.17 |
| Total | 1,177 | 100.00 |

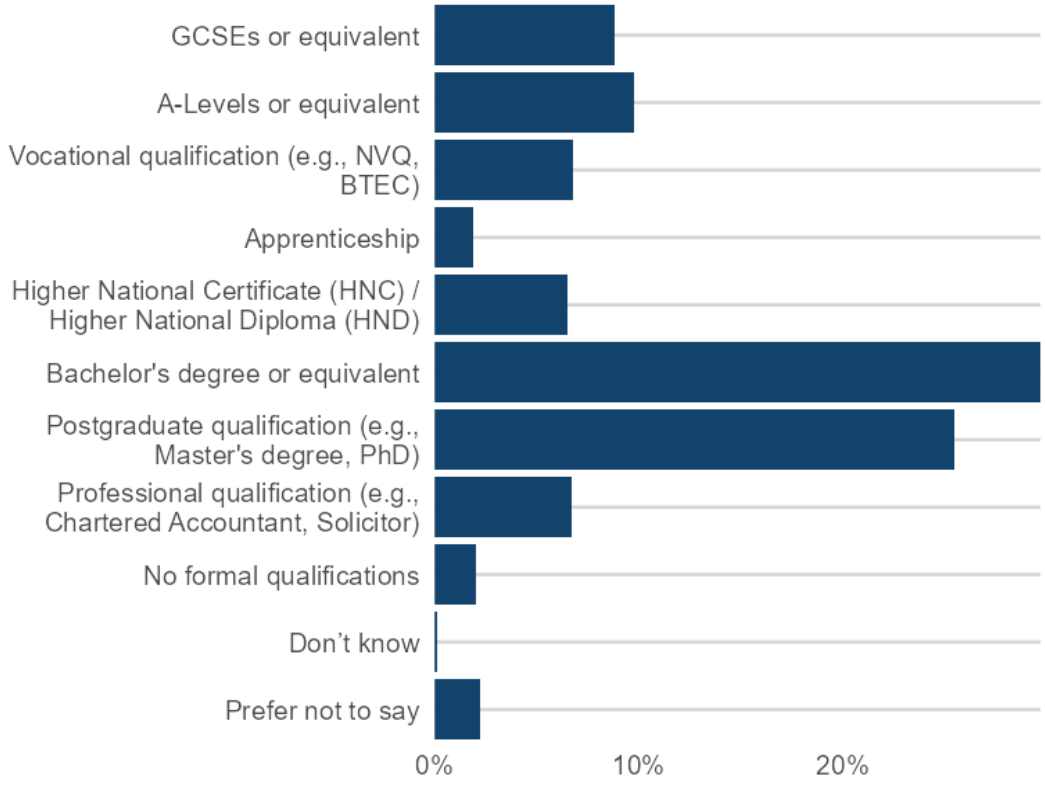



*Figure 4. Highest education level of respondents.*

*Table 10. Education frequency table.*

| Education level | n | % |
|---|---|---|
| GCSEs or equivalent | 103 | 8.75 |
| A-Levels or equivalent | 115 | 9.77 |
| Vocational qualification (e.g., NVQ, BTEC) | 80 | 6.80 |
| Apprenticeship | 22 | 1.87 |
| Higher National Certificate (HNC) / Higher National Diploma (HND) | 77 | 6.54 |
| Bachelor's degree or equivalent | 350 | 29.74 |
| Postgraduate qualification (e.g., Master's degree, PhD) | 300 | 25.49 |

| Education level | n | % |
|---|---|---|
| Professional qualification (e.g., Chartered Accountant, Solicitor) | 79 | 6.71 |
| No formal qualifications | 24 | 2.04 |
| Don’t know | 1 | 0.08 |
| Prefer not to say | 26 | 2.21 |
| Total | 1,177 | 100.00 |

*Table 11. Nationality frequency table.*

| Response | n | % |
|---|---|---|
| English | 729 | 61.94 |
| Welsh | 11 | 0.93 |
| Scottish | 16 | 1.36 |
| Irish | 9 | 0.76 |
| Northern Irish | 3 | 0.25 |
| British | 332 | 28.21 |
| Other (please specify) | 69 | 5.86 |
| Prefer not to say | 8 | 0.68 |
| Total | 1,177 | 99.99 |

Nearly a quarter of respondents (24.81%) had visited a green and natural space (not including their garden, work visits or abroad) once day in the last 14 days (Figure 5, Table 12). With the next most populous category being twice in 14 days (12.06%).

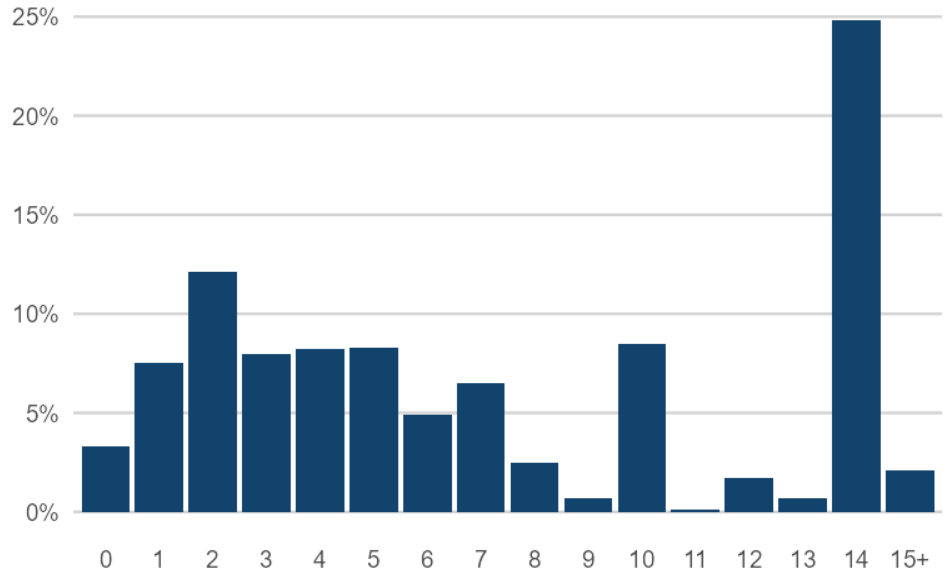



*Figure 5. Number of greenspaces visits.*

*Table 12. Number of greenspaces visits.*

| response | n | % |
|---|---|---|
| 0 | 39 | 3.31 |
| 1 | 88 | 7.48 |
| 2 | 142 | 12.06 |
| 3 | 94 | 7.99 |
| 4 | 97 | 8.24 |
| 5 | 98 | 8.33 |
| 6 | 58 | 4.93 |
| 7 | 77 | 6.54 |
| 8 | 30 | 2.55 |
| 9 | 8 | 0.68 |
| 10 | 100 | 8.50 |
| 11 | 1 | 0.08 |
| 12 | 20 | 1.70 |
| 13 | 8 | 0.68 |
| 14 | 292 | 24.81 |
| 15+ | 25 | 2.12 |
| Total | 1,177 | 100.00 |

In response to statements intended to assess participants' Nature Relatedness (Nisbet and Zelinsky, 2013) (Table 13, Figure 6):

- Nearly three quarters of respondents agreed strongly that 'I take notice of wildlife wherever I am'
- Whereas, less than a third (31.69%) agreed strongly that 'My ideal vacation (holiday) spot would be a remote, wilderness area' and just over a third (35%) that 'My connection to nature and the environment is a part of my spirituality'
- Just over a half (55.99% and 52.85%) agreed strongly that 'My relationship to nature is an important part of who I am' and 'I always think about how my actions affect the environment'.
- Just less than half (45.96%) agreed strongly that 'I feel very connected to all living things and the earth'.

*Table 13. Nature Relatedness frequency table.*

| Statement | Disagree strongly | Disagree a little | Neither agree nor disagree | Agree a little | Agree strongly |
|---|---|---|---|---|---|
| My ideal vacation (holiday) spot would be a remote, wilderness area | 5.86% (69) | 12.23% (144) | 17.50% (206) | 32.71% (385) | 31.69% (373) |
| I always think about how my actions affect the environment | 0.59% (7) | 2.63% (31) | 8.24% (97) | 35.68% (420) | 52.85% (622) |
| My connection to nature and the environment is a part of my spirituality | 5.10% (60) | 10.03% (118) | 21.16% (249) | 28.72% (338) | 35.00% (412) |
| I take notice of wildlife wherever I am | 0.34% (4) | 0.42% (5) | 2.80% (33) | 25.32% (298) | 71.11% (837) |
| My relationship to nature is an important part of who I am | 0.59% (7) | 3.40% (40) | 8.75% (103) | 31.27% (368) | 55.99% (659) |
| I feel very connected to all living things and the earth | 1.10% (13) | 4.33% (51) | 14.27% (168) | 34.32% (404) | 45.96% (541) |

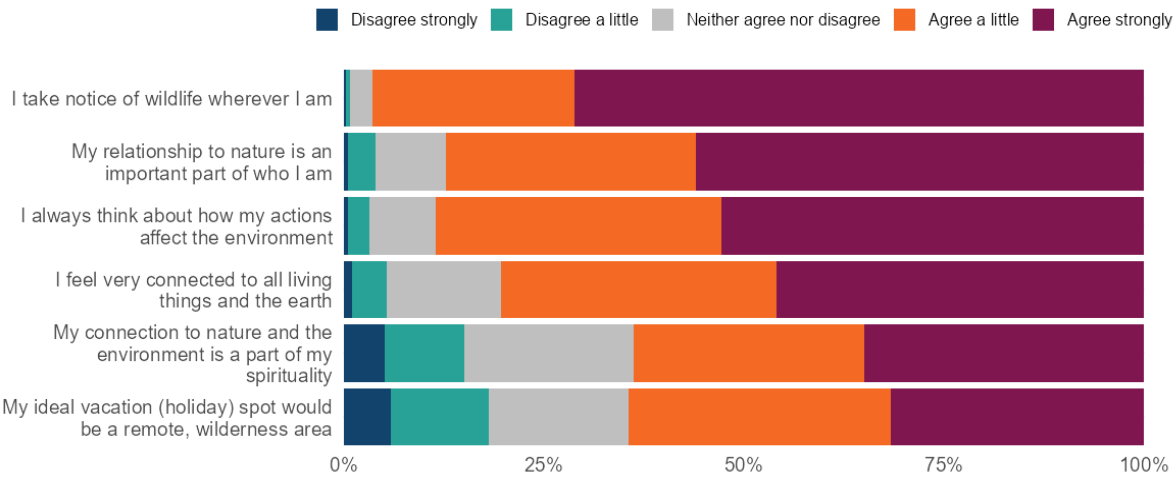



*Figure 6. Strength of agreement by Nature Relatedness statement.*

Using responses to the above statements (apart from 'My ideal vacation (holiday) spot would be a remote, wilderness area') we created a Nature Relatedness (NR5) score for each respondent – the distribution of these scores is shown in Figure 7. The score is scaled and a value near zero indicates a neutral score or 'relatedness' and a positive value indicates a stronger 'relatedness' to nature. The correlation between average score of the six statements and score NR5 is 0.924.

Figure 7 shows that many respondents have a high nature relatedness. Along with demographic and other sample characteristics, outlined in this section, we considered the influence of Nature Relatedness in responses to questions about dead and decaying trees.

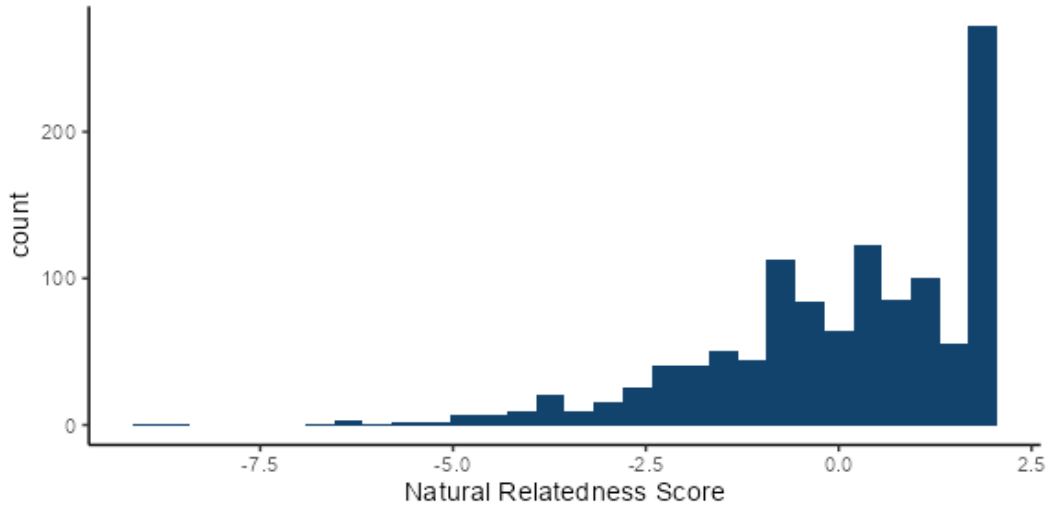



*Figure 7. Distribution of Nature Relatedness (NR5) scores among respondents.*

*Table 14. Statistics summary of NR5 score.*

| Min | 1st quartile | Median | Median | 3rd quartile | Max |
|---|---|---|---|---|---|
| -9.050 | -0.9188 | 0.322 | 0 | 1.4203 | 1.7916 |

## How do people feel about dead and dying trees in the landscape?

Interviewers indicated a visible dead and/or decaying tree and respondents were asked to point to one of a series of faces to indicate how they felt about the tree (Figure 8, Table 15). Most people felt neutral to slightly happy when asked how the trees made them feel (75.5% were neutral, happy or very happy). Differences between the responses are statistically significant ($\chi$ -squared (n,4) = 313.18, p-value < 0.001).

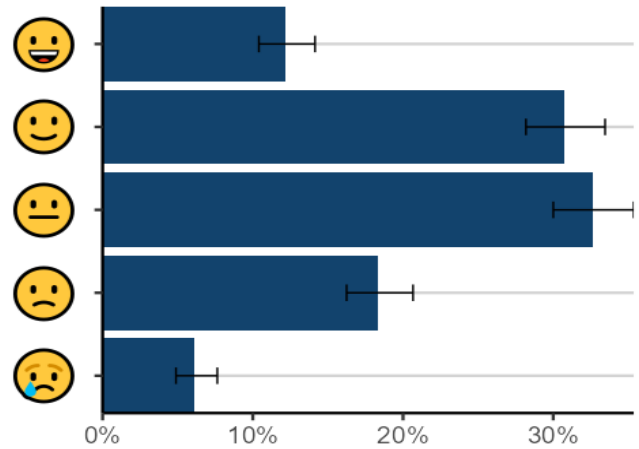



*Figure 8. Response frequency: Can you point to how this tree makes you feel?*

*Table 15. Summary statistics of responses: "Can you point to how this tree makes you feel?"*

| Response | n | % | Proportion | se | min | max |
|---|---|---|---|---|---|---|
| Very unhappy | 72 | 6.1 | 0.061 | 0.007 | 0.049 | 0.076 |
| Unhappy | 216 | 18.4 | 0.184 | 0.011 | 0.162 | 0.207 |
| Neither happy nor unhappy | 384 | 32.6 | 0.326 | 0.014 | 0.300 | 0.354 |
| Happy | 362 | 30.8 | 0.308 | 0.013 | 0.282 | 0.335 |
| Very happy | 143 | 12.1 | 0.121 | 0.010 | 0.104 | 0.141 |
| *Total* | *1,177* | *100* | | | | |

## Does how respondents feel about the tree vary by demographic or site characteristics?

We looked at whether socio-demographic variables and site characteristics affected how respondents felt about the tree. There are statistically significant differences in the responses according to age group ($p<0.001$), Nature Relatedness (NR5) score ($p=0.004$), site ($p<0.001$) and frequency of visits to that site ($p<0.001$) (Table 16, Figure 9,Figure 10,Figure 11,Figure 12). Table 16 also shows variables which were nearly significant (the number of visits respondents made to green and natural spaces in the last 14 days and whether the weather was windy on the day of the interview).

Figure 9 shows that, in general, visitors to Knepp felt more positively about the trees and those from Stowe least happy. Figure 10 shows that those who felt neither happy or unhappy were more likely to be in the two lower NR5 quartiles (low Nature Relatedness), and there's some evidence that those that felt unhappy were in the lowest NR5 quartile. Both smallest groups, those who were very unhappy (n=72) and very happy (143), had relatively higher proportions of respondents in the higher NR5 quartile (high nature relatedness).

