Evaluation of Woodland Pathways: Biodiversity Supplement

1. Introduction

This note provides supplementary evidence and analysis related to biodiversity outcomes and values in "Evaluation of delivery pathways for the 2050 target for woodland and trees outside of woodland" (eftec, 2026).

Background

eftec (2026) provides evidence on a critical policy question: to what extent do different pathways that achieve the government's target to increase England's tree canopy and woodland cover to at least 16.5% of land by 2050 (henceforth the 2050 woodland target) contribute towards the government's wider biodiversity commitments? The assessment in eftec (2026) considered the biodiversity outcomes associated with changes in woodland extent and condition, including how different woodland types contribute to those outcomes and their estimated economic value. It also considered the potential contribution of new planting and the management of existing woodland to the wildlife-rich habitat and species recovery targets.

That assessment was the result of three steps:

- Developing feasible scenario pathways for England to reach the 2050 woodland target;
- Modelling the state of future woodlands and trees outside woodland (TOW) under these scenarios, including woodland area, type and condition; and
- Estimating the biodiversity outcomes and the economic value of associated benefits, and assessing the potential contribution of the pathways to biodiversity targets.

While eftec (2026) does provide a reasonable step towards understanding the differences across pathways, biodiversity was largely proxied through woodland type and condition, limiting the assessment of pathways against biodiversity targets. This was in part a result of the data available (large scale biodiversity audits are not available on woodland across England), and in part due to the constraints of the project.

Purpose and approach

This note provides further detail on the analysis in eftec (2026), reviews the sensitivity of the results to key assumptions and inherent uncertainties around how biodiversity is assessed, which metrics are used, and discusses their implications for the conclusions of the report.

To accomplish this aim, this supplement provides more detail on the approach used and presents additional evidence and analysis to explore:

- The categorisation of woodlands in England and how they relate to government priorities for biodiversity outcomes. *Which woodlands are considered most valuable for biodiversity in England?*

- The breakdown of woodland condition outcomes by woodland type, for both overall woodland and new planting, and how those combinations link back to priority habitats. *How do the modelled physical biodiversity outcomes vary between woodland types, and how can this be used to proxy overall biodiversity outcomes?*
- The contribution of the modelled pathways to the wildlife-rich habitat target, including comparison with Natural England's ongoing monitoring approach and definitions of habitat creation, restoration and sufficient quality. *To what extent can new planting and improvements to existing woodland reasonably be expected to count towards this target?*
- The contribution of newly planted woodland and the management of existing woodland to the species recovery target.[1] *Which woodland types and management actions are more likely to support species recovery, given the uncertainty in attributing outcomes at the scale of the model?*
- The economic value of changes in woodland biodiversity by woodland type, including the relationship between woodland condition, the evidence used as a proxy for biodiversity, and the underlying composition of the woodland condition assessment. *How sensitive is the total estimated value of biodiversity benefits to assumptions about the value of different woodland types?*

Specifically, this supplement: (i) provides a breakdown of modelled woodland condition outcomes by woodland type for overall woodland and new planting; (ii) compares the approach used to assess contributions to the wildlife-rich habitat target with Natural England's monitoring approach; (iii) develops the narrative on how new planting and the management of existing woodland may contribute to the species recovery target; (iv) presents the associated economic benefit valuation and sensitivity analysis for different assumptions about woodland type; and (v) discusses the implications of these findings for interpreting the biodiversity outcomes of pathways to achieve the 2050 woodland target.

[1] Environmental Targets (Biodiversity) (England) Regulations 2023, made under the Environment Act 2021.

2. Defining wildlife-rich woodland habitats

There are multiple ways to define woodland types or habitats in the UK, which reflects the various classification systems used by different organisations for different purposes. This means that:

1. Woodland categorisations need to be translated across data sources and models to assess certain research questions, such as the contribution of woodland towards the wildlife-rich habitat target;[2] and
2. Benefits assessments for biodiversity will be sensitive to woodland classifications if biodiversity outcome metrics differ across woodland types. Further, benefits assessments may not appropriately reflect underlying priorities where there are misaligned outcome metrics.

Both points are important in the context of the estimation of biodiversity benefits and contributions towards the 2042 wildlife-rich habitat target presented in eftec (2026).

Table 1 presents: (i) woodland habitat types (broadly as defined in the NFI 2014 woodland ecological condition analysis (Forest Research, 2020); (ii) whether they contribute towards the wildlife-rich habitat target (based on UK Biodiversity Action Plan habitat or Environment Act Habitat Target definitions[3]); (iii) the amount of each habitat found in England in 2014; and (iv) the associated eftec (2026) woodland type.