*Table 16. Results from ordinal model considering effect of socio-demographic variables or site characteristics on how respondents feel about the visible dead/decaying tree.*

| | df | statistic | p.value |
|---|---|---|---|
| Age group | 7 | 1,213.772 | 0.000 |
| NR5 score | 1 | 8.232 | 0.004 |
| Number of visits | 1 | 2.667 | 0.102 |
| Site | 2 | 39.116 | 0.000 |
| Windy weather | 1 | 3.427 | 0.064 |
| Frequency of visits | 2 | 18.560 | 0.000 |

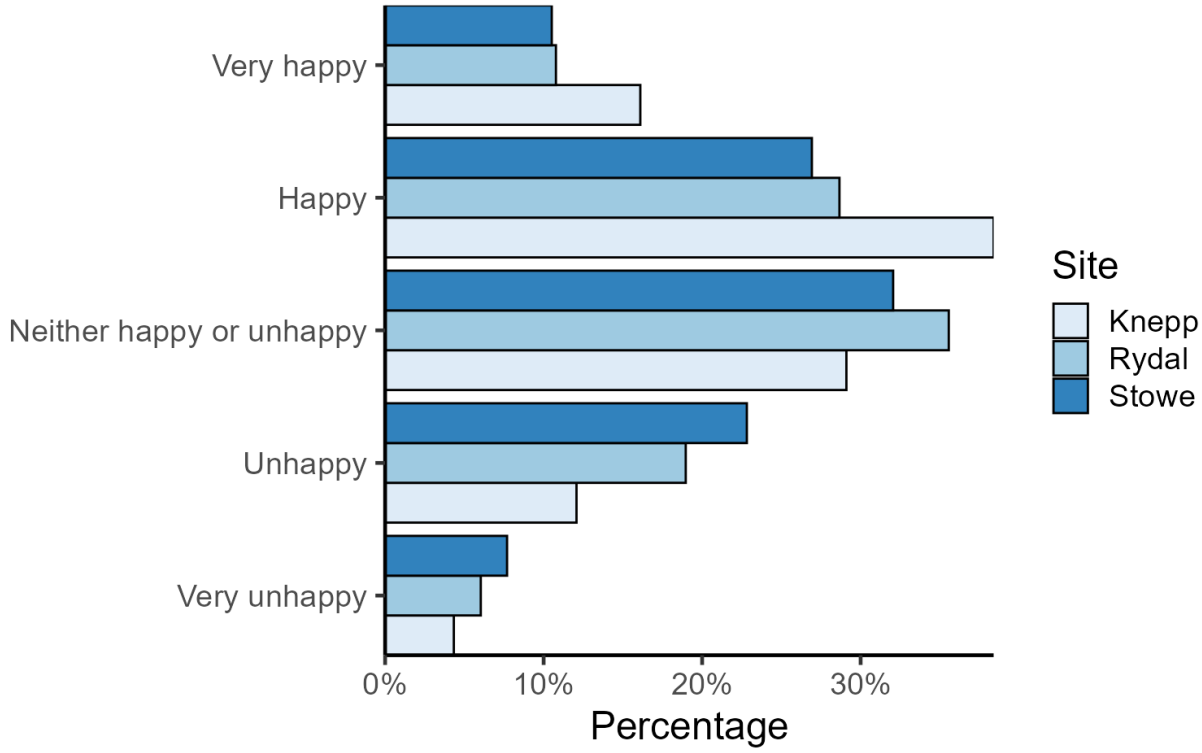



*Figure 9. How respondents feel about the visible dead/decaying tree according to site.*

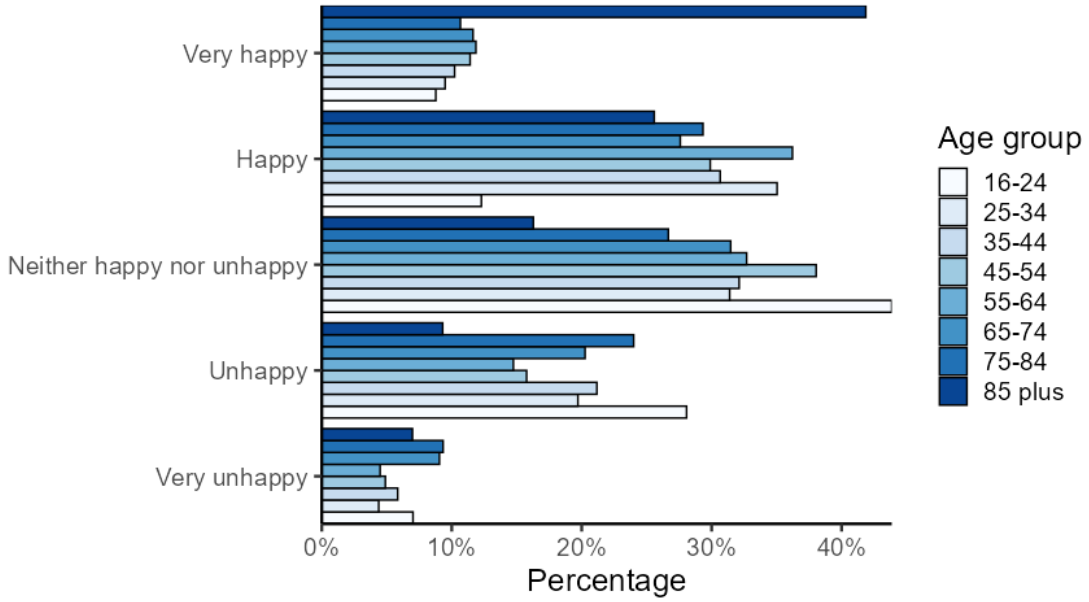



*Figure 10. How respondents feel about the visible dead/decaying tree according to age group.*

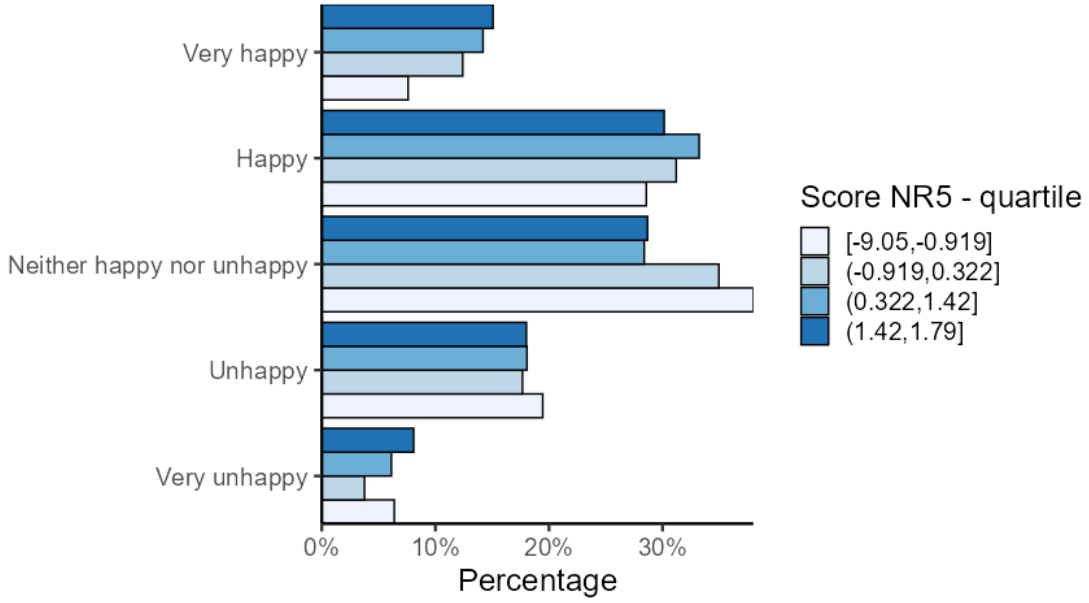



*Figure 11. How respondents feel about the visible dead/decaying tree according to NR5 quartiles. Darker blue bars are associated to higher scores and higher Nature relatedness.*

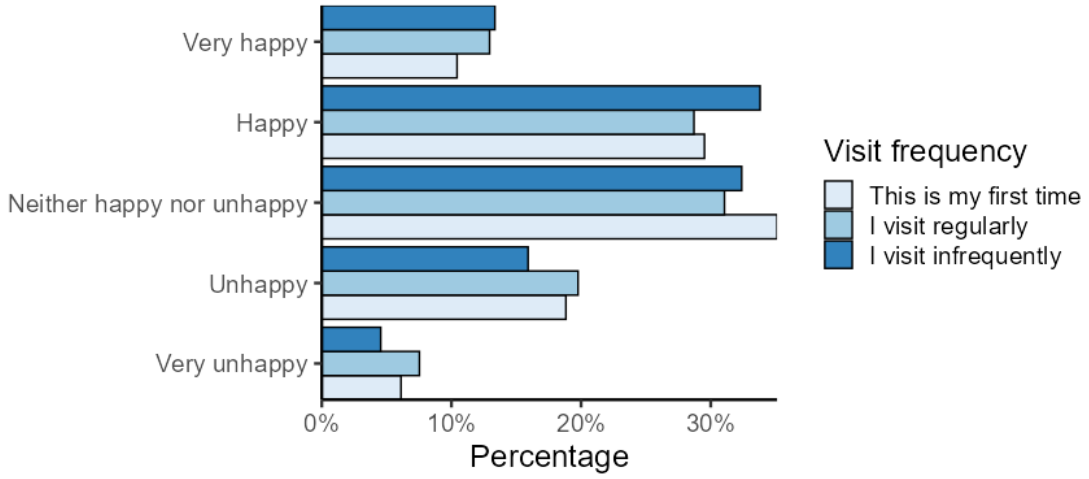



*Figure 12. How respondents feel about the visible dead/decaying tree according to site visit frequency.*

Additional details of the analysis - An ordinal model was fitted to understand factors affecting the response, with socio-demographic variables and site characteristics as covariates. Using a stepwise procedure, we identified the significant covariates. Results show that there are statistically significant differences in the responses according to age group ($p<0.001$), NR5 score ($p=0.004$), site ($p<0.001$) and frequency of visits ($p<0.001$).

## Do visitors think the dead and/or decaying trees should be removed?

The majority of respondents (79.1%) thought that landowners should not remove the tree and 16.1% of respondents thought it depended on the context. Differences between response categories were statistically significant ($\chi$ -squared (n,2) =1131.6, p-value < 0.001). Figure 13 and Table 17.

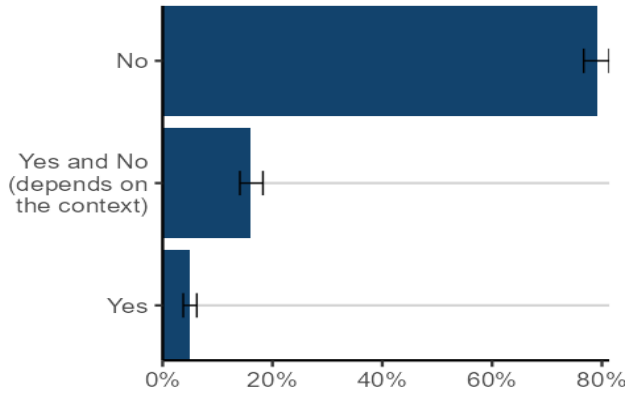



*Figure 13. Response frequency: Do you think the landowner should remove the tree?*

*Table 17. Responses to "Do you think the landowner should remove the trees?"*

| Response | n | % | prop | se | min | max |
|---|---|---|---|---|---|---|
| Yes | 57 | 4.8 | 0.048 | 0.006 | 0.038 | 0.062 |
| No | 931 | 79.1 | 0.791 | 0.012 | 0.767 | 0.813 |
| Yes and No (depends on the context) | 189 | 16.1 | 0.161 | 0.011 | 0.141 | 0.183 |

## Does opinion on whether the landowner should remove the tree vary by demographic or site characteristics?

We looked at whether socio-demographic variables and site characteristics affected whether respondents thought the tree should be removed (Table 18). There are statistically significant differences in the responses according to age group (p=0.002), frequency of visits (p=0.041), NR5 score (p=0.015) and site (p<0.001). Whether they live locally or not was almost significant.

*Table 18. Results from multinomial model.*

| | statistic | df | p.value |
|---|---|---|---|
| Age group | 34.272 | 14 | 0.002 |
| Frequency of site visits | 9.994 | 4 | 0.041 |
| Live locally | 5.102 | 2 | 0.078 |
| NR5 score | 8.347 | 2 | 0.015 |
| Site | 26.980 | 4 | 0.000 |

Figure 14 shows that 'yes' (landowner should remove the tree) respondents had a significantly higher representation of those aged 85+ than other age groups. The largest age group in 'no' respondents is 65-74, and in 'depends on the context' is 25-34. Those saying 'depends on the context' are most likely to be under 44 years old.

Figure 17 shows that Nature Relatedness of the respondent significantly affected whether participants thought the tree should be removed: Those with highest nature relatedness were more likely to say 'no' (with the caveat that all respondents across all NR5 quartiles were mostly likely to say 'no').

Figure 18 shows that visitors to Stowe were more likely to say 'yes' and visitors to Knepp were more likely to say 'no'.

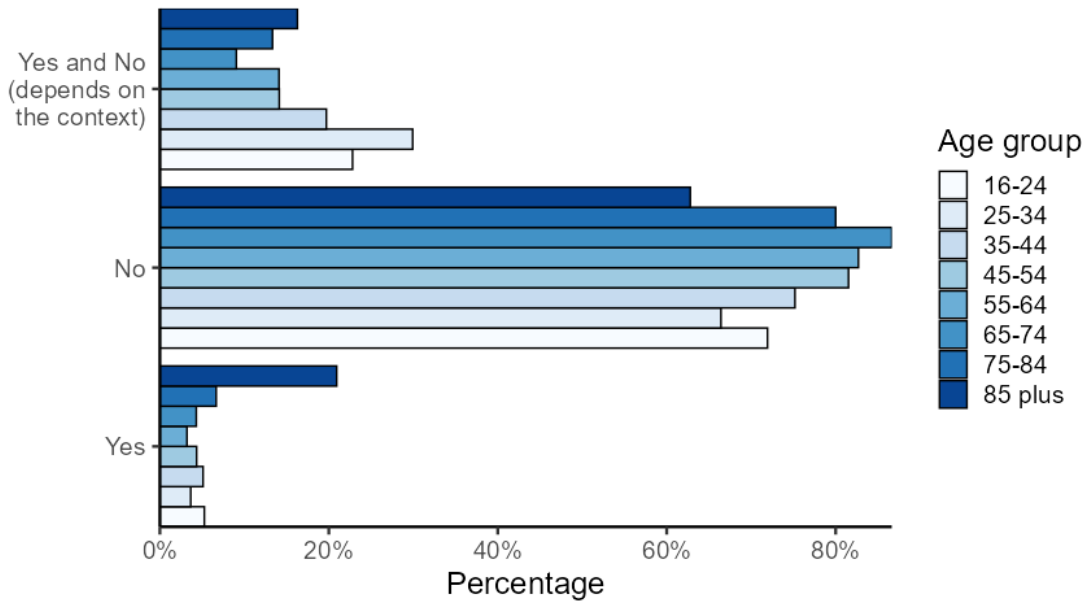



*Figure 14. Opinion on tree removal according to age group.*

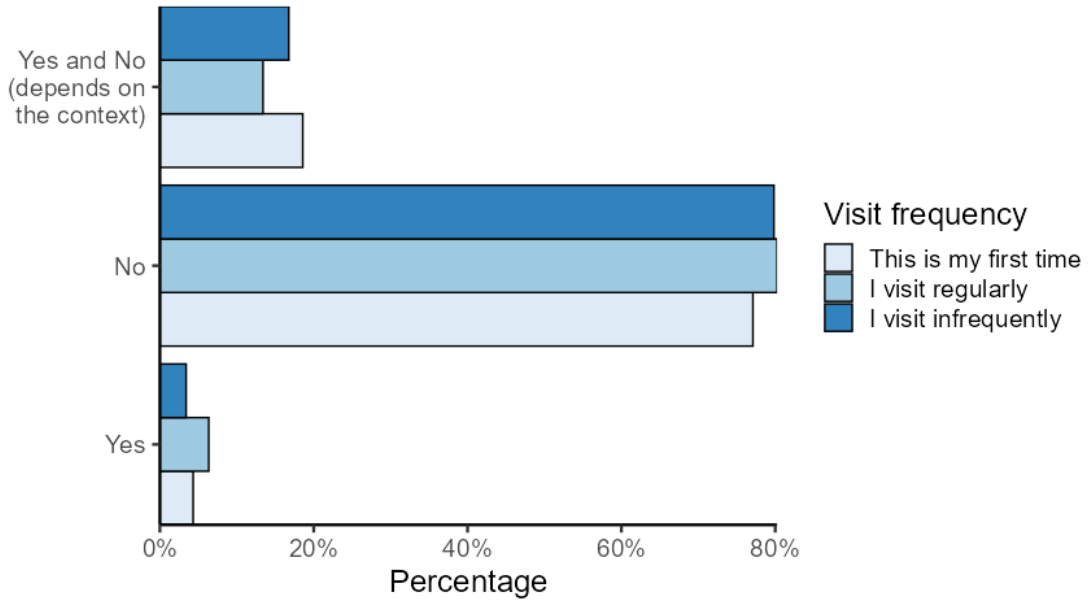



*Figure 15. Opinion on tree removal according to site visit frequency.*

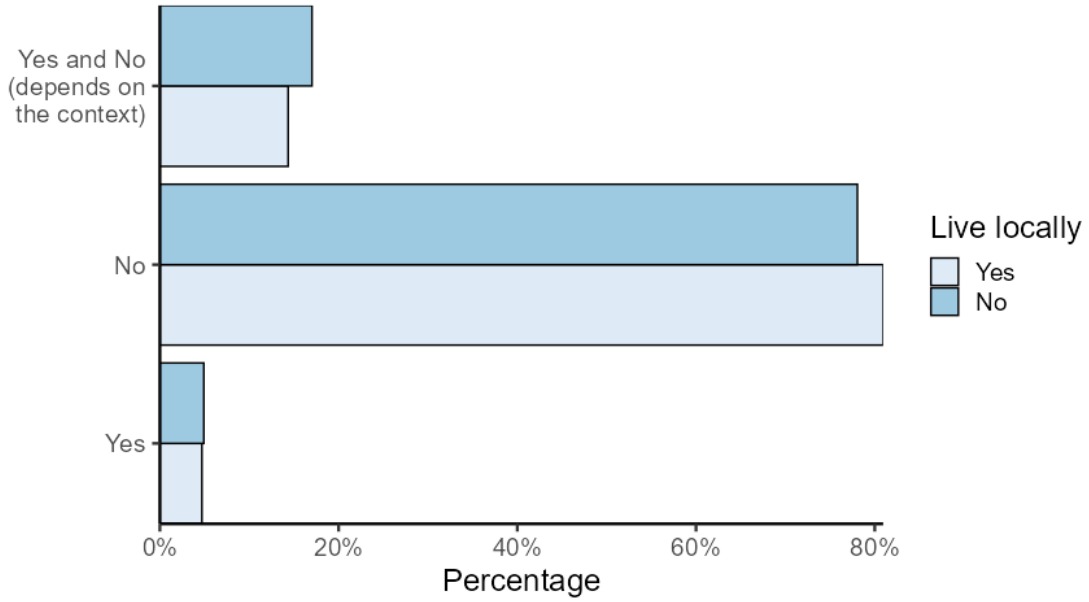



*Figure 16. Opinion on tree removal according to whether they live locally.*

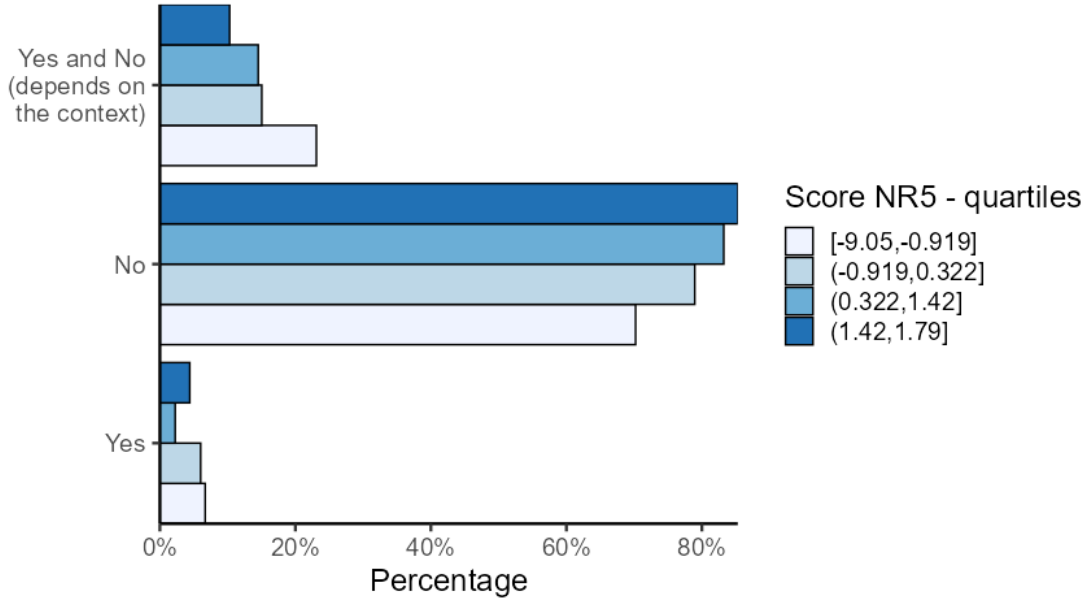



*Figure 17. Opinion on tree removal according to Nature Relatedness score (NR5).*

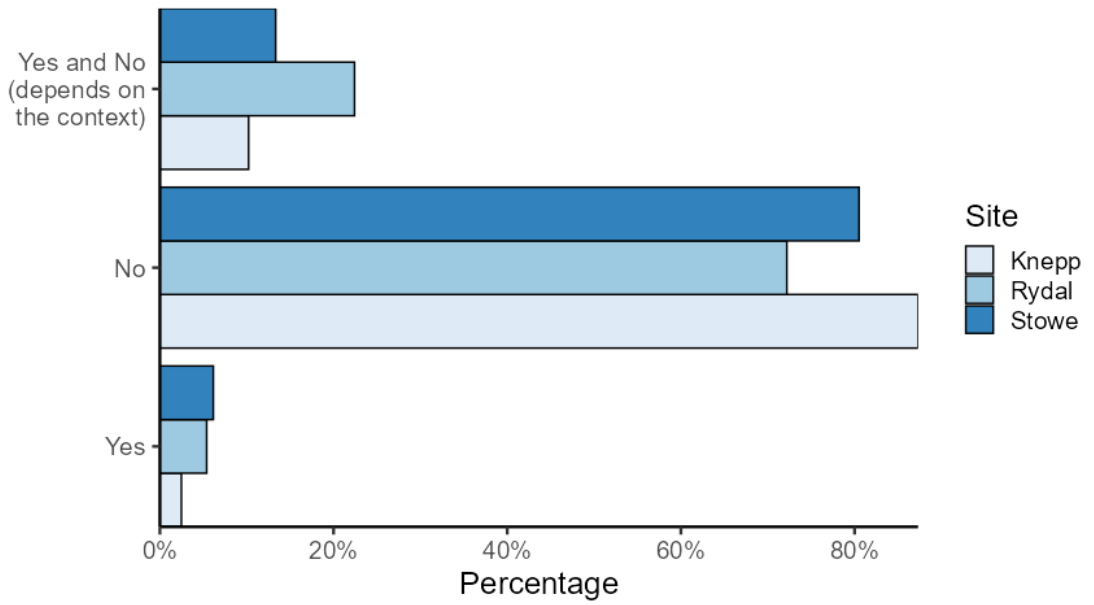



*Figure 18. Opinion on tree removal according to site.*

## Do visitors think more dead and decaying trees should be left in the landscape to decay in place?

62.8% of people think more dead and decaying trees should be left in the landscape to decay in place (statistically significant difference, $\chi$-squared (n,2) = 544.3, p-value < 0.001) (Figure 19, Table 19).

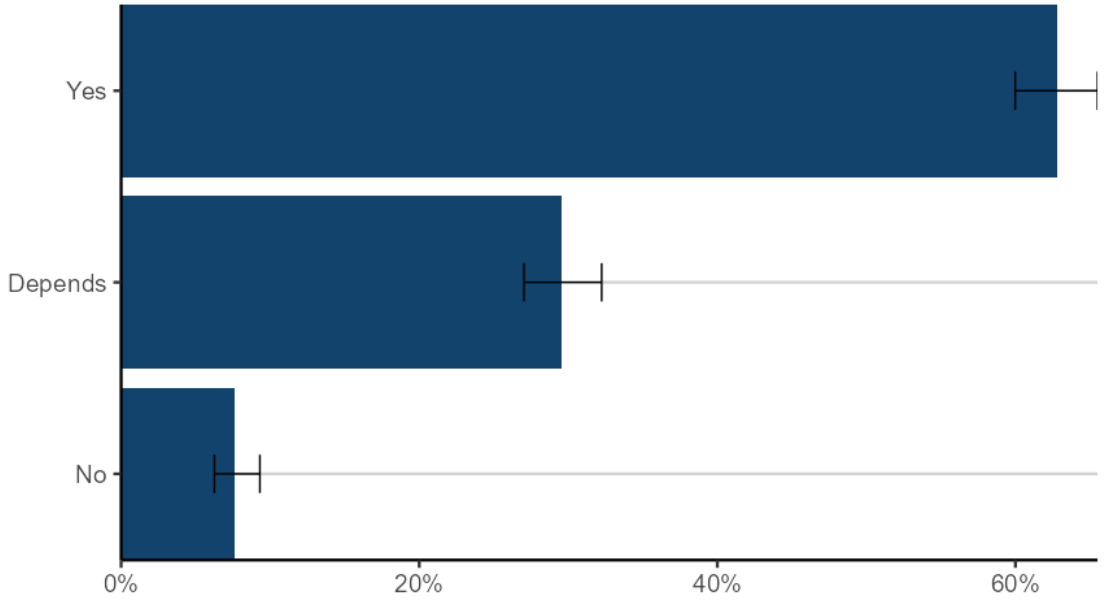



*Figure 19. Do you think more dead and decaying trees should be left in the landscape to decay in place?*

*Table 19. Do you think more dead and decaying trees should be left in the landscape to decay in place? Frequency table.*

| Response | n | % | prop | se | min | max |
|---|---|---|---|---|---|---|
| Yes | 739 | 62.8 | 0.628 | 0.014 | 0.600 | 0.655 |
| No | 90 | 7.6 | 0.076 | 0.008 | 0.063 | 0.093 |
| Depends | 348 | 29.6 | 0.296 | 0.013 | 0.270 | 0.322 |
| *Total* | *1,177* | *100* | | | | |

## Does whether visitors think more dead and decaying trees should be left in the landscape to decay in place vary by socio-demographic and site characteristics?

Age group, gender and nature relatedness affect whether visitors think that more dead and decaying trees should be left in the landscape to decay in place (Table 20).

*Table 20. Results from multinomial model. Variables significantly affecting whether visitors believe more dead and decaying trees should be left in the landscape to decay in place (Q12).*

| term | statistic | df | p.value |
|---|---|---|---|
| Age group | 51.990 | 14 | 0.000 |
| Gender | 16.598 | 6 | 0.011 |
| Score NR5 | 33.157 | 2 | 0.000 |

Those in the 85+ age group are less likely than other age groups to believe more dead and decaying trees should be left in the landscape to decay (Figure 20).

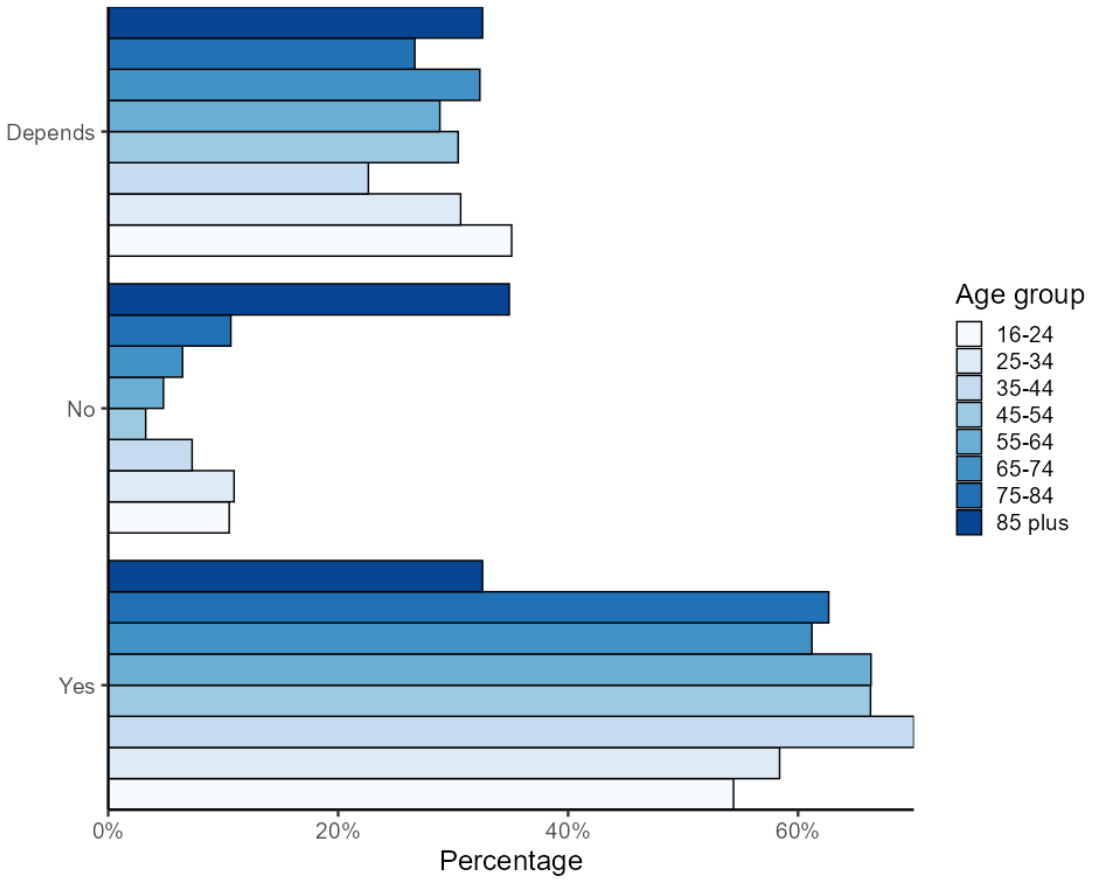



*Figure 20. Do you think more dead and decaying trees should be left in the landscape to decay in place? By age group.*

Females were more likely than males to say that 'it depends' when asked if more dead and decaying trees should be left in the landscape to decay in place (Figure 21).

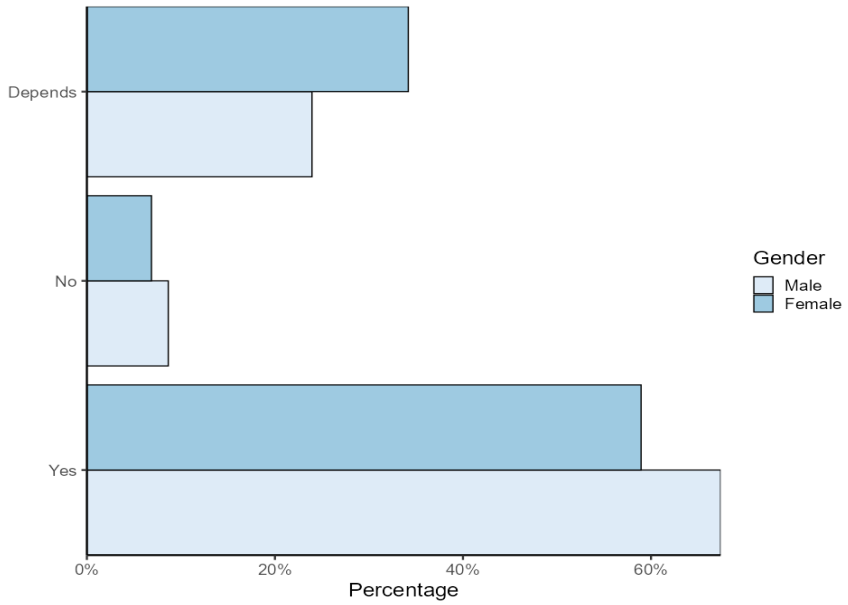



*Figure 21. Do you think more dead and decaying trees should be left in the landscape to decay in place? By Gender.*

Those with a higher nature relatedness score were more likely to agree that more dead and decaying trees should be left in the landscape to decay in place (Figure 22).

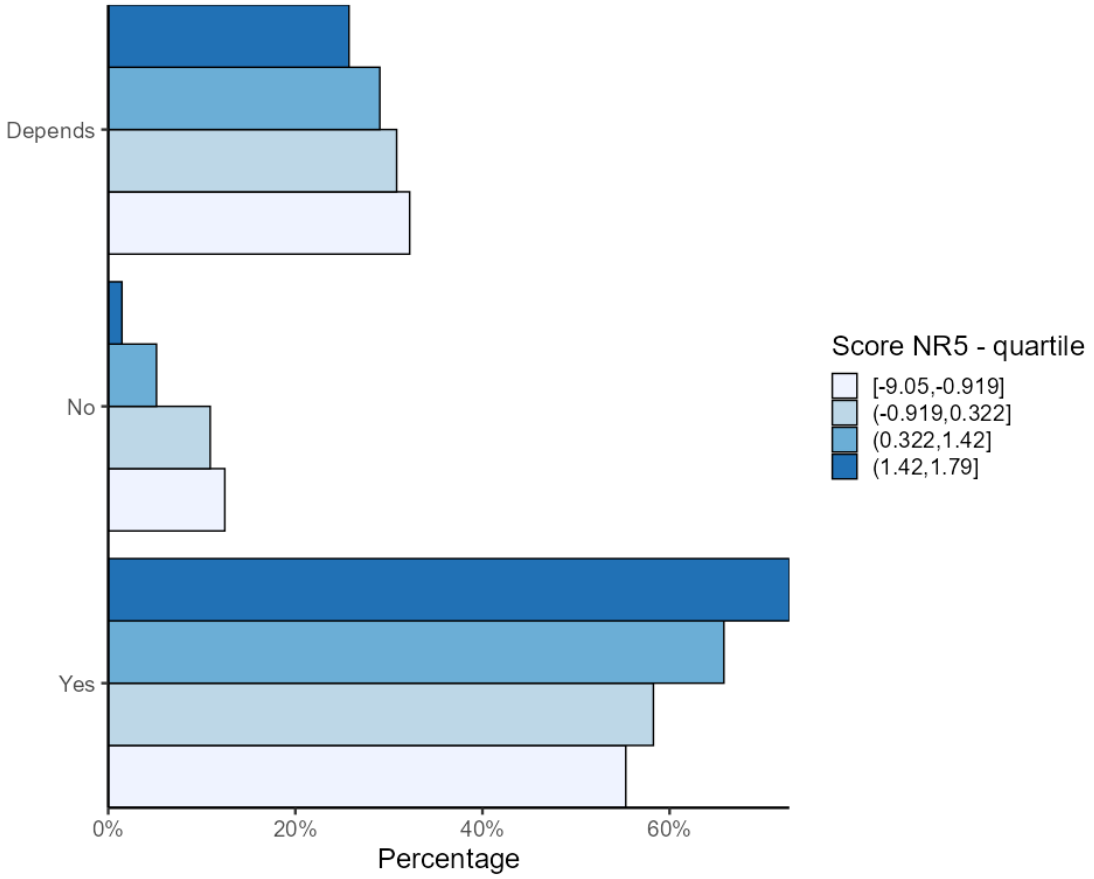



*Figure 22. Do you think more dead and decaying trees should be left in the landscape to decay in place? By NR5 score quartiles.*

## Does the cause of tree death or illness affect how people feel?

Most respondents (77.4%) reported their answer would change depending on the reasons for the tree death/decay. There is a statistically significant difference between responses ($\chi$-squared (n,1) = 353.46, p-value < 0.001).

# What reasons do people give for thinking that the landowner should or should not remove the dead / decaying tree?

Figure 23 and Table 21 show the frequency of responses against reasons for keeping or removing the tree. There were statistically significance differences between categories, ($\chi$ - squared (n,16) =1897.687, p-value < 0.001). 'Biodiversity / wildlife' as a reason was the most commonly cited (as reasons to keep the tree) (41.8%), followed by for 'insects / bugs / invertebrates' (27%) and then more generically for 'nature / natural' reasons (25.4%). Based on the pilot study, we can hypothesize that some of the 'other' reasons (25.1%) included concern about access being blocked. Over ten percent (10.6%) said the reason for their answer 'Depends on reason for the tree death / why the tree is unhealthy'. With regard to reasons to remove the tree, the most frequently cited reason was because it poses 'risk / hazard / safety / danger' (7.7%), followed by because of 'disease / pests' (5.1%).

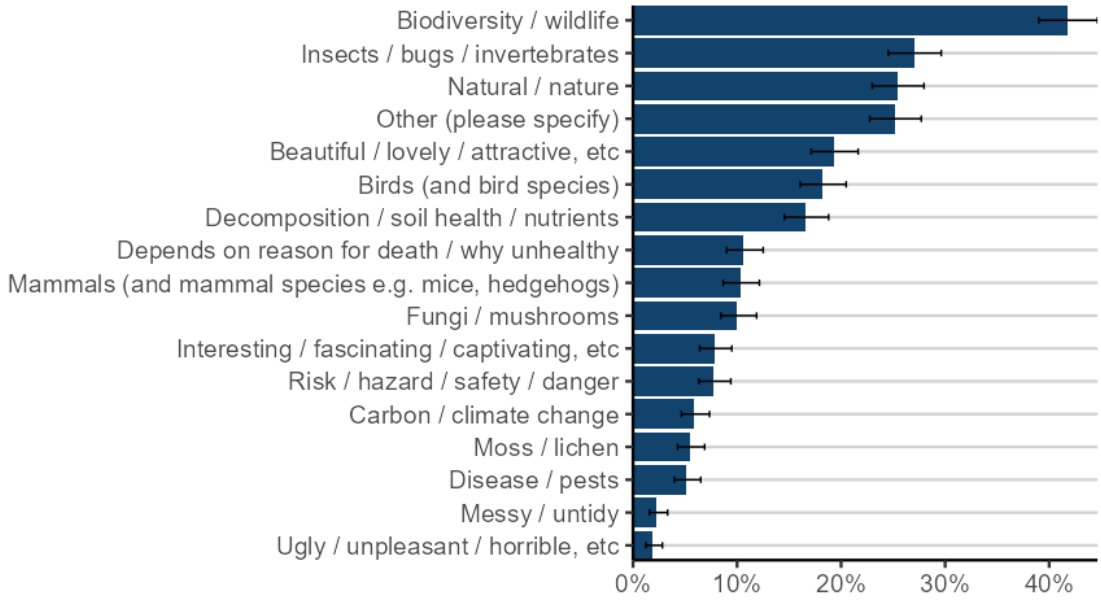



*Figure 23. Why do you say that? [Response to question asking if the landowner should remove the tree]*

*Table 21. Why do you say that? [Response to question asking if the landowner should remove the tree]. Respondents could select multiple options hence % don't sum to 100.*

| Response | n | % | prop | se | min | max |
|---|---|---|---|---|---|---|
| Beautiful / lovely / attractive, etc | 227 | 19.3 | 0.193 | 0.012 | 0.171 | 0.216 |
| Biodiversity / wildlife | 492 | 41.8 | 0.418 | 0.014 | 0.390 | 0.446 |
| Birds (and bird species) | 214 | 18.2 | 0.182 | 0.011 | 0.161 | 0.205 |
| Carbon / climate change | 69 | 5.9 | 0.059 | 0.007 | 0.047 | 0.074 |
| Decomposition / soil health / nutrients | 195 | 16.6 | 0.166 | 0.011 | 0.146 | 0.188 |
| Depends on reason for death / why unhealthy | 125 | 10.6 | 0.106 | 0.009 | 0.090 | 0.125 |
| Disease / pests | 60 | 5.1 | 0.051 | 0.006 | 0.040 | 0.065 |
| Fungi / mushrooms | 118 | 10.0 | 0.100 | 0.009 | 0.084 | 0.119 |
| Insects / bugs / invertebrates | 318 | 27.0 | 0.270 | 0.013 | 0.246 | 0.296 |
| Interesting / fascinating / captivating, etc | 92 | 7.8 | 0.078 | 0.008 | 0.064 | 0.095 |
| Mammals (and mammal species e.g. mice, hedgehogs) | 121 | 10.3 | 0.103 | 0.009 | 0.087 | 0.121 |
| Messy / untidy | 27 | 2.3 | 0.023 | 0.004 | 0.016 | 0.033 |
| Moss / lichen | 64 | 5.4 | 0.054 | 0.007 | 0.043 | 0.069 |
| Natural / nature | 299 | 25.4 | 0.254 | 0.013 | 0.230 | 0.280 |
| Risk / hazard / safety / danger | 91 | 7.7 | 0.077 | 0.008 | 0.063 | 0.094 |
| Ugly / unpleasant / horrible, etc | 22 | 1.9 | 0.019 | 0.004 | 0.012 | 0.028 |
| Other (please specify) | 296 | 25.1 | 0.251 | 0.013 | 0.228 | 0.277 |

To assess whether categories were more frequent, a Q-Cochran test was conducted. There were statistically significance differences between categories, ($\chi$ -squared (n,16) =1897.687, p-value < 0.001), being Biodiversity/ wildlife the most frequent with 41.8%.