This mapping of NFI and Natural England types to the eftec (2026) modelling demonstrates a clear difference in categorisation. Many of the woodlands categories used by Natural England and the NFI may appear in several of the eftec (2026) categories, and vice versa (see Table 2). This was the result of the focus of eftec (2026), which was modelling future outcomes based on woodland management and broad species mix rather than biodiversity outcomes based on relatively narrow definitions of habitats.

eftec (2026) also includes mixed woodland and trees outside woodland (TOW). The NFI woodland main dataset includes mixed woodland but not the ecological condition dataset, and no woodland habitat type in that captures mixed woodland fully. This is important as the eftec modelling includes mixed woodland as its own category and makes up 5% of total woodland in England (it has some overlap with Lowland beech/yew woodland, but this does not include mixed timber commercial woodland). Mixed woodland can also be a wildlife-rich habitat under the terms of the Environment Act.[4] TOW is a significant part of canopy cover in England, and will play a significant role in achieving the 2050 woodland target. It is also not included comprehensively in the NFI ecological condition or Natural England definitions.

Mapping eftec (2026) woodland types to the habitat target (Table 2), shows that nearly all broadleaf management types and some of the mixed management types are likely to result in woodlands that qualify as priority habitats for the biodiversity targets, and all coniferous types would not. This is largely the approach undertaken in assessing the alignment of the woodland pathways to the targets, with the added element of woodland condition (see Section 3). Section 4 undertakes a more thorough assessment of alignment and final quantities of woodland under various pathways.

[2] There are specific habitats (based on certain habitat definitions) that can contribute towards the wildlife-rich habitat target.

[3] The UK BAP habitats are available here: https://jncc.gov.uk/our-work/uk-bap-priority-habitats/, and the Environment Act Habitat Target definitions are available here: https://publications.naturalengland.org.uk/publication/6427187599900672

[4] If it contains 70-80% native broadleaved species (anything more than 80% is classified as purely broadleaf forest)

Table 1: Mapping woodland habitats to eftec woodland model woodland types

Broad woodland habitat type[1]	Contributes towards habitat target[2]	% of woodland cover[1]	Potentially relevant woodland types (eftec, 2026)	Notes
Lowland beech/yew woodland	✓	4%	• Conifer unmanaged; • Broadleaf light management; • Broadleaf rotation; • Broadleaf CCF; • Mixed unmanaged; • Mixed light management; • Mixed CCF	Depends on how much yew is present. In the beech zone, likely to be beech dominated, elsewhere may be mixed or yew dominated
Lowland mixed deciduous woodland	✓	57%	• Broadleaf unmanaged; • Broadleaf light management; • Broadleaf rotation; • Broadleaf CCF	
Native pine woodlands		0%	n/a	Habitat not found in England
Non-HAP native pinewood		0%	n/a	Habitat not found in England
Birch dominated upland oakwoods	✓	1%	• Broadleaf unmanaged; • Broadleaf light management; • Broadleaf rotation; • Broadleaf CCF	Unclear amount of rotation broadleaf in upland areas
Upland mixed ashwoods	✓	2%	• Broadleaf unmanaged; • Broadleaf light management; • Broadleaf rotation; • Broadleaf CCF	Unclear amount of rotation broadleaf in upland areas
Upland oakwoods	✓	3%	• Broadleaf unmanaged; • Broadleaf light management; • Broadleaf rotation; • Broadleaf CCF	Unclear amount of rotation broadleaf in upland areas
Wet woodland	✓	6%	• Broadleaf unmanaged; • Broadleaf light management; • Broadleaf rotation; • Broadleaf CCF	Broadleaf rotation not expected in wet woodland
Wood pasture & parkland	✓	1%[3]	• Broadleaf unmanaged; • Broadleaf light management; • TOW	The vast majority of this in TOW, when canopy cover is not high enough to qualify as woodland
Broadleaf habitat NOT classified as priority		2%	• Broadleaf unmanaged; • Broadleaf light management; • Broadleaf rotation; • Broadleaf CCF	Unclear what this habitat covers from the NFI methodology

Broad woodland habitat type[1]	Contributes towards habitat target[2]	% of woodland cover[1]	Potentially relevant woodland types (eftec, 2026)	Notes
Non-native coniferous woodland		25%	• Conifer unmanaged; • Conifer short rotation; • Conifer medium rotation; • Conifer CCF	Most conifer woodland in England is non-native and not a priority habitat (expectations include yew and juniper woodland)
Mixed woodland	?	n/a[4]	• Mixed unmanaged; • Mixed light management; • Mixed CCF	Not included as an NFI category, but a small but important part of canopy cover, and has its own category in other NFI datasets
Wildlife-rich hedgerows and lines of trees	✓	n/a[4]	• TOW	Not included as an NFI category, but a habitat creation target habitat
Trees outside woodland	?	n/a[4]	• TOW	Not included as an NFI category, but an important part of total canopy cover in England

Table notes: (1) As per Forest Research (2020); (2) As per Natural England (2024); (3) Only includes the percentage of wood pasture and parkland that qualifies as woodland, i.e., min 0.5 ha with at least 20% canopy cover. Total wood pasture parkland area was estimated at 278,000 ha in 2026 (Natural England, 2026a), compared to 7,700 ha that included woodland (in 2014). (4) Not included as a woodland category in the NFI ecological condition analysis.