## Do reasons cited for whether the landowner should remove the tree vary by demographic or site characteristics?

We looked at whether socio-demographic variables and site characteristics affected the reasons respondents thought the tree should be removed. There are statistically significant differences according to statement, age group, frequency of visits to site, and NR5 score (all p<0.001) (Table 22). The significant interaction shows that the effect of reason on the response is different for different age groups and for frequency of visits to site.

*Table 22. Results from GLMM binomial model testing effect of socio-demographic variables and site characteristics on reasons given for keeping/removing tree. * Denotes interaction.*

| | statistic | df | p.value |
|---|---|---|---|
| Reason | 1,242.2361 | 15 | 0.0000 |
| Age group | 23.6162 | 7 | 0.0013 |
| Frequency of visits to site | 8.0265 | 1 | 0.0046 |
| NR5 score | 7.3071 | 1 | 0.0069 |
| Reason* Age group | 186.3867 | 105 | 0.0000 |
| Reason* Frequency of visits to site | 32.1733 | 15 | 0.0061 |

Figure 24Figure 25Figure 26 show how the different reasons given vary by age group, frequency of visit to site and Nature Relatedness (NR5) score quartiles.

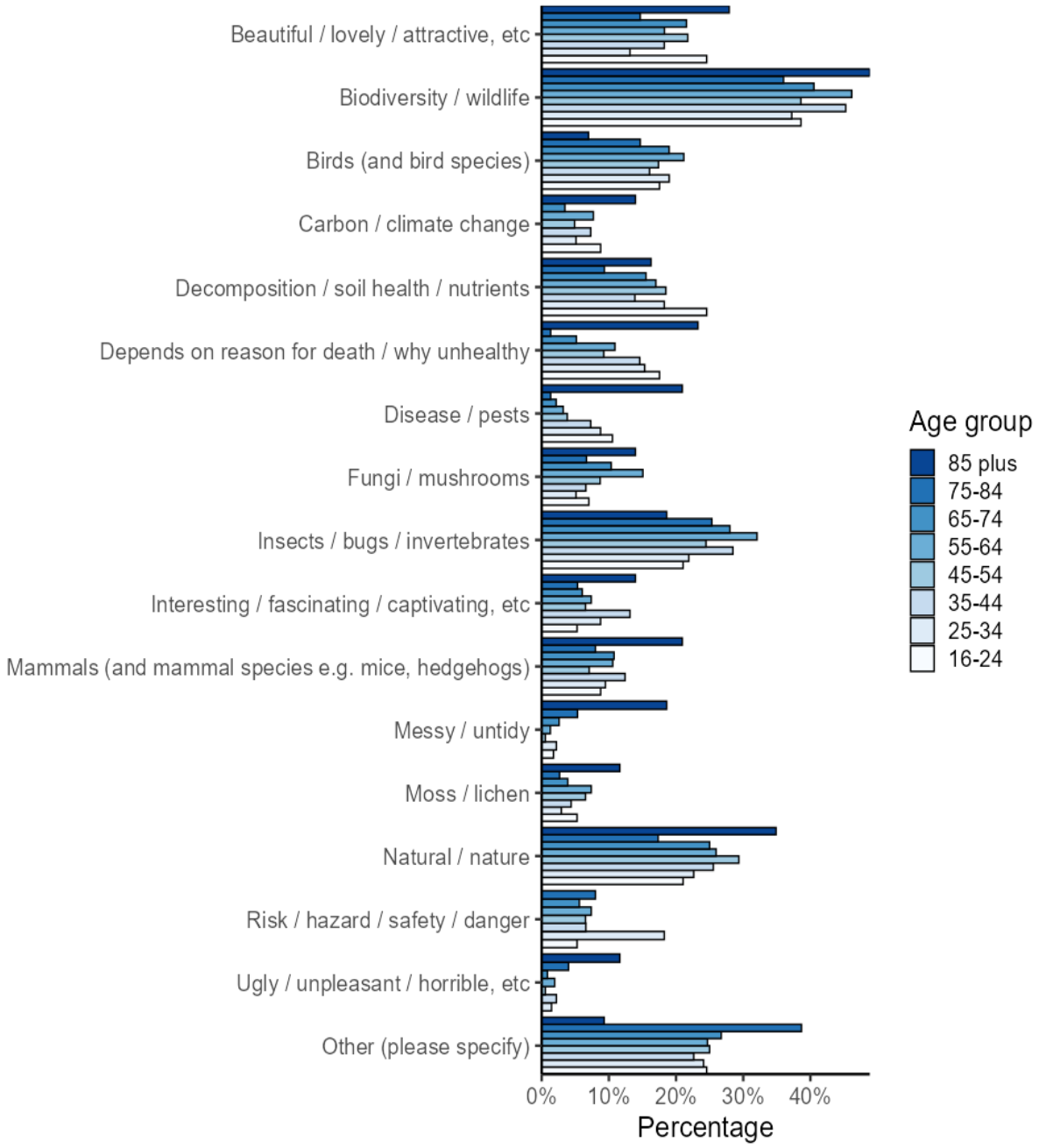



*Figure 24. Why do you say that? [Response to question asking if the landowner should remove the tree.] By age group.*

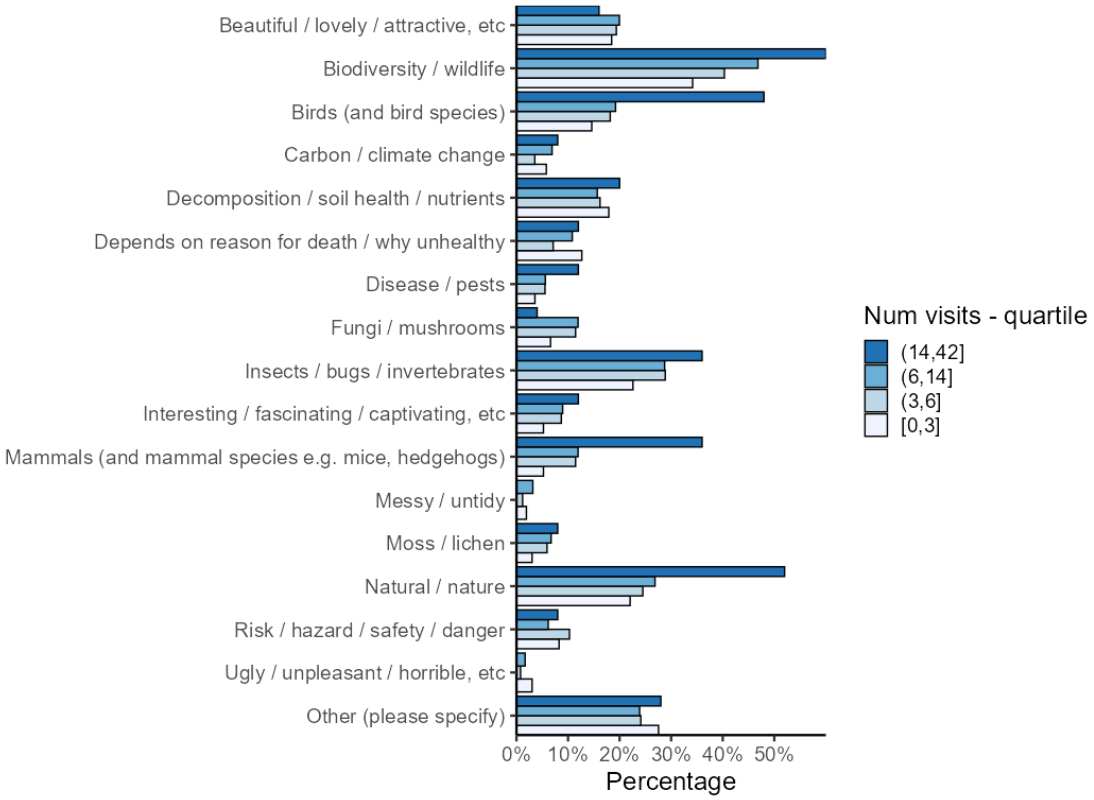



*Figure 25. Why do you say that? [Response to question asking if the landowner should remove the tree.] By frequency of visit to site.*

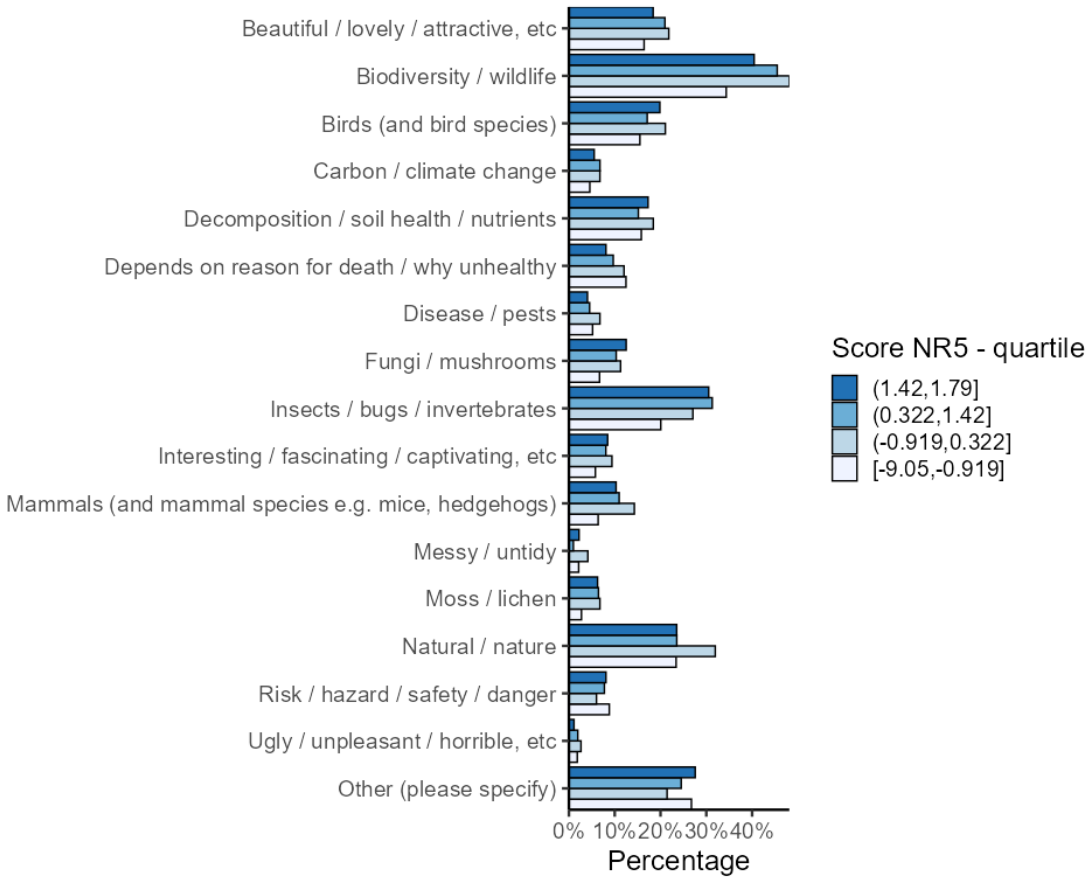



*Figure 26. Why do you say that? [Response to question asking if the landowner should remove the tree.] By Nature Relatedness (NR5) score quartiles.*

## Generally, how do people respond to the idea of dead/dying trees in the landscape?

Figure 27and Table 23 illustrate responses to the question 'What comes to mind if I say the words dead and decaying trees?'

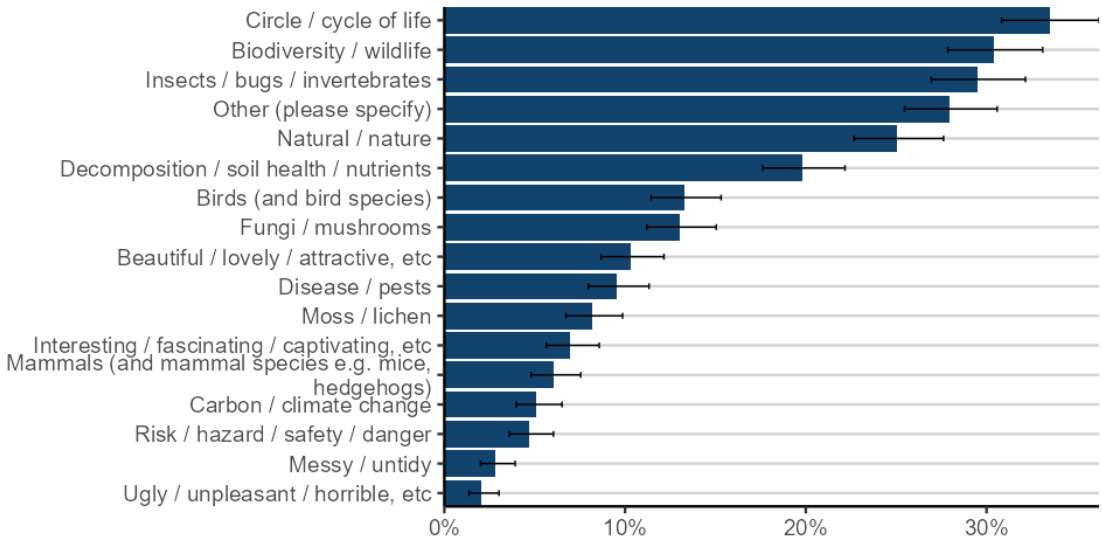



*Figure 27. Response frequency: What comes to mind if I say the words dead and decaying trees?*

*Table 23. What comes to mind if I say the words dead and decaying trees? Respondents could select multiple options hence % don't add to 100.*

| Response | n | % | prop | se | min | max |
|---|---|---|---|---|---|---|
| Beautiful / lovely / attractive, etc | 121 | 10.3 | 0.103 | 0.009 | 0.087 | 0.121 |
| Biodiversity / wildlife | 358 | 30.4 | 0.304 | 0.013 | 0.279 | 0.331 |
| Birds (and bird species) | 156 | 13.3 | 0.133 | 0.010 | 0.114 | 0.153 |
| Carbon / climate change | 60 | 5.1 | 0.051 | 0.006 | 0.040 | 0.065 |
| Circle / cycle of life | 394 | 33.5 | 0.335 | 0.014 | 0.308 | 0.362 |
| Decomposition / soil health / nutrients | 233 | 19.8 | 0.198 | 0.012 | 0.176 | 0.222 |
| Disease / pests | 112 | 9.5 | 0.095 | 0.009 | 0.080 | 0.113 |
| Fungi / mushrooms | 153 | 13.0 | 0.130 | 0.010 | 0.112 | 0.150 |
| Insects / bugs / invertebrates | 347 | 29.5 | 0.295 | 0.013 | 0.269 | 0.322 |
| Interesting / fascinating / captivating, etc | 82 | 7.0 | 0.070 | 0.007 | 0.056 | 0.086 |
| Mammals (and mammal species e.g. mice, hedgehogs) | 71 | 6.0 | 0.060 | 0.007 | 0.048 | 0.075 |
| Messy / untidy | 33 | 2.8 | 0.028 | 0.005 | 0.020 | 0.039 |
| Moss / lichen | 96 | 8.2 | 0.082 | 0.008 | 0.067 | 0.099 |
| Natural / nature | 295 | 25.1 | 0.251 | 0.013 | 0.227 | 0.276 |
| Risk / hazard / safety / danger | 55 | 4.7 | 0.047 | 0.006 | 0.036 | 0.060 |
| Ugly / unpleasant / horrible, etc | 24 | 2.0 | 0.020 | 0.004 | 0.014 | 0.030 |
| Other (please specify) | 329 | 28.0 | 0.280 | 0.013 | 0.255 | 0.306 |

## Do responses to the question ‘What comes to mind if I say the words dead and decaying trees?’ vary by socio-demographic or site characteristics?

We looked at whether socio-demographic variables and site characteristics affected responses to the question ‘What comes to mind if I say the words dead and decaying trees?’. There are statistically significant differences according to statement, age group and NR5 score ($p<0.001$) (Table 24). Effect of frequency of visits to site is nearly significant. The significant interaction shows that the effect of reason on the response is different for different age groups, for frequency of visits to site, and NR5 score.

*Table 24. Results from GLMM binomial model. * denotes interaction.*

| | statistic | df | p.value |
|---|---|---|---|
| Statement | 1,175.5903 | 15 | 0.0000 |
| Age group | 39.5319 | 7 | 0.0000 |
| Frequency of visits to site | 3.1372 | 1 | 0.0765 |
| NR5 score | 8.0437 | 1 | 0.0046 |
| Statement* Age group | 168.3171 | 105 | 0.0001 |
| Statement* Number of visits | 35.9272 | 15 | 0.0018 |
| Statement * NR5 score | 36.0700 | 15 | 0.0017 |

Figure 28, Figure 29 and Figure 30 show how the different reasons given vary by age group, frequency of visit to site and Nature Relatedness (NR5) score quartiles.