Table 2: Mapping eftec (2026) woodland types to whether they contribute to the habitat target

Woodland types (eftec, 2026)	Habitat name	Contribution towards habitat target (for woodland in intermediate condition or better)
Conifer unmanaged	• Lowland beech/yew woodland; • Non-native coniferous woodland	No (0% assumed)
Conifer short rotation	• Non-native coniferous woodland	No (0% assumed)
Conifer medium rotation	• Non-native coniferous woodland	No (0% assumed)
Conifer long rotation	• Non-native coniferous woodland	No (0% assumed)
Conifer CCF	• Non-native coniferous woodland	No (0% assumed)
Broadleaf unmanaged	• Lowland mixed deciduous woodland • Birch dominated upland oakwoods • Upland mixed ashwoods • Upland oakwoods • Wet woodland • Wood pasture & parkland	Yes (100% assumed)
Broadleaf light management	• Lowland beech/yew woodland • Lowland mixed deciduous woodland • Birch dominated upland oakwoods • Upland mixed ashwoods • Upland oakwoods • Wet woodland • Wood pasture & parkland	Yes (100% assumed)
Broadleaf rotational	• Lowland beech/yew woodland • Lowland mixed deciduous woodland • Birch dominated upland oakwoods • Upland mixed ashwoods • Upland oakwoods	Yes (100% assumed)
Broadleaf CCF	• Lowland beech/yew woodland • Lowland mixed deciduous woodland • Birch dominated upland oakwoods • Upland mixed ashwoods • Upland oakwoods • Wet woodland	Yes (100% assumed)
Mixed unmanaged	• Lowland beech/yew woodland • Mixed woodland	Partial (50% assumed)[1]
Mixed light management	• Lowland beech/yew woodland • Mixed woodland	Partial (50% assumed)[1]
Mixed CCF	• Mixed woodland	No (0% assumed)
TOW	• Wood pasture & parkland (a small fraction) • Wildlife-rich hedgerows & lines of trees • Other non-woodland habitats	No (0% assumed) – however these habitat types may contribute to other habitat targets

Table notes: (1) For mixed unmanaged and light management, some mixed yew woodland plus broadleaf dominated mixed woodland can contribute to the target.

3. Woodland condition and biodiversity

eftec (2026) uses woodland ecological condition, as measured by the Woodland Condition Assessment (WCA) (Field Studies Council et al., 2024) measure, as a proxy for woodland biodiversity. This approach has several strengths and potential weaknesses but was adopted due to data availability and pragmatism in application (see Appendix 1). For assessing the biodiversity targets, condition can be further combined with woodland type (as mapped in Section 2) to get a better overall picture of how various woodland extents are expected to change in each pathway and the proportions of those woodlands that have a good probability of contributing to the wildlife-rich woodland habitat target and having high levels of biodiversity.

Table 3 shows the overall change in condition of woodland and TOW area by 2042 (the final year of the biodiversity targets) and by 2100 (the end of the modelled period), compared to the starting position (2024), for each scenario. Full details of these results broken down by specific woodland type are in Appendix Table 1 , and the same analysis by 2100 in Appendix Table 2 . The net condition change is overall positive, reflecting an increase in area containing woodland biodiversity, as these figures include newly created woodlands.

In summary, these results show by 2042 an increase in the area of woodland (ha) at intermediate and favourable condition, coming from both newly created woodland and change in condition of existing woodland. By 2100, there is more area at favourable condition, while the net amount of woodland in intermediate condition falls, reflecting a shift from intermediate to favourable. There is also an increase in the extent of woodlands in poor condition, driven by increasing impacts of climate change included in the modelling (see eftec (2026) report for further details). There is more woodland in poor condition and less in favourable condition in the continuation of current trends scenario, which reflects the lower management rate in this scenario compared to the others. There is less distinction between the other three scenarios, especially by 2100.

Table 3: Comparison of change in woodland condition across scenarios by key years compared to the starting year (2024) for the median scenarios.

Time	Condition	Increase of current trends (ha)	Increased management (ha)	Increased conifer proportion (ha)	Increased agroforestry proportion (ha)
2042	Unfavourable	-1,300	1,000	9,100	6,200
2042	Intermediate	48,300	12,700	24,800	23,700
2042	Favourable	89,700	123,000	102,800	106,800
2100	Unfavourable	63,800	41,800	59,100	52,000
2100	Intermediate	-131,900	-184,000	-222,100	-221,200
2100	Favourable	270,900	345,000	365,800	372,000

Table note: The differences in favourable across increased management, conifer, and agroforestry proportion scenarios are all non-significant (see the main report for more detail on the distribution of outcomes.