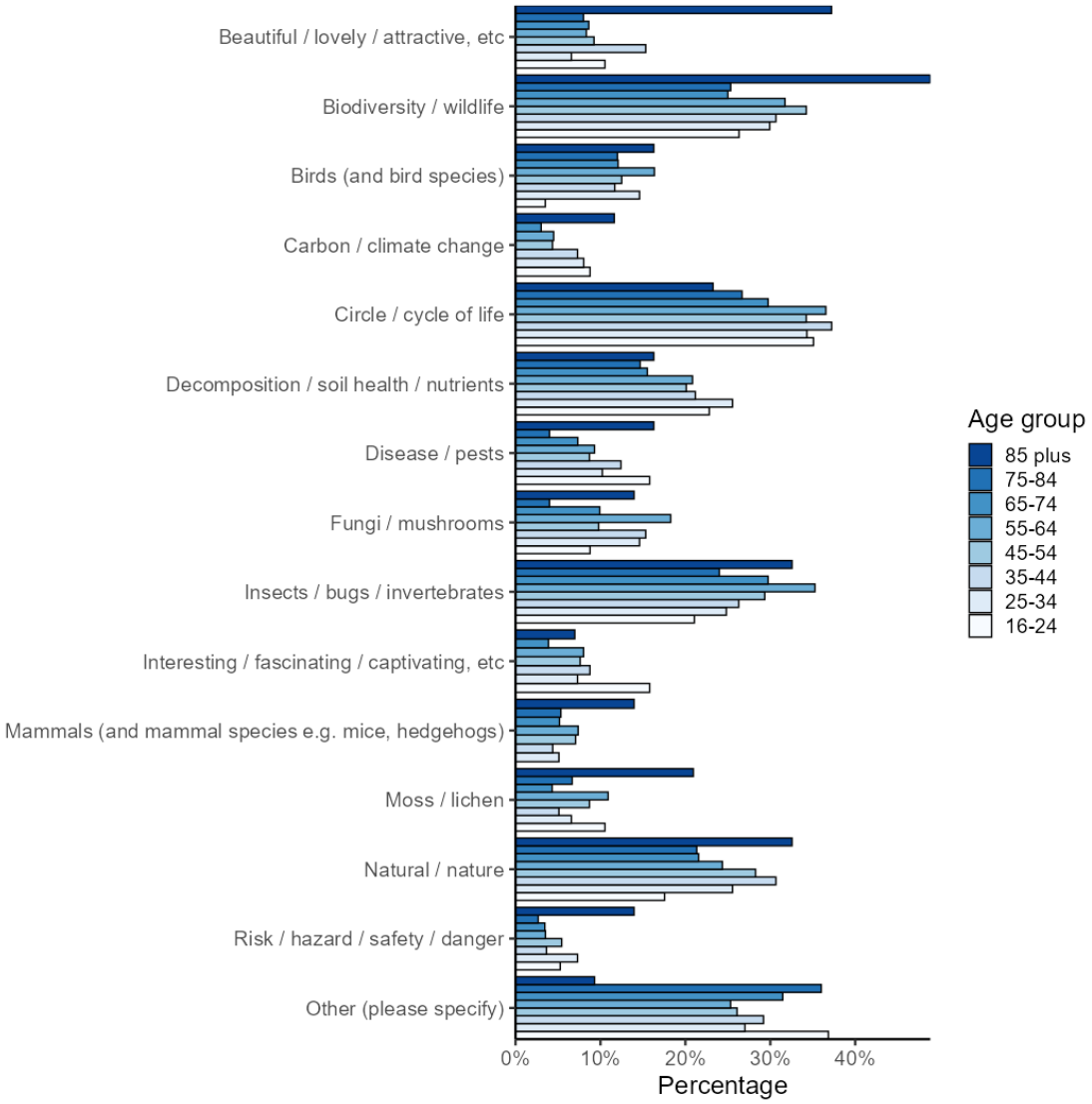



*Figure 28. What comes to mind if I say the words dead and decaying trees? By age group.*

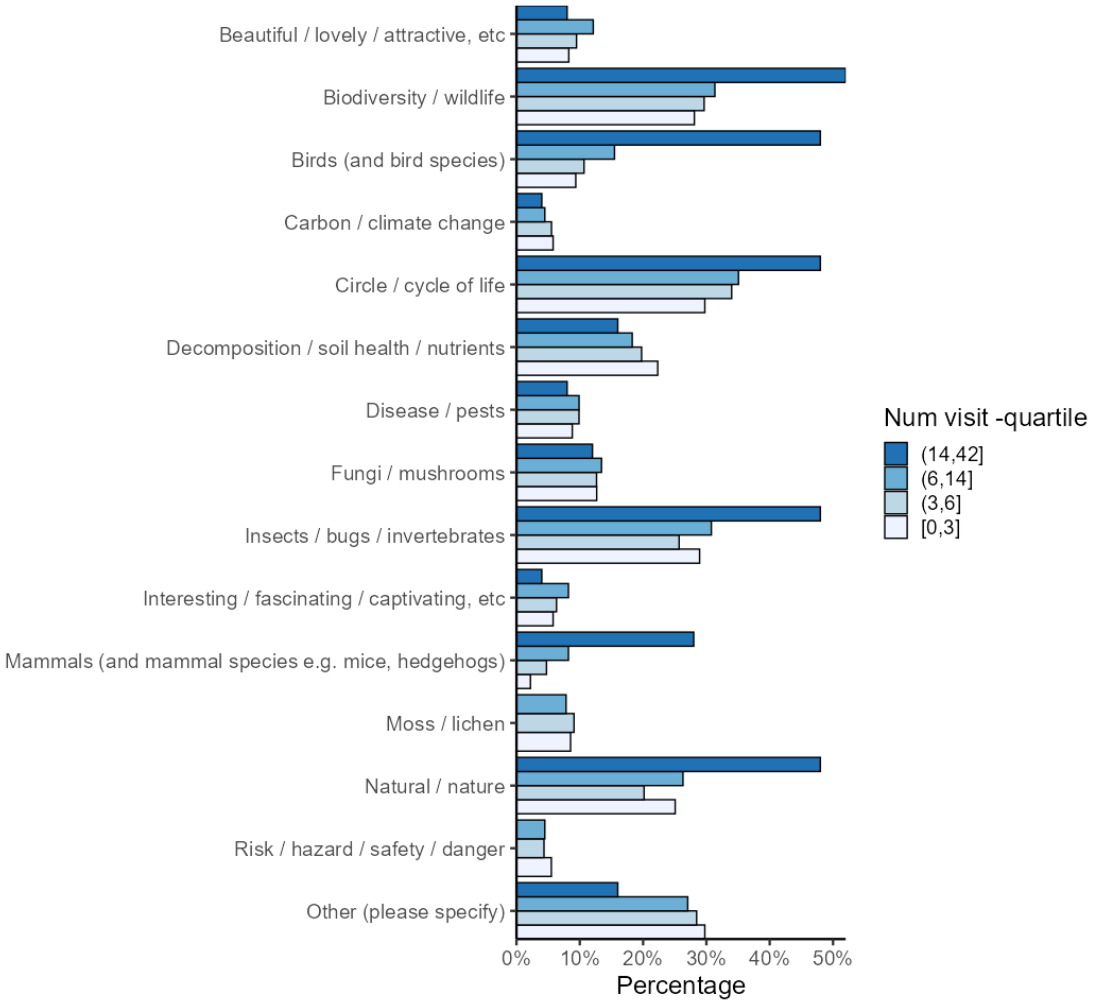



*Figure 29. What comes to mind if I say the words dead and decaying trees? By frequency of visits to site.*

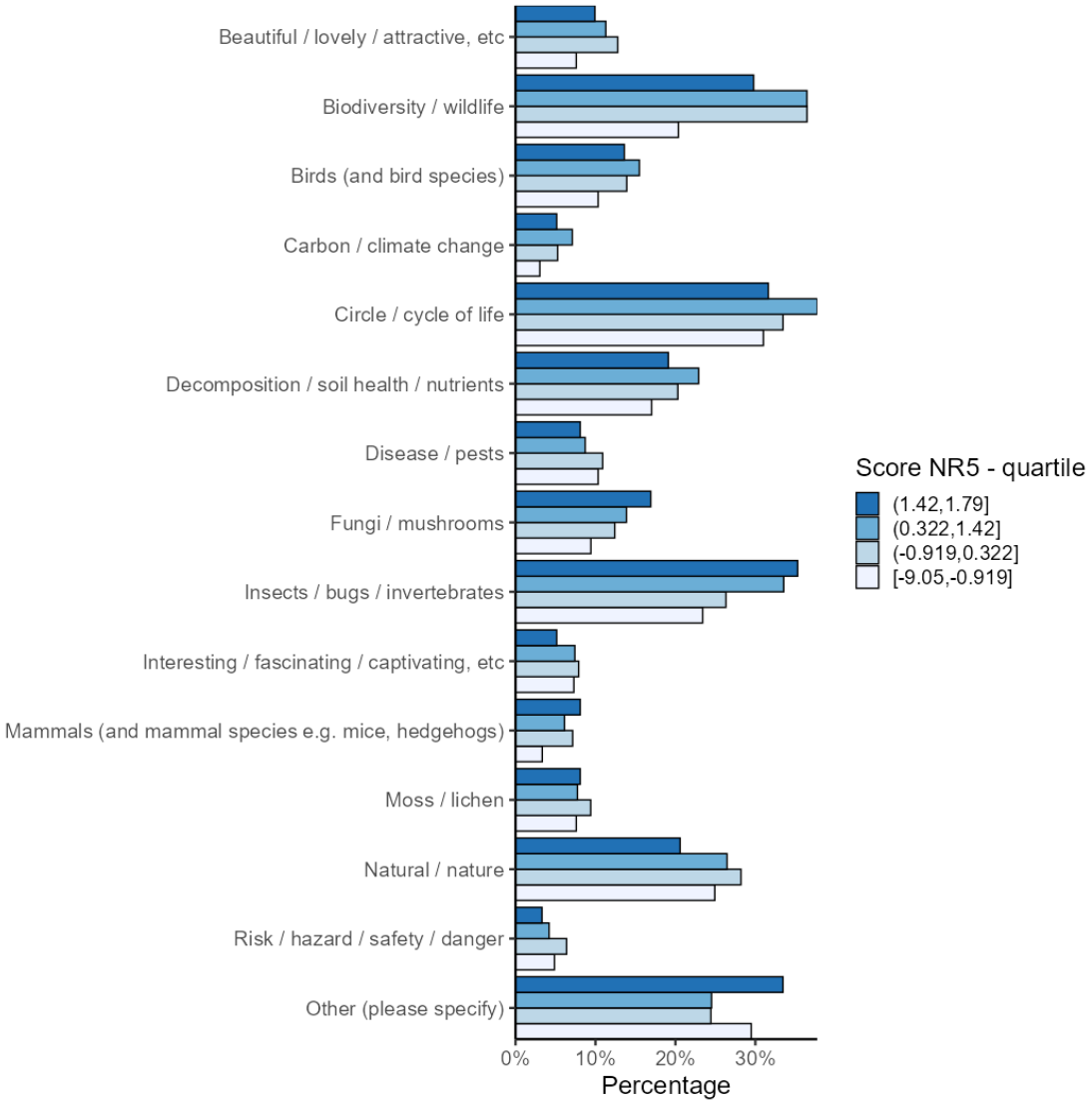



*Figure 30. What comes to mind if I say the words dead and decaying trees? By NR5 score quartiles.*

## Do visitors notice dead wood, dead trees and decaying trees in the landscape?

90.1% of respondents notice dead wood, dead trees and decaying trees in the landscape (9.9% don't) (statistically significant difference, $\chi$-squared (n,1) = 758.73, p-value < 0.001).

### Do socio-demographic or site characteristics affect whether visitors notice dead wood, dead trees and decaying trees in the landscape?

There are statistically significant differences in responses to "Do you notice dead wood, dead trees and decaying trees in the landscape?" according to age group ($p<0.001$) and frequency of visits to site ($p=0.033$) (Table 25).

*Table 25. Results from binomial model. Responses to "Do you notice dead wood, dead trees and decaying trees in the landscape?"*

| | statistic | df | p.value |
|---|---|---|---|
| Age group | 74.508 | 7 | 0.000 |
| Frequency of visits to site | 4.542 | 1 | 0.033 |

**Error! Reference source not found.**Figure 32 show how the different reasons given vary by age group and frequency of visit to site (quartiles).

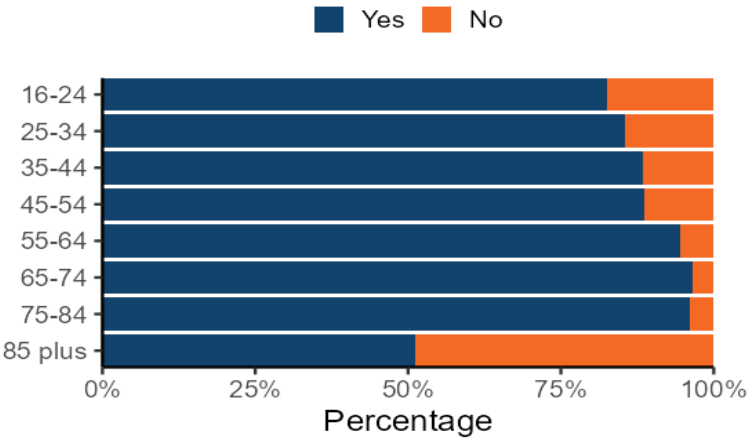



*Figure 31. Do you notice dead wood, dead trees and decaying trees in the landscape? By age group.*

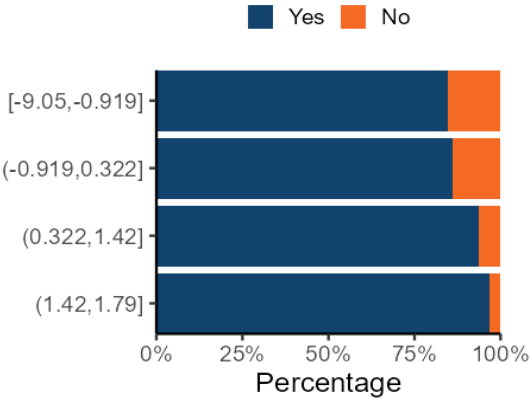



*Figure 32. Do you notice dead wood, dead trees and decaying trees in the landscape? By number of visits – quartiles*

## What do visitors notice dead wood, dead trees and decaying trees in the landscape?

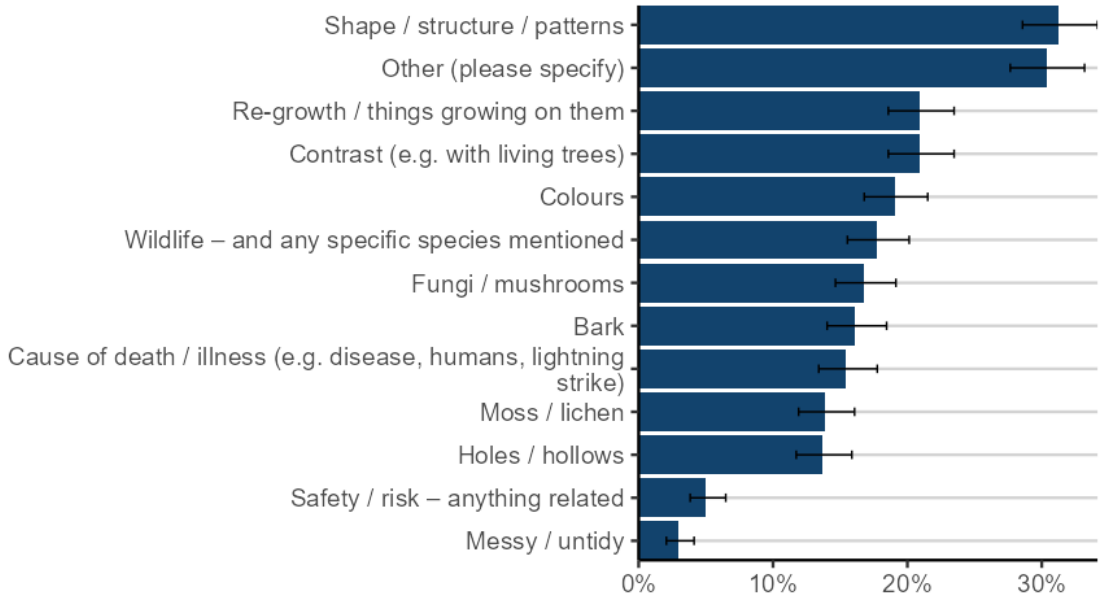



*Figure 33. What do you notice [about dead wood, dead trees and decaying trees in the landscape]? (n=1,061)*

*Table 26. What do you notice [about dead wood, dead trees and decaying trees in the landscape]? (n=1,061)*

| Response | n | total | prop | se | min | max |
|---|---|---|---|---|---|---|
| Bark | 171 | 1,061 | 0.161 | 0.011 | 0.140 | 0.185 |
| Cause of death / illness (e.g. disease, humans, lightning strike) | 164 | 1,061 | 0.155 | 0.011 | 0.134 | 0.178 |
| Colours | 202 | 1,061 | 0.190 | 0.012 | 0.168 | 0.215 |
| Contrast (e.g. with living trees) | 222 | 1,061 | 0.209 | 0.012 | 0.186 | 0.235 |
| Fungi / mushrooms | 178 | 1,061 | 0.168 | 0.011 | 0.146 | 0.191 |
| Holes / hollows | 145 | 1,061 | 0.137 | 0.011 | 0.117 | 0.159 |
| Messy / untidy | 31 | 1,061 | 0.029 | 0.005 | 0.021 | 0.041 |
| Moss / lichen | 147 | 1,061 | 0.139 | 0.011 | 0.119 | 0.161 |
| Re-growth / things growing on them | 222 | 1,061 | 0.209 | 0.012 | 0.186 | 0.235 |
| Safety / risk – anything related | 53 | 1,061 | 0.050 | 0.007 | 0.038 | 0.065 |
| Shape / structure / patterns | 332 | 1,061 | 0.313 | 0.014 | 0.286 | 0.341 |
| Wildlife – and any specific species mentioned | 188 | 1,061 | 0.177 | 0.012 | 0.155 | 0.201 |
| Other (please specify) | 322 | 1,061 | 0.303 | 0.014 | 0.277 | 0.332 |

There are statistically significant differences in the responses *(Cochran's Q test, T (11) = 505.1793, p-value < 0.001)*.

## How does what visitors notice about dead wood, dead trees and decaying trees in the landscape vary by socio-demographic and site characteristics?

There are statistically significant differences in what respondents notice about dead wood, dead trees and decaying trees in the landscape according to age group (p=0.0248), NR5 score (p=0.0208) (Table 27). There are also significant interactions between what is noticed and the age group and what is noticed and the NR5 score.

*Table 27. Results from GLMM binomial model.*

| term | statistic | df | p.value |
|---|---|---|---|
| statement | 255.3233 | 10 | 0.0000 |
| age_group_recoded | 16.0369 | 7 | 0.0248 |
| score_nr5_pca | 5.3425 | 1 | 0.0208 |
| statement:age_group_recoded | 102.3885 | 70 | 0.0070 |
| statement:score_nr5_pca | 26.9698 | 10 | 0.0026 |

Figure 34Figure 35 show how what is noticed vary by age group and NR5 score.