Figure 1 to Figure 4 present a summary of the median results for each broad woodland or TOW type under each scenario from eftec (2026), in terms of the net change in condition by 2042, compared to the starting position (2024). These figures show the difference between scenarios in terms of the impact of increased

management (more woodland at higher condition across all types compared to the increase of current trends scenario), and the differing distributions of woodland composition from the increased conifer or agroforestry scenario.

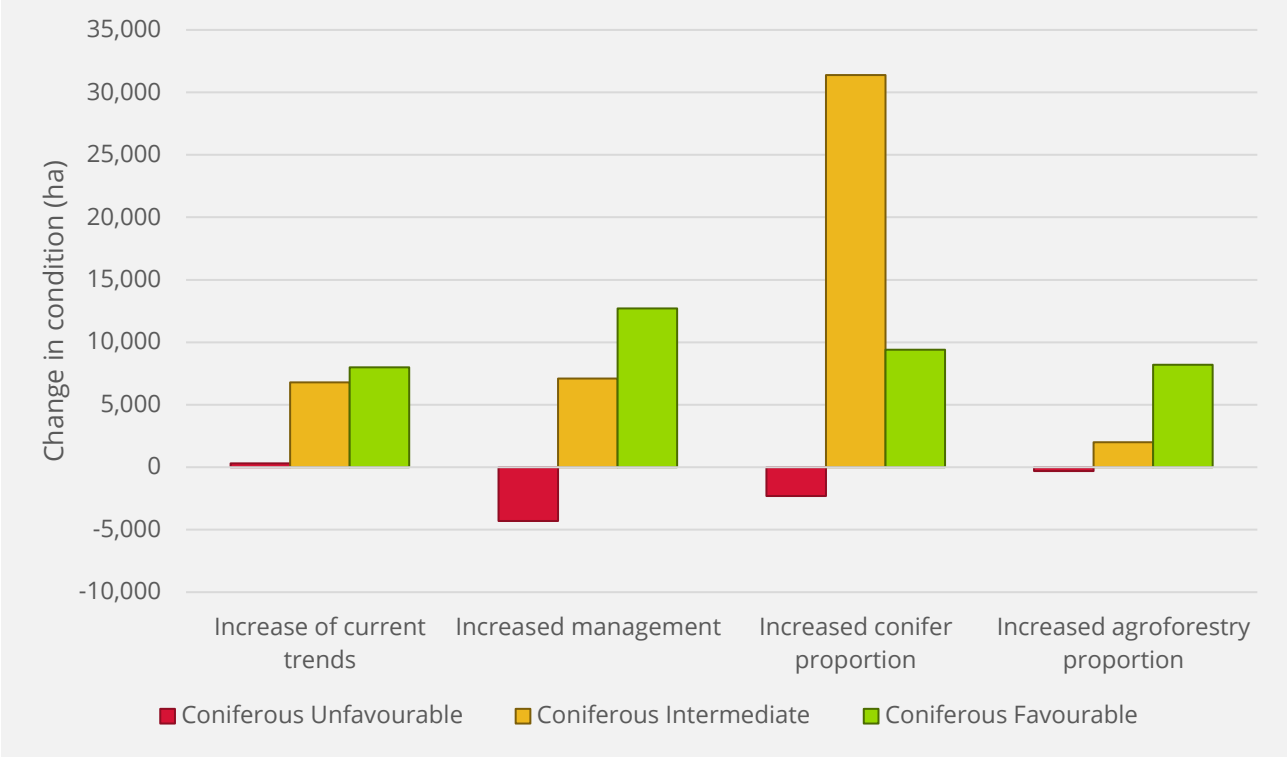


Figure 1: Change in conifer woodland condition by 2042 across scenarios in eftec (2026)