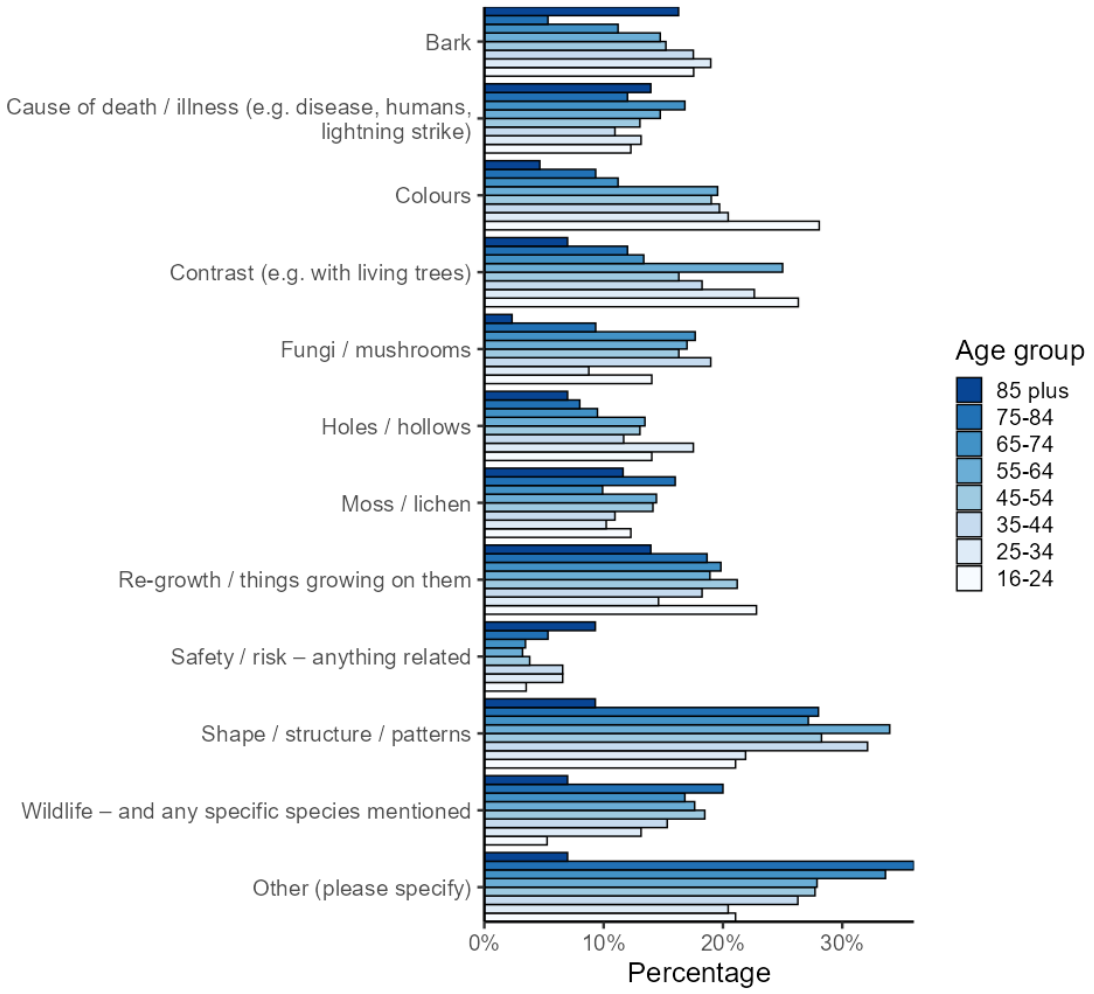



*Figure 34. What do they notice [about dead wood, dead trees and decaying trees in the landscape]? By age group.*

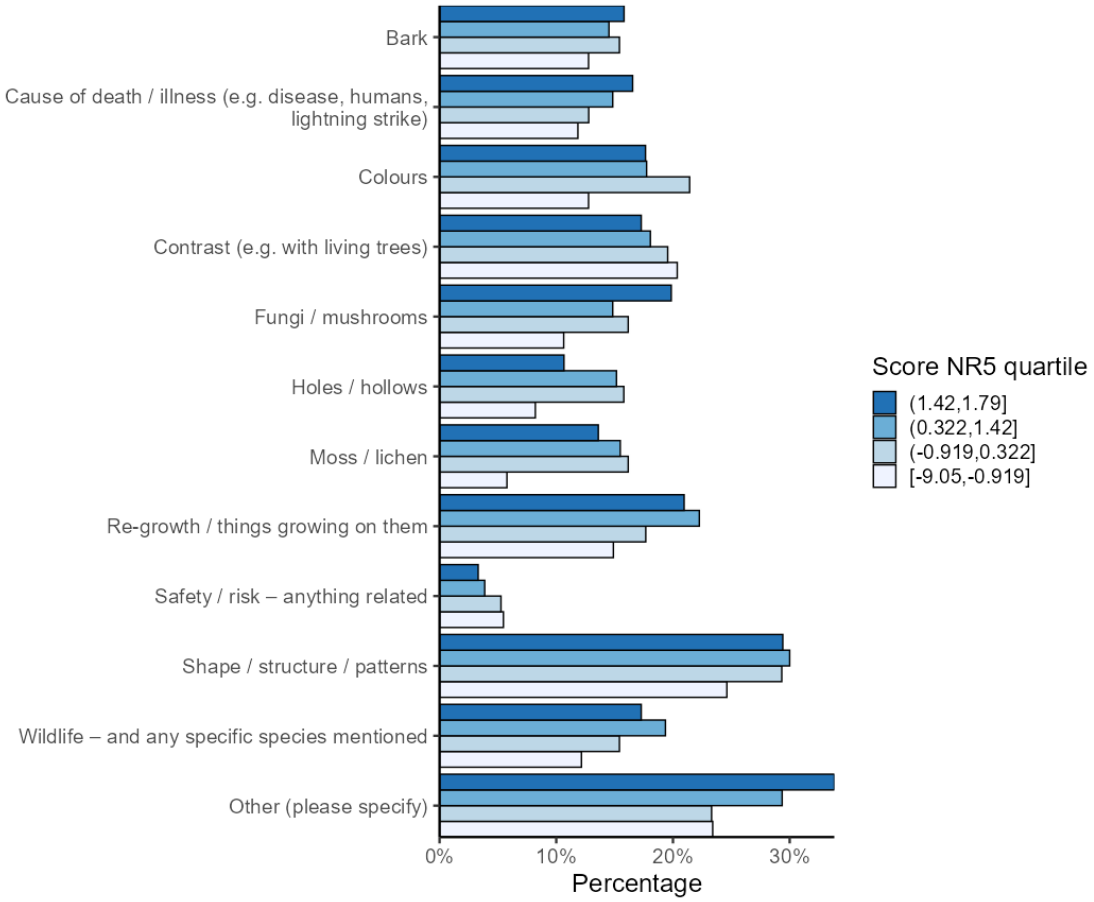



*Figure 35. What do they notice [about dead wood, dead trees and decaying trees in the landscape]? By NR5 score.*

## Do people value dead/dying trees differently to trees/woods more generally?

We asked respondents to score how highly they valued (or did not value) dead and decaying trees in the landscape against 5 statements (Table 28). We compared the scores with the scores of participants who were asked the same questions but in relation to trees and woodlands generally (O'Brien et al, 2024). Comparisons across the two datasets must be considered carefully given the different aims, sample sizes and data gathering modes. However, there is some indication that dead and dying trees are valued less overall (there are statistically significant differences between total scores (Wilcoxon rank sum test, W = 89160, p-value < 0.001).)

*Table 28. Value statements.*

| | |
|---|---|
| 1 | I value dead and decaying trees because of their importance for wildlife |
| 2 | I value dead and decaying trees because they are good for my mental wellbeing |
| 3 | I value dead and decaying trees because they make me feel creative and inspired |
| 4 | I value dead and decaying trees because they can help me learn more about nature |
| 5 | I value dead and decaying trees because they provide places to spend time with friends and family (e.g. to sit on, climb, play around) |

Figure 36 shows how the value scores varied for each statement (dead and dying trees vs trees and woodlands in general). The main differences are that people are more likely to strongly agree that trees and woodlands generally are important for wildlife, for their mental wellbeing and providing places to spend time with their friends and family (compared to dead and dying trees). Both types of trees/treescapes scored similarly in relation to helping people feel creative and inspired and to learn more about nature.

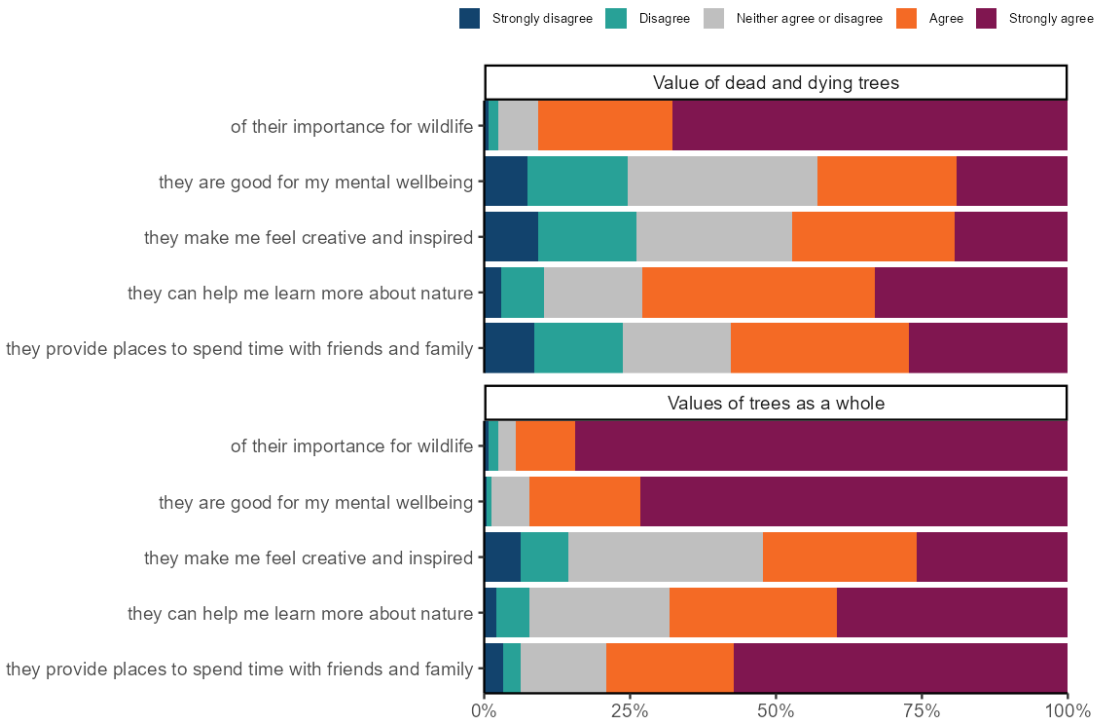



*Figure 36. Comparison on statements regarding dead and decaying trees (top) vs. trees and woodlands generally (bottom).*

## Do socio-demographic variables and site characteristics affect how people value dead and dying trees?

To assess whether there were differences in how dead and decaying trees were valued by covariates, we defined a dummy variable which took the value of 1 if the respondent scored 'Agree' or 'Strongly agree'.

*Table 29. Results from GLMM binomial model. * denotes interaction.*

| | statistic | df | p.value |
|---|---|---|---|
| statement | 791.513 | 4 | 0.000 |
| Age group | 14.908 | 7 | 0.037 |
| Gender | 6.417 | 1 | 0.011 |
| NR5 score | 108.874 | 1 | 0.000 |
| Statement * Age group | 45.166 | 28 | 0.021 |
| Statement * Gender | 8.797 | 4 | 0.066 |
| Statement * NR5 score | 11.912 | 4 | 0.018 |

Age, gender and nature relatedness score all influenced the overall value respondents placed on dead and decaying trees. How this varied depended on the statement. Females were more positive overall (Figure 38) as were those with higher nature relatedness scores (Figure 39).

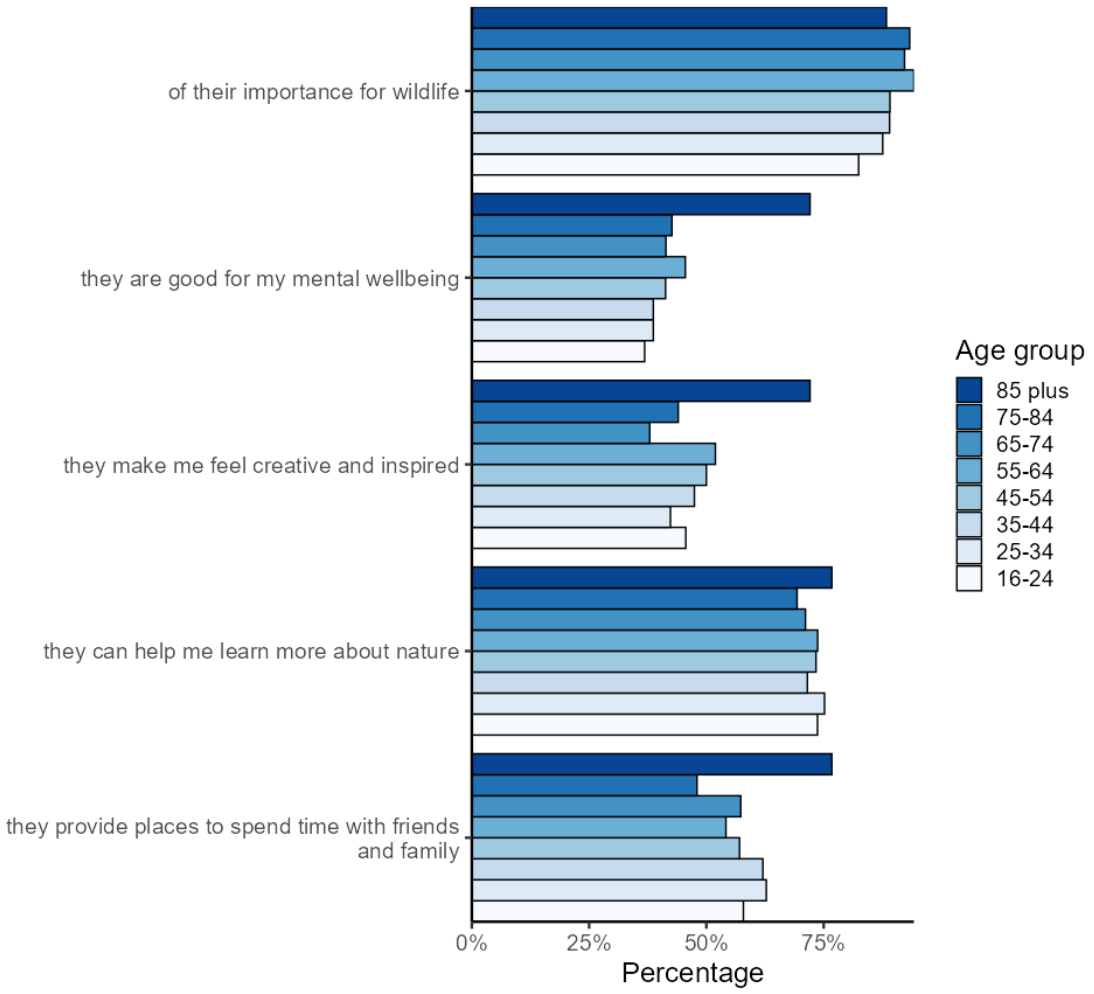



*Figure 37. Proportion of respondents that score Agree/Strongly agree weighted by Age group.*

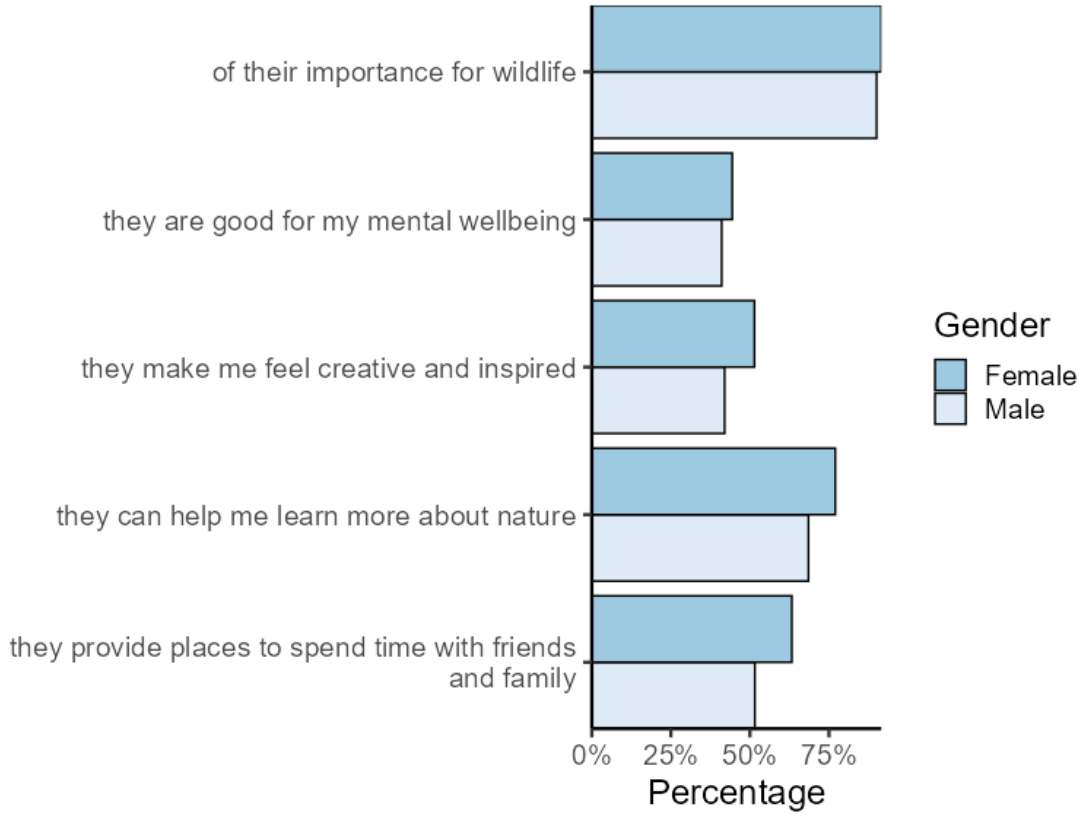



*Figure 38. Proportion of respondents that score Agree/Strongly agree weighted by gender*

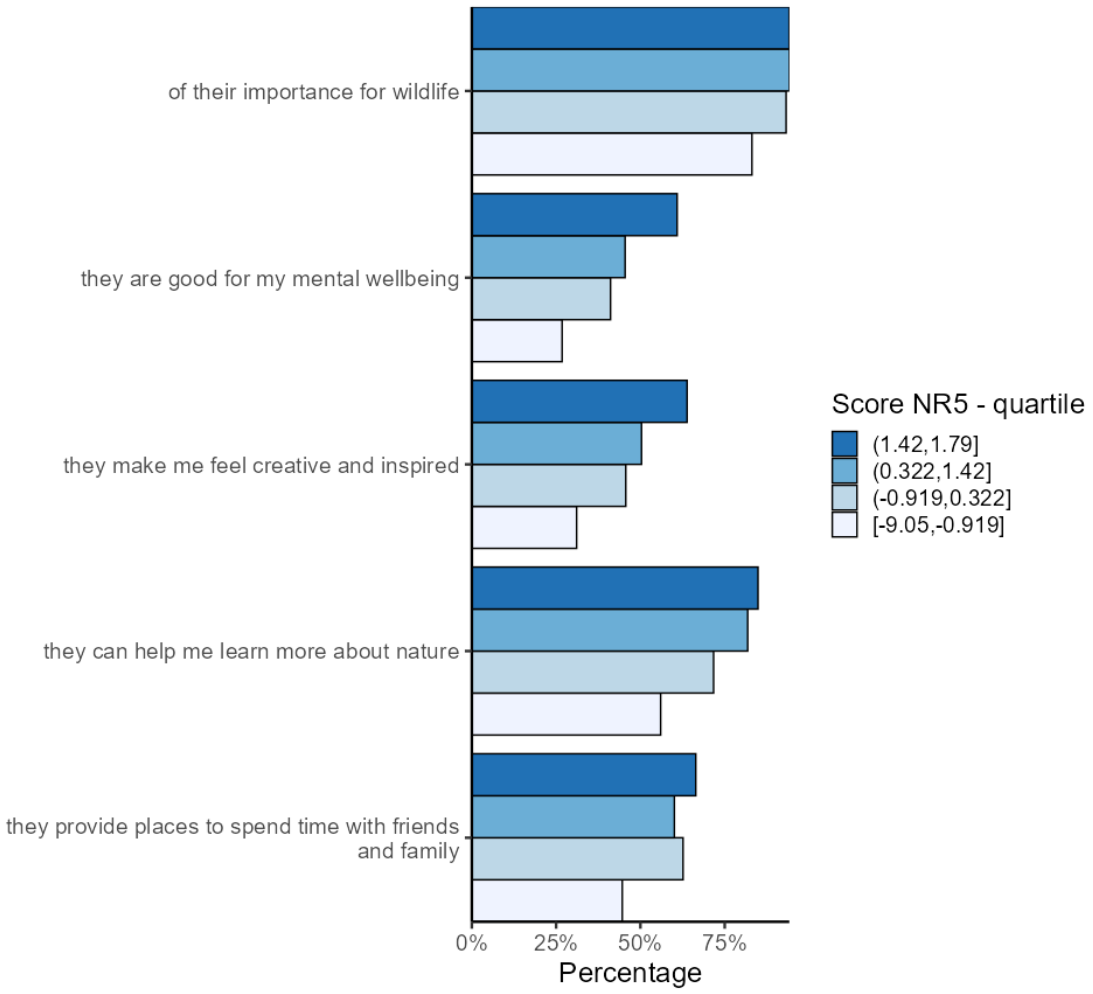



*Figure 39. Proportion of respondents that scoring Agree/Strongly agree by Score NR5 - quartile*

## Are people aware of the ecosystem services (supporting, regulating, provisioning) which dead and dying trees provide?

Significantly more (76%) respondents stated that they were aware of reasons why land owners may decide to keep dead wood, dead trees, or decaying trees rather than removing them, compared to those who were unaware (24%). ($\chi$-squared (n,1) = 323.44, p-value < 0.001).

This varied by age group (Figure 40) and nature relatedness scores (Figure 41), with those with higher scores more likely to be aware.

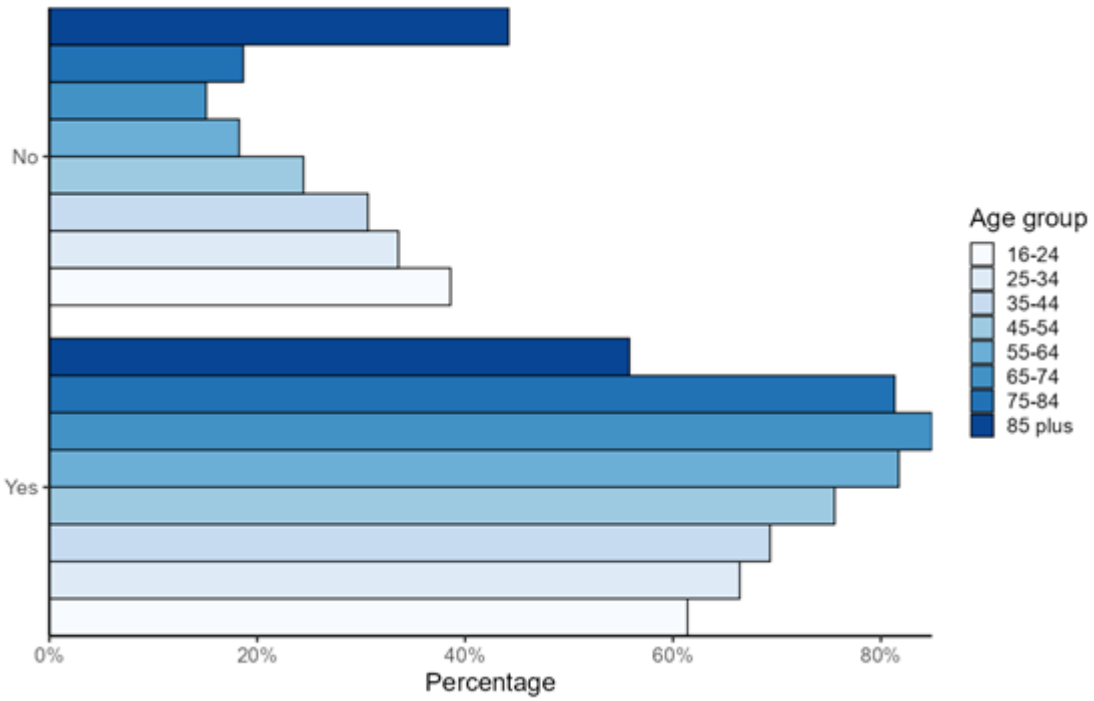



*Figure 40. Respondents' awareness of why landowners may decide to keep dead wood, according to Age group.*

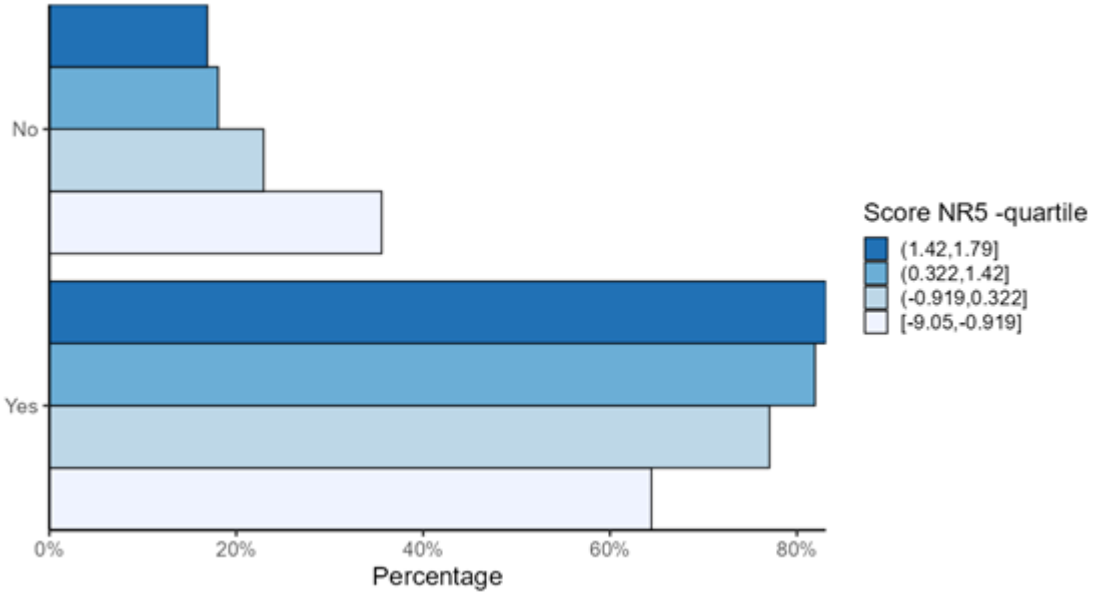



*Figure 41. Respondents' awareness of why landowners may decide to keep dead wood, according to NR5 quartiles.*

The most common reason cited was for biodiversity and wildlife, followed by insects/bugs/invertebrates, then decomposition/soil health/nutrients (see Figure 42 for full list).

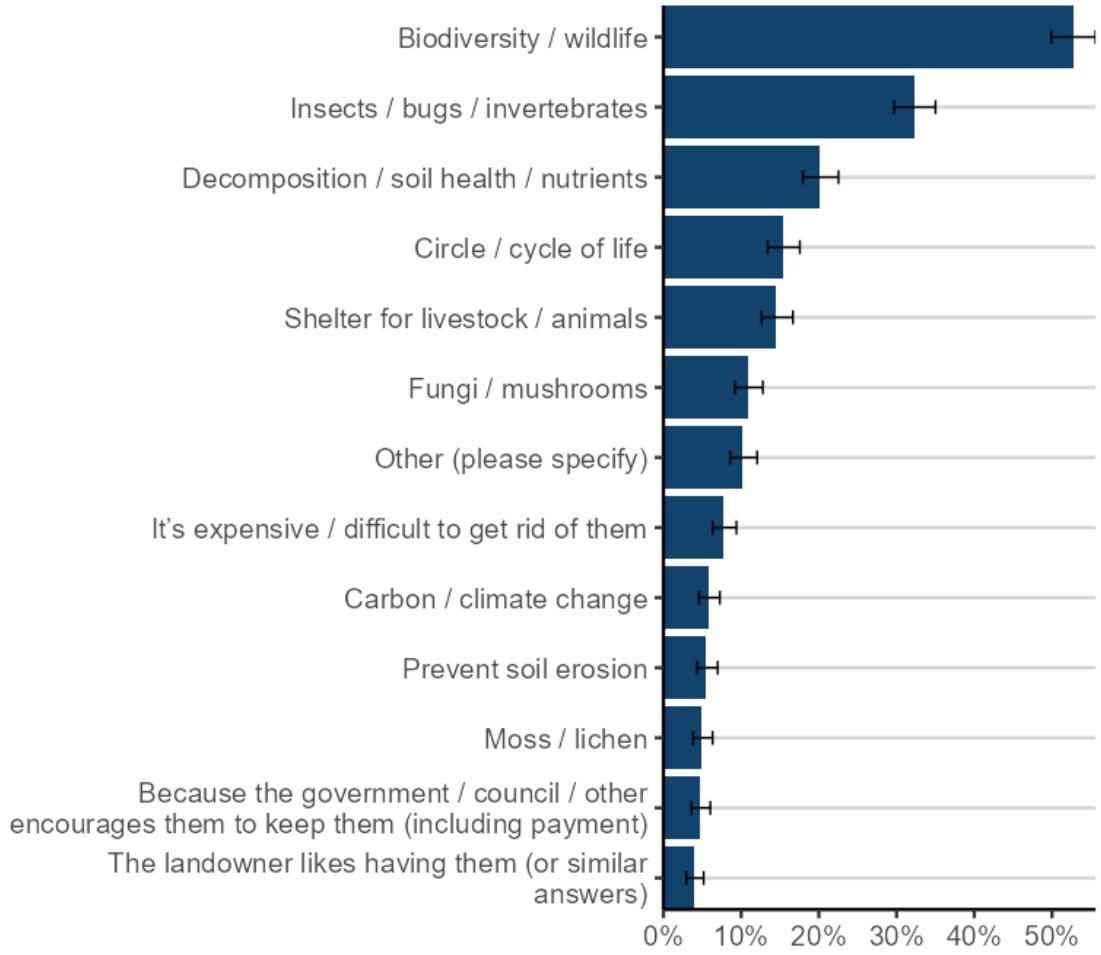



*Figure 42. Response frequency: Why might they decide to keep dead wood?*

There are statistically significant differences in the responses *(Cochran's Q test, df (11) =2401.077, p-value < 0.001)*.

Respondents were later asked to list any benefits that they thought a specific, visible dead or decaying tree brought to the environment. A similar list was created from these responses (Figure 43). This list had more categories but biodiversity and wildlife, insects/bugs/invertebrates and decomposition/soil health/nutrients were still mentioned most frequently, along with a new category, birds and bird species, which was ranked 3rd most frequently mentioned.

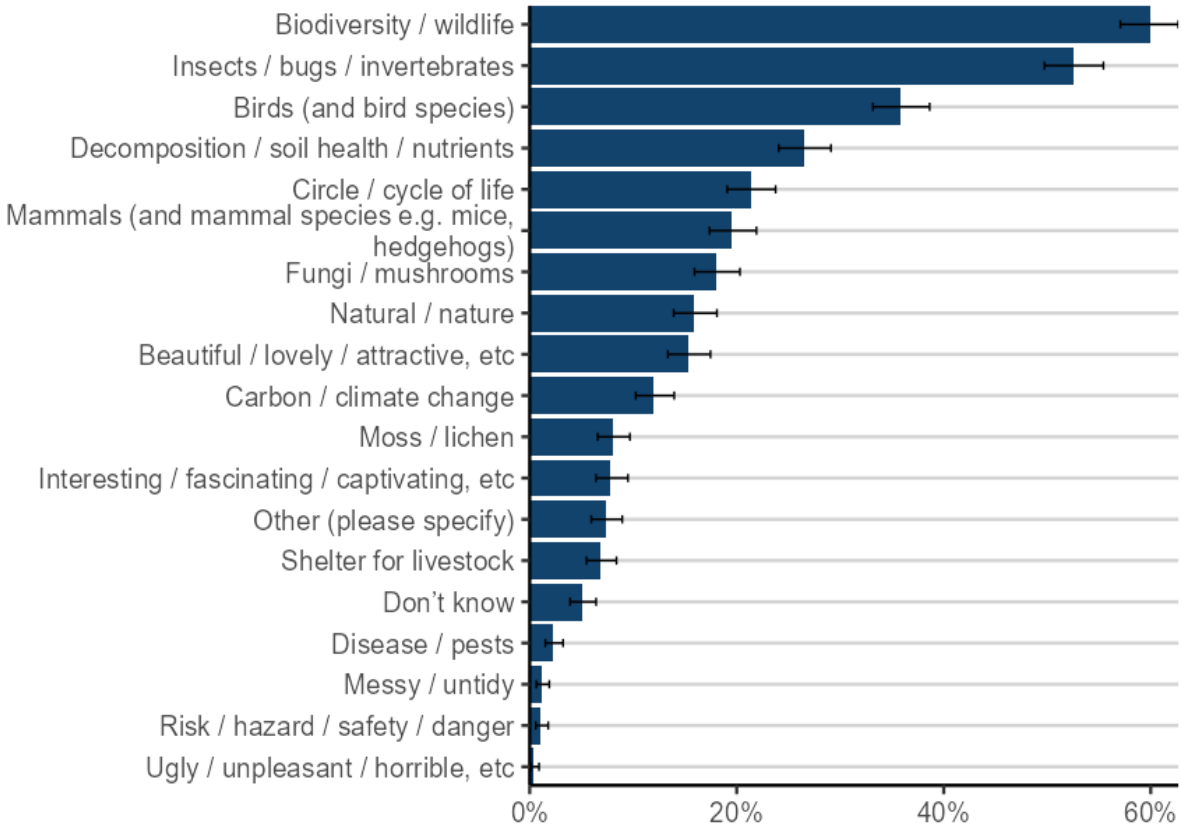



*Figure 43. Response frequency: Are you aware of any benefits this tree brings to the environment?*

There are statistically significant differences in the responses *(Cochran's Q test, df (16) =4134.543, p-value < 0.001).*

We created a 'knowledge score' for each respondent which counted how many unique ecosystem services were mentioned by each participant across responses to both questions. This was used in later analysis (see section 'Does knowledge of benefits affect attitudes to and values relating to dead and dying trees?').

Sixteen percent of respondents did not mention any and nearly a quarter (24.2%) mentioned 3 or more (Table 30). Education and nature relatedness score significantly affected how many unique ecosystem services were mentioned.

*Table 30. Number of ecosystem services, frequency table.*

| Number of Ecosystem Services | n | % |
|---|---|---|
| 0 | 154 | 15.67 |
| 1 | 324 | 32.96 |
| 2 | 267 | 27.16 |
| 3 | 130 | 13.22 |
| 4 | 66 | 6.71 |
| 5 | 23 | 2.34 |
| 6 | 11 | 1.12 |
| 7 | 6 | 0.61 |
| 8 | 2 | 0.20 |
| Total | 983 | 99.99 |

## Does knowledge of benefits affect attitudes to and values relating to dead and dying trees?

How knowledgeable participants were about the beneficial ecosystem services provided by dead/decaying trees significantly affected how the specific dead/dying tree made them feel (Figure 44). With those who were least knowledgeable more likely to feel unhappy or very unhappy about the tree. With a caveat that the majority of respondents had the lowest knowledge scores.

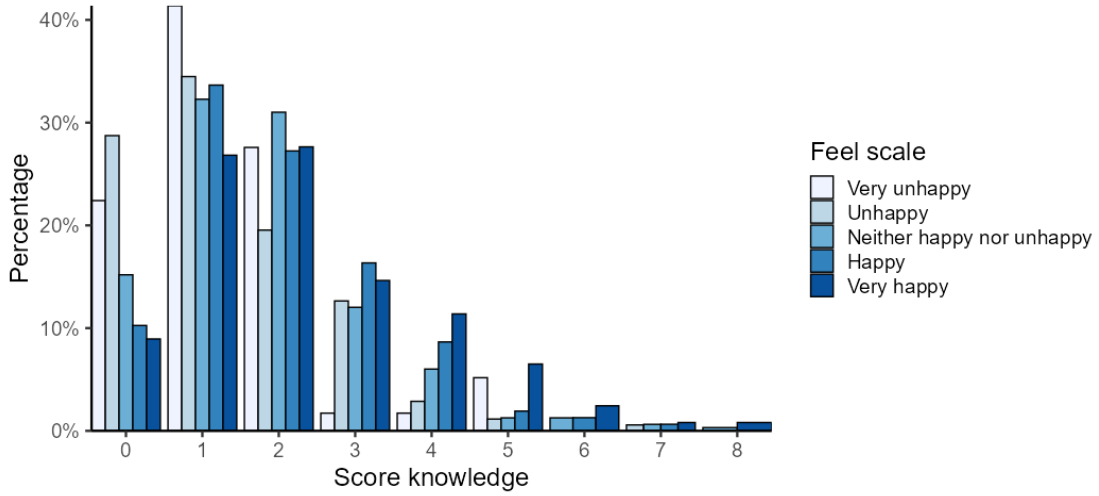



*Figure 44. Distribution of Knowledge score by feeling scale*

How knowledgeable participants were about the beneficial ecosystem services provided by dead/decaying trees significantly affected their responses to tree removal ($p<0.001$). Those with a knowledge score of zero (no knowledge of the ecosystem service benefits of dead and decaying trees) were more likely to suggest that the tree should be removed (Figure 45).

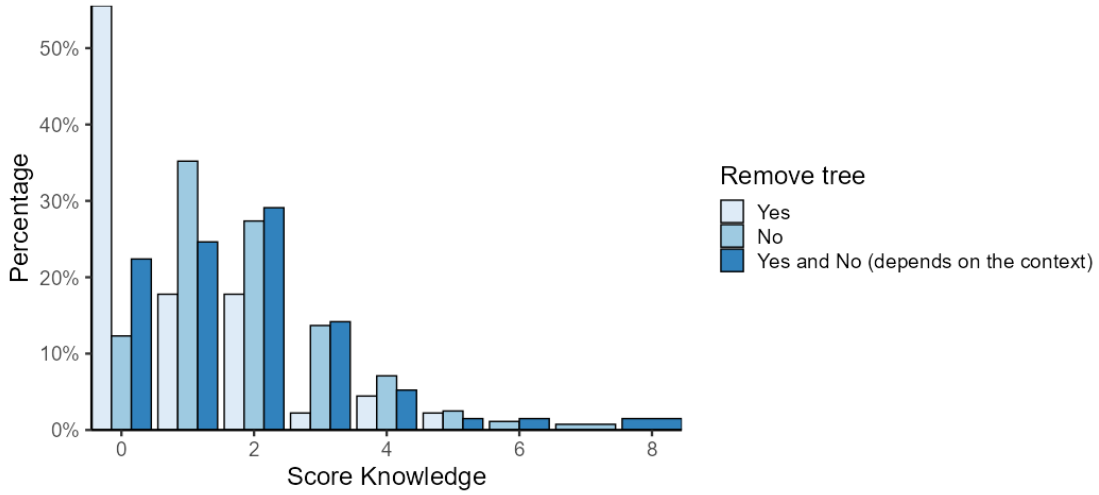



*Figure 45. Distribution of knowledge score by opinion of whether the dead/decaying tree should be removed.*

Knowledge score also significantly affected whether people noticed dead and decaying trees in the landscape ($p=0.061$) and what they noticed (Figure 46).