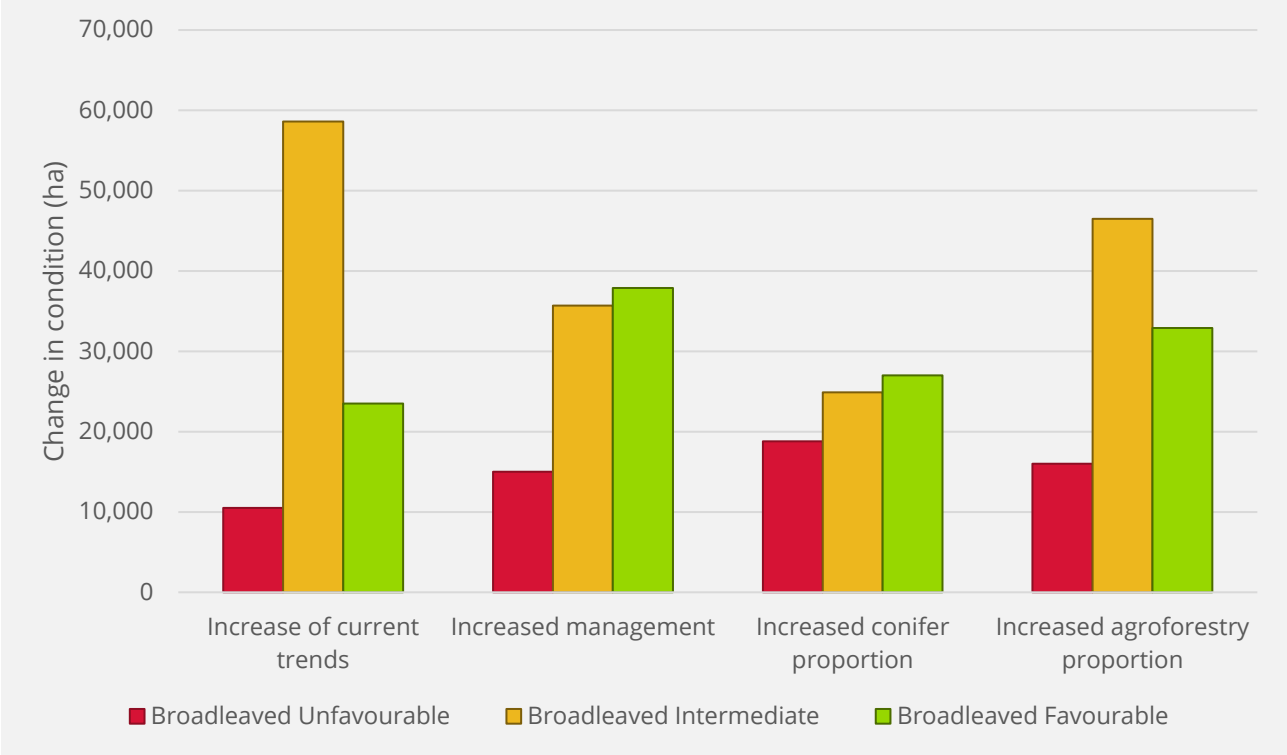


Figure 2: Change in broadleaf woodland condition by 2042 across scenarios in eftec (2026)

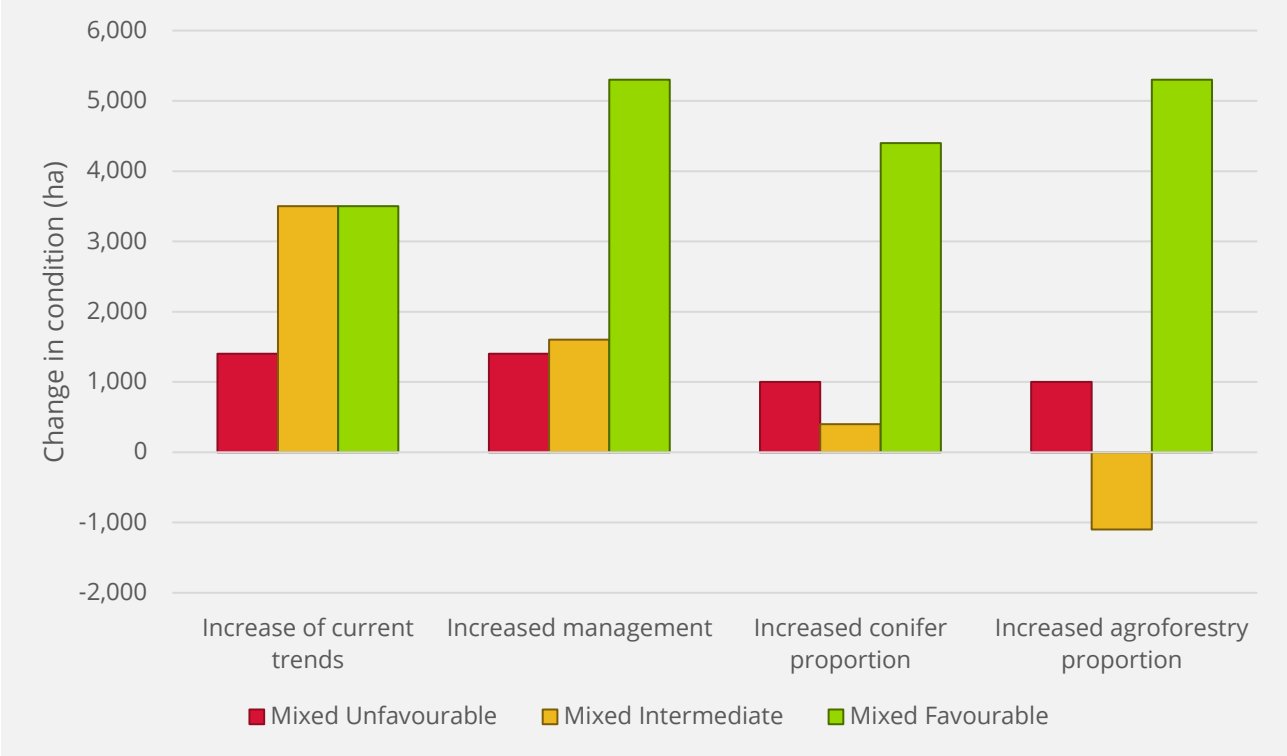


Figure 3: **Change in mixed woodland condition by 2042 across scenarios in eftec (2026)**

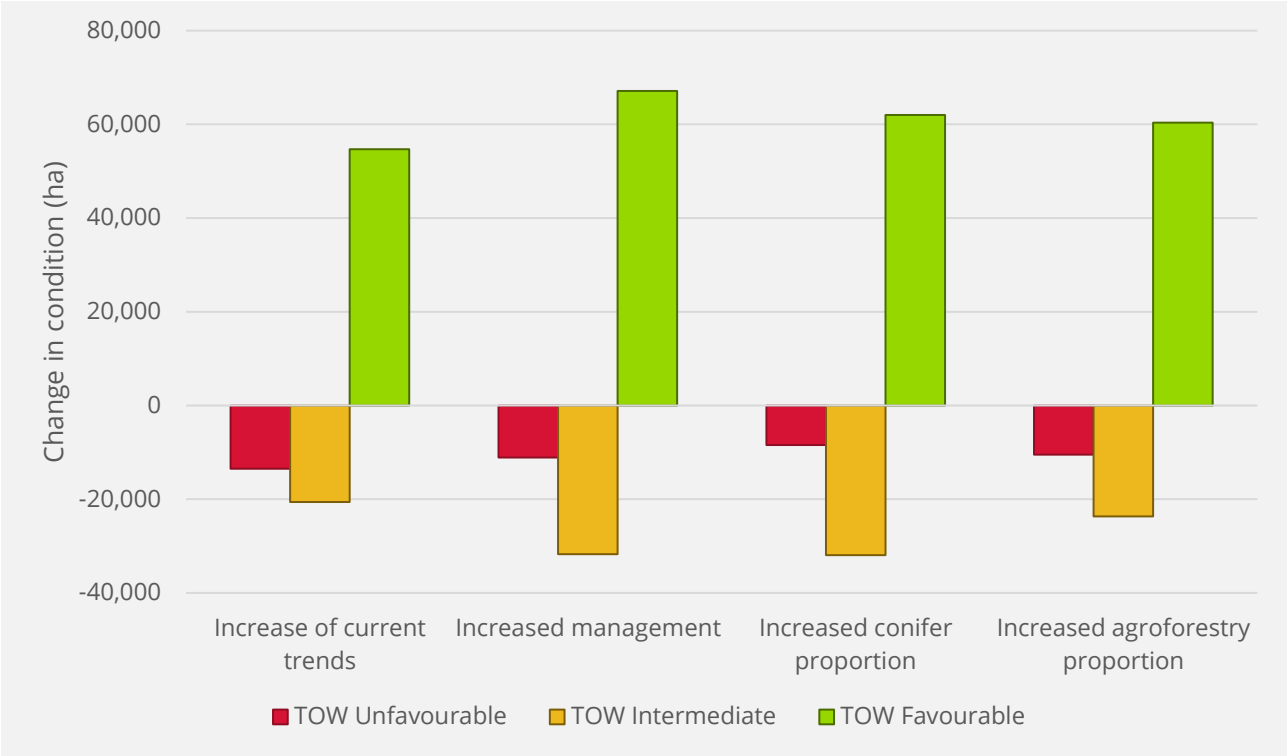


Figure 4: **Change in TOW condition by 2042 across scenarios in eftec (2026)**

4. Details of contribution to habitat target

The changes in woodland area by type and condition (Section 3), alongside the relative contribution towards the habitat target for each type (Section 2), are used here to estimate the amount of woodland creation in each pathway that would count towards the 2042 wildlife-rich habitat target. The wildlife-rich habitat target delivery plan (Defra, 2026a) expects 100,000 ha of woodland and TOW to contribute to the target, and therefore is the threshold for "meeting" the expected contribution towards the target.

As the results in Table 4 show, the increase of current trends, the increased management rates, and the increase of agroforestry proportion scenarios are all close to achieving the 100,000 ha threshold (93,000 ha to 99,000), and therefore are likely to significantly contribute toward meeting the wildlife-rich habitat target. The increased conifer proportion scenario only achieved 75,000 ha of wildlife-rich woodland, meaning that scenario is largely off track to meeting the target.