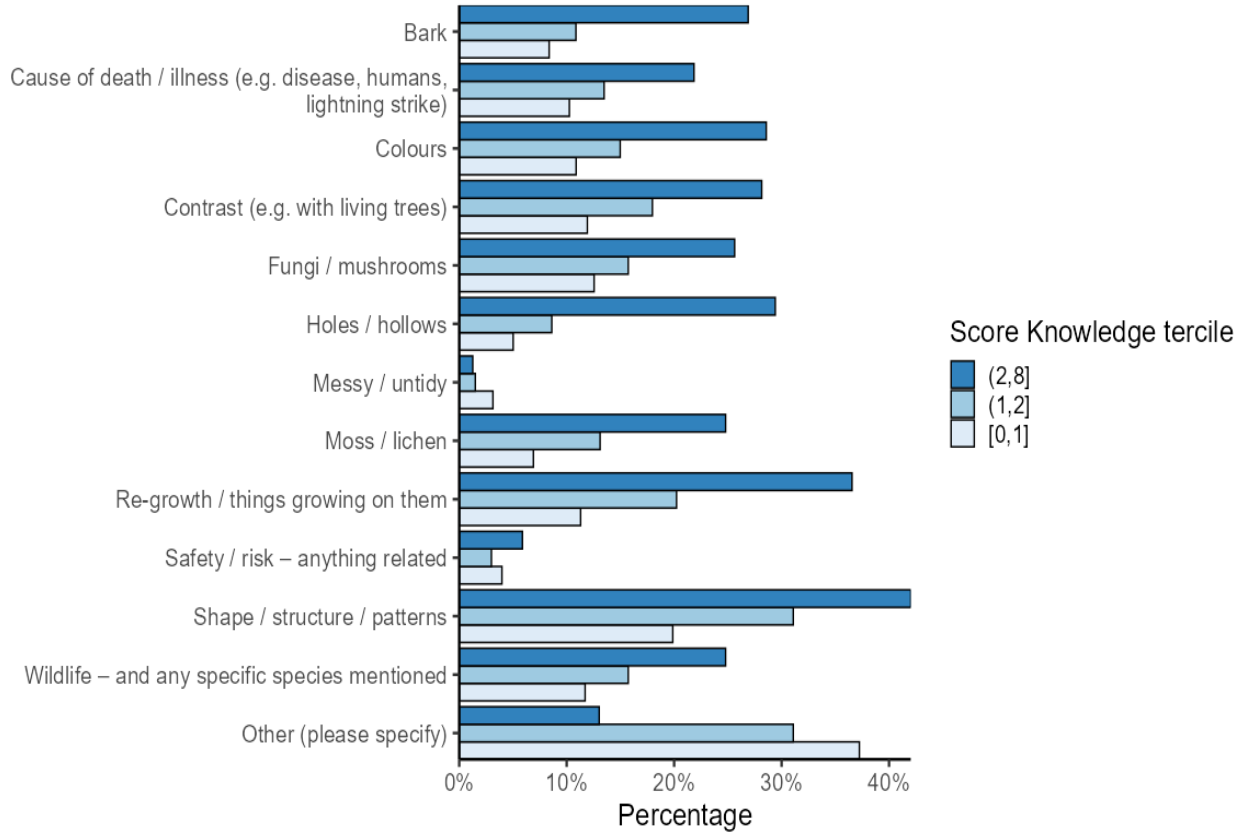



*Figure 46. What do you notice? by Knowledge score tercile*

Those with the lowest knowledge score (lowest tercile) were consistently most likely to report across all concerns about dead and decaying trees being left in the environment, except for 'Concern for the tree itself' (Figure 47).

We defined a binary variable which took the value of 1 if the respondent reported they were 'concerned' or 'very concerned' and 0 otherwise. There were statistically significant differences regarding concerns about risks, according to knowledge score ($p<0.001$) and statement ($p<0.001$) as well as their interaction ($p=0.005$).

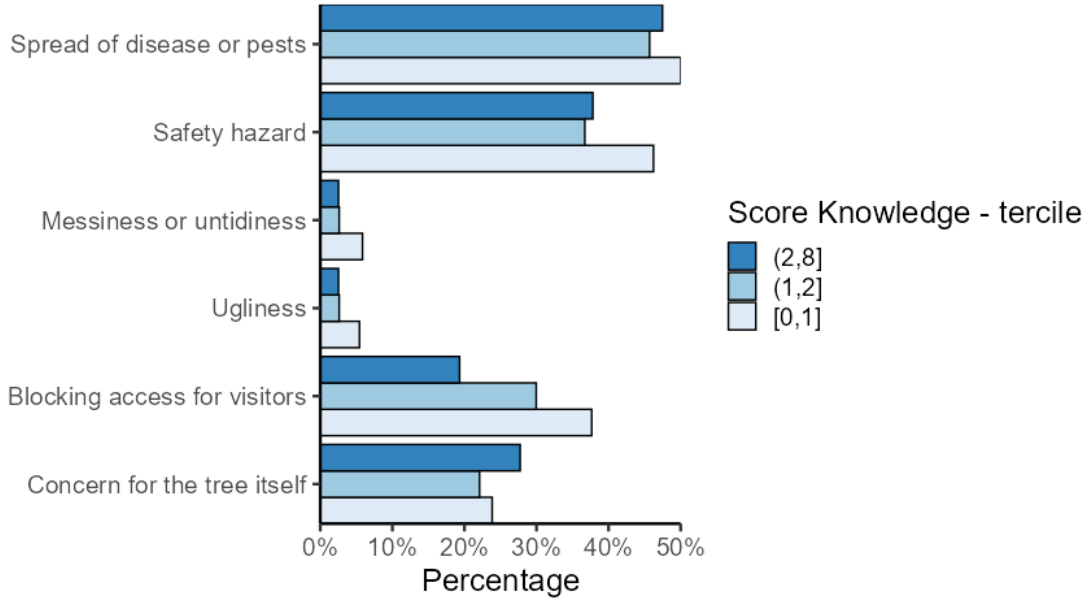



*Figure 47. Proportion of respondents responding Concerned/Very concerned according to Knowledge score tercile.*

## How concerned are people about specific risks posed from dead and decaying trees? Are any specific concerns cited significantly more often?

Figure 48 shows how concerned respondents were about different risks or concerns.

We defined a set of binary variables which took a value of 1 if the respondent was 'concerned' or 'very concerned' about each of the risks and 0 otherwise.

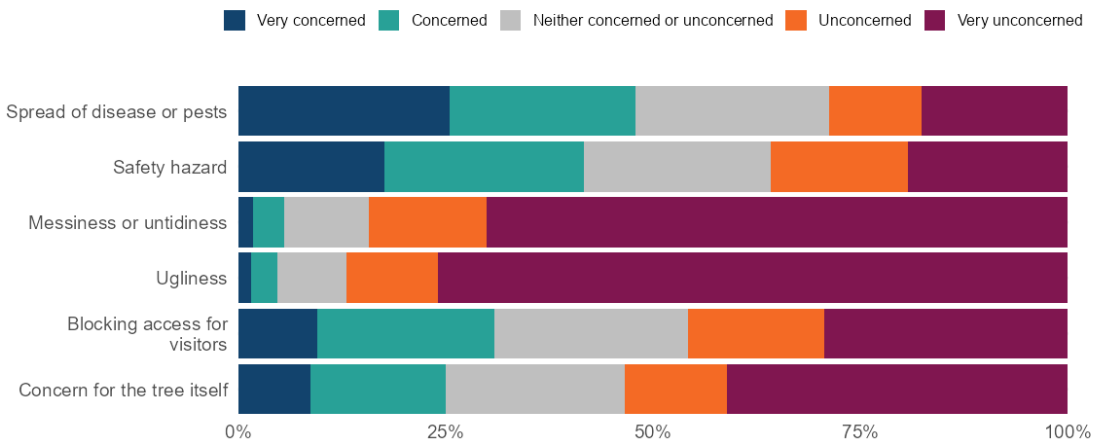



*Figure 48. How concerned are you about dead and decaying trees being left in the environment? By different fear/concern.*

Respondents were most concerned about dead and decaying trees spreading diseases or pests to other trees (47.9% concerned or very concerned) and being a safety hazard (41.6%). They were least concerned about the trees being ugly (4.8%) or messy/untidy (5.5%) (Table 31).

*Table 31. Proportion of respondents that are concerned or very concerned about each of the options. % are calculated out of n=1,177 and do not add up to 100.*

| Response | n | % | prop | se | min | max |
|---|---|---|---|---|---|---|
| Spread of disease or pests | 564 | 47.9 | 0.479 | 0.015 | 0.451 | 0.508 |
| Safety hazard | 490 | 41.6 | 0.416 | 0.014 | 0.388 | 0.445 |
| Messiness or untidiness | 65 | 5.5 | 0.055 | 0.007 | 0.044 | 0.070 |
| Ugliness | 56 | 4.8 | 0.048 | 0.006 | 0.037 | 0.061 |
| Blocking access for visitors | 364 | 30.9 | 0.309 | 0.013 | 0.283 | 0.336 |
| Concern for the tree itself | 295 | 25.1 | 0.251 | 0.013 | 0.227 | 0.276 |

# References

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Appendix IX: Understanding the social and cultural values of Trees outside Woodland: Peri-Urban and Rural (TOWPUR)

| **Socio-demographics & site details** | **People's connection to nature/env behaviours/visiting behav** | **What are their attitudes to specific dead/dying ToWPUR in landscape? What values do they hold in relation?** | **What are their attitudes to dead/dying ToWPUR in general? Do they notice them and what do they notice? What values do they hold in relation?** | **What knowledge do they hold about dead/dying ToWPUR? And the benefits they provide?** | **Are they familiar with the tree, landscape, site? Any other modifying factors (reason for death/demise, site context)?** | **Role of risk** |
|---|---|---|---|---|---|---|
| R01 Please record the site<br><br>R02 Please record your What3words location<br><br>Do you identify as male, female or in another way?<br><br>What was your age on your last birthday? Or age band<br><br>Which ethnic group or groups do you belong to?<br><br>What is your highest level of qualification?<br><br>What is your nationality? | Q03 What is the reason for your visit today?<br><br>Q04 How many times have you visited a green and natural space in the last 14 days, not including your garden, work visits or abroad?<br><br>Q05 Nature relatedness scale NR6 | Q06a Using the emotional scale below, can you point to how this tree makes you feel?<br><br>Q06b Can you explain why you feel this way?<br><br>Q11b Do you think the land owner should remove this tree?<br><br>Q11c Why do you say that? | Q07 What comes to mind if I say the words dead and decaying trees?<br><br>Q08 Do you notice dead wood, dead trees, and decaying trees in the landscape?<br><br>Q09 What do you notice?<br><br>Q12 Do you think more dead and decaying trees should be left in the landscape to decay in place?<br><br>Q13 Would your answer change depending on why the tree was dead/decaying?<br><br>Q13a Why is that?<br><br>Q15 How concerned are you about dead and decaying trees being left in the environment, in relation to the following things?<br><br>Q16 Value statements re dead and decaying trees. | Q10 Are you aware of any reasons why land owners may decide to keep dead wood, dead trees, or decaying trees rather than removing them?<br><br>Q11a Why might they decide to keep them?<br><br>Q14 Are you aware of any benefits this tree brings to the environment? | Q01 How regularly do you visit here?<br><br>Q02 Do you live locally?<br><br>Q13 Would your answer change depending on why the tree was dead/decaying?<br><br>Q13a Why is that?<br><br>Q15 How concerned are you about dead and decaying trees being left in the environment, in relation to the following things?<br><br>R01 Please record the site<br><br>R02 Please record your What3words location<br><br>R03 Please record the weather condition during this survey | Q13 Would your answer change depending on why the tree was dead/decaying?<br><br>Q13a Why is that?<br><br>Q15 How concerned are you about dead and decaying trees being left in the environment, in relation to the following things? |

## Overarching research questions/scenarios for empirical testing:

What social and cultural values do the general public hold in relation to rotting, dead, decaying, dying, damaged trees in TOWPUR settings?

a. How do people respond to specific dead and dying ToWPUR in a landscape?
b. How do the values people hold for dead/dying ToWPUR compare to values held in relation to trees and woodland more generally?
c. How does level of knowledge about other ecosystem services derived from ToWPUR affect RQa?
d. Are responses affected by factors such as familiarity/relationship with tree, location of tree (specifically how formal the landscape is)?

e. What are the primary concerns people have (if any) about such trees being left in landscape or disbenefits they confer?
f. Does the cause of death/ill health play a role in RQa?

Analysis:

**I. Create a proxy connection to nature indicative number for each participant**

Q05 NR-6 Nature Relatedness scale. Nisbet and Zelinsky 2013 – paper supplied. (Also see Kövi et al 2023, paper supplied).

**II. Sample description**

Demographics, plus Q3-5 (we can compare this to national figures via PANS survey Welcome to the People and Nature Survey (arcgis.com))

Figures for publication.

**III. What are people's responses when asked about specific dead and dying trees in the landscape? (RQa)**

Responses to Q6a – number of people for each number (positive to negative). Can we state any significant differences in responses between the 5 points? Null hypothesis – there is no difference in the number of respondents who feel positively, negatively or neutral about the trees.

Responses to Q11b. Can we state any significant differences in responses?

Consider above by respondent demographic, frequency of visits to nature (Q4) and nature relatedness (Q5). Also, familiarity – whether/how well they know the site (Q1-2) (**RQd**). Test for significance.

Does site (as a proxy for formality of landscape) have an effect on response (R01) (**RQd**)

Does weather during survey (R03) have an effect (rule out effect)?

**IV. How do people feel about specific dead and dying trees in the landscape? (RQa)**

Q6b and Q11c reasons for this (qual).

**V. Generally, how do people respond to the idea of dead/dying trees in the landscape? (RQa)**

Descriptive statistics for Q07. Figure for publication. Are any of the responses cited significantly more often than others? Or differences between groups of categories e.g. biodiversity vs others?

Q08 any significant difference between those who notice and those who don't?

Q09 what do they notice? Individual responses and any significant differences, but also differences between groups of categories:

- **Biodiversity related**: Fungi / mushrooms; Moss / lichen; Re-growth / things growing on them; Wildlife – and any specific species mentioned

- **Visual/aesthetic**: Bark; Colours; Contrast (e.g. with living trees); Holes / hollows; Shape / structure / patterns
- **Negative**: Messy / untidy; Safety / risk – anything related
- **Concern**: Cause of death / illness (e.g. disease, humans, lightning strike); Safety / risk – anything related

Q12 any significant difference between number who think trees should be left and those who don't?

Consider above by respondent demographic, frequency of visits to nature (Q4) and nature relatedness (Q5). Test for significance.

Site effect?

### VI. Do people value dead/dying trees differently to trees/woods as a whole? (RQb)

Comparison of responses to Q16 with the results from the same 5 statements from this study Exploring the social and cultural values of trees and woodlands in England: A new composite measure - O'Brien - 2024 - People and Nature - Wiley Online Library

Expectation – to be able to state (across the whole sample population) whether the responses were significantly different between our sample (asking about dead and dying trees) and O'Brien's population (asking about trees/woodlands as a whole). Null hypothesis is that there is no overall difference between the value statements, pooled and individual, between the two sample populations (who have been asked to focus on different types of tree in their responses).

*Question for statisticians – what will the analysts need in addition to our data to run this? Do we need to source the original dataset from O'Brien? If we did source the original dataset I assume we could then also look at whether a difference exists depending on gender (and possibly other demographic or other variables, such as connection to nature (Q4)).*

Consider above by respondent demographic, frequency of visits to nature (Q4) and nature relatedness (Q5). Test for significance.

### VII. Are people aware of the other ecosystem services (supporting, regulating, provisioning) which dead and dying trees provide? (RQa)

There are 5 different questions which provide the respondent with an opportunity to state their knowledge of the supporting and regulating ecosystem services such trees provide (see list below). It will be interesting to see responses to individual questions but also to understand how many people mentioned each benefit/ecosystem service across all the questions ('knowledge score). It will be interesting to see comparisons by individual response but also groups of responses:

| |
|---|
| Biodiversity / wildlife |
| Birds (and bird species) |
| Carbon / climate change |
| Circle / cycle of life |
| Decomposition / soil health / nutrients |
| Fungi / mushrooms |
| Insects / bugs / invertebrates |

| |
|---|
| Mammals (and mammal species e.g. mice, hedgehogs) |
| Moss / lichen |
| Natural / nature |
| Prevent soil erosion |
| Shelter for livestock / animals |

*List of supporting and regulating ecosystem services (compiled from Qs 7, 11a, 11c, 14)*

Groups of responses:

- **Biodiversity**: Biodiversity / wildlife; Birds (and bird species); Fungi / mushrooms; Mammals (and mammal species e.g. mice, hedgehogs); Moss / lichen
- **Soil/nutrient/carbon**: Carbon / climate change; Decomposition / soil health / nutrients; Prevent soil erosion
- **Generic nature**: Circle / cycle of life; Natural / nature

Also, a group that reflects (positive) **social and cultural values**: Beautiful / lovely / attractive, etc; Interesting / fascinating / captivating, etc

Q07 How many people mention ecosystem service benefits? Consider by respondent demographic, frequency of visits to nature (Q4) and nature relatedness (Q5). Test for significance.

Q10 How many people are aware of reasons for keeping the trees? Significant difference? Consider by respondent demographic, frequency of visits to nature (Q4) and nature relatedness (Q5). Test for significance.

Q11a, Q11c, Q14:

- Descriptive Consider by respondent demographic, frequency of visits to nature (Q4) and nature relatedness (Q5). Test for significance.
- whether any individual responses or groups of responses are mentioned significantly more often than others. Figures for publication

Overall, across the four questions (Q07, 11a, 11c and 14), how many ecosystem services from the above list are mentioned by respondents (avoiding duplication) – the total is their 'knowledge score' and would be between 0 and 12. A different approach - how many people mention at least one ecosystem service from the 'Biodiversity' group and/or the 'Soil/nutrient/carbon' group – people awarded alternative knowledge score of 0, 1 or 2. Consider by respondent demographic, frequency of visits to nature (Q4) and nature relatedness (Q5). Test for significance.

**VIII. Does knowledge of benefits/ecosystem services affect attitudes to and values relating to dead and dying trees? (RQc)**

Analyse whether the knowledge score (VII) significantly affects responses to III, IV, V, VI, IX, X

**IX. What disbenefits do people perceive and how many are concerned about risk (RQe)**

Q15 How concerned are people about specific risks posed from dead and decaying trees – descriptive. Are any specific concerns cited significantly more often? Figure for publication.

Consider above by respondent demographic, frequency of visits to nature (Q4) and nature relatedness (Q5). Test for significance.

**X. Does the cause of tree death or illness affect how people feel?**

Q13 what percentage of people's answer would change depending on reason for death (significance?) and how (Q12)?

Why would people's response change by reason for death (Q13a) (qual)?