There is uncertainty in this result, coming from the translation of woodland types, and around what % of each eftec woodland type would be expected to contribute to the wildlife-rich habitat target. This is most obviously seen with TOW, which are assumed to not contribute to the target at all, but make up a significant portion of all new planting. Natural England currently excludes TOW and small woods from NFI data used in its evidence reports on progress towards the wildlife-rich habitat target. However, some proportion of TOW is likely to contribute to the target as it may feature in wood pasture and parkland (that does not qualify as woodland) or in wildlife-rich hedgerows and lines of trees. Whatever the proportion, it is unlikely that >75% of all new TOW planted would count as wildlife-rich habitat, which is what would be required for the increased conifer proportion to be aligned with the wildlife-rich habitat target.

Second, it assumes that no new woodland is planted in protected areas, as planting in these areas does not contribute to the wildlife-rich habitat target (it is covered in other Environment Act targets).

The approach taken here differs from that carried out by Natural England in its ongoing annual assessment of progress towards this target for all habitats (not just woodland and TOW) (Natural England, 2026b). The Natural England evidence reports:

- Are backward looking, based on assessing area-based data that has contributed to the target;
- Contains contributions of all habitat types;
- Includes the restoration of habitats (relevant for woodland is the restoration of broadleaf habitats on Plantations on Ancient Woodland Sites (PAWS))[5]
- Are action based, not outcome based. This means that to qualify for inclusion, evidence for habitat creation only has to demonstrate that habitats will achieve "sufficient quality", where sufficient quality generally aligns with "Good" habitat condition, found in the BNG Metric (Defra, 2024). For woodland, this is almost identical for "favourable" condition as defined in the WCA.

Therefore, the approach used in the eftec report is quite different. The main point of difference is that the eftec analysis is a forward projection and includes consideration of habitat condition as a requirement of

[5] The eftec analysis has not included the restoration of ancient woodland in this analysis. This was not included in the woodland modelling, and the conversion of existing coniferous woodland to broadleaf on PAWS would not increase overall canopy cover so not part of the 2050 woodland target.

contributing towards the target. Based on the definition of "sufficient quality", it was assumed that by 2042 newly created woodland habitat will need to be at least in intermediate condition to contribute to the target. While the definition implies that habitat will reach favourable quality, the oldest newly created woodland will be 17 years old by the target deadline. Given the criteria for woodland ecological condition (e.g. woodland age, diversity of woodland structure) it is unlikely to reach favourable condition at this age, so instead intermediate was used as the minimum requirement.

Table 4: Amount of new planting that contributes towards the 2042 Habitat Target

Woodland types (eftec, 2026)	Contribution towards habitat target[1]	Increase of current trends (ha)	Increased management (ha)	Increased conifer proportion (ha)	Increased agroforestry proportion (ha)
Conifer unmanaged	0%	-	-	-	-
Conifer short rotation	0%	-	-	-	-
Conifer medium rotation	0%	-	-	-	-
Conifer CCF	0%	-	-	-	-
Broadleaf unmanaged	100%	6,400	-	-	-
Broadleaf light management	100%	42,200	48,800	37,400	66,100
Broadleaf rotational	100%	26,400	23,600	20,300	16,900
Broadleaf CCF	100%	17,200	15,500	12,400	11,600
Mixed unmanaged	50%	200	-	-	-
Mixed light management	50%	1,450	1,650	1,100	900
Mixed CCF	0%	-	-	-	-
TOW	0%	-	-	-	-
Planting in 2023-2024 (based on Natural England, (2025) assessment)[2]	100%	3,681	3,681	3,681	3,681
Total	**-**	**97,531**	**93,231**	**74,881**	**99,181**

Table notes: (1) See Table 2 for the percentages of contribution towards the target assigned to each.
(2) This was included in the values as the starting point for the target was 2023, while the eftec modelling started from 2025. Therefore, the Natural England's assessment bridges this gap.

5. Details of contribution to species targets

The two Environment Act statutory species abundance targets aim to halt the decline in species abundance by 2030, and then increase species abundance by 10% from this level by 2042.[6] This is based on a biodiversity indicator index of 1,185 species[7] in England (Defra, 2026b). The statutory species targets delivery plan states it expects a significant contribution to come from achieving the 2050 woodland target and increasing the condition of woodland and TOW (Defra, 2026c).

eftec (2026) was not able to provide evidence on contributions towards these targets, for two main reasons:

- While there are nascent quantitative methods linking large-scale habitat creation to species abundance at a national level, as would be needed to assess the contribution of woodland pathways to these targets, results from these approaches are currently unpublished. Further, the evidence linking woodland and TOW creation and management to relative changes in species abundance is unclear, especially at a national level.
- The multi-species indicator that is used to assess progress towards the statutory species targets is still undergoing development (Defra, 2026d), and has been subject to critique, including whether it is representative of species found in England, or if it can accurately track year to year changes in species abundance (Robertson et al., 2026). Furthermore, a multi-species abundance indicator is still a proxy of biodiversity, which is a multi-dimensional and multi-scale concept that is difficult to define in a single metric (Díaz et al., 2006).

There is, however, some evidence linking different types of woodland to species abundance, and other considerations for what woodland types are likely to support greater levels of biodiversity at a species level, which may be relevant for framing contributions towards the species abundance targets.

Woodlands including native broadleaves can support more native species of certain taxa (e.g. birds, per Broome *et al.*, 2017), and can support more overall woodland biodiversity compared with woodlands containing only non-native conifer species (Mitchell et al., 2025). Given that the biodiversity index contains native species (and habitat specialist species), this suggests that planting more native broadleaf and mixed woodland will support the species target better than non-native conifer woodland. This is supported by native woodland's inclusion in the wildlife-rich habitat target (Natural England, 2024). However, other papers highlight that conifer woodland can still support many species, and that well-managed non-native forests are not "ecological deserts" (e.g., Quine and Humphrey, 2010).

Other factors, including the management of woodland and the impact of risks, are also important for the contribution of woodland towards the species abundance targets, but have not been quantitively assessed in this work. Some general principles supporting biodiversity would be to increase the complexity of forest structure and tree species diversity (Beesley et al., 2025). The UKFS (Forest Research, 2022) generally follows these principles. The eftec analysis assumed all new woodland followed this standard. Based on this, newly created woodland would be expected to provide higher levels of biodiversity than equivalent age woodland managed in a different way, supporting the delivery of the species abundance targets.

[6] There is a third target to improve the Red List Index for England for species extinction risk by 2042 compared to 2022.
[7] Covering the taxon of: birds; bumblebees; butterflies; fish; freshwater invertebrates; mammals; moths; and vascular plants

6. Economic benefits of biodiversity

eftec (2025) used woodland condition (based on the WCA indicators) as the only proxy for woodland biodiversity. This method was carried over to eftec (2026) to estimate the contribution of new woodland and management changes to biodiversity but does not have sensitivity to the type of woodland created. This lack of sensitivity is due to two reasons:

- All woodland types are assumed to contribute to biodiversity outcomes equally, assuming the same level of condition is achieved;[8] and
- The WCA and NFI ecological condition measurement scales tend to score most woodland as "intermediate" condition, regardless of the tree mix present. This is in part due to the breadth of scores allowed for each category, and due to individual metrics assessed (see Appendix 1).

The rest of this section presents a sensitivity analysis on the benefits of woodland biodiversity outcomes from planting and management under a different set of assumptions about how much each category contributes to overall biodiversity. Due to the lack of quantitative evidence to support assumptions on relative biodiversity contributions[9], this sensitivity analysis uses the priority habitat classifications and a set of accompanying ad-hoc value factors which are used to adjust the biodiversity benefit estimates.

Table 5 presents the relative biodiversity factors (as a percentage of the eftec (2025) values), applying the following assumptions that reflect the relative expected proportion of native species:

- All increases in woodland extent and condition have at least some positive contribution towards biodiversity;
- Coniferous woodlands, which are much less likely to be comprised of native species and do not contribute towards biodiversity targets in England, have lower relative biodiversity values;
- Mixed woodlands have smaller contributions to biodiversity than broadleaf woodlands, but higher contributions than coniferous woodlands.

Given the lack of supporting quantitative evidence on the relative levels of woodland biodiversity, relatively large confidence intervals are also applied, with the exception of broadleaf woodland types, as broadleaf is expected to fall into one of the priority habitat types.

The biodiversity benefits for each scenario in eftec (2026) have been recalculated using the adjusted eftec (2025) values and the area and condition outputs by woodland type and management from eftec (2026). Table 6 presents results of the adjusted biodiversity values for all woodland, and Table 7 for new woodland only. This analysis shows that the benefits of scenarios with higher levels of conifer planting decrease sharply with increasing levels of species sensitivity applied. This is an expected result as the adjusted values penalise conifer woodlands, but the scale of the change demonstrates that this sensitivity is meaningful. Regardless, the relative benefits between scenarios change accordingly, such that those scenarios that increase management and increase agroforestry result in higher relative biodiversity benefits. However, it is notable that the full CBA for all scenarios results in benefits well in excess of costs, regardless of the

[8] This result is partially due to the framing of the eftec (2025) evidence, which was a Great Britain wide study. Therefore, it included native coniferous forests found in Scotland, which would be expected to have high levels of biodiversity. This is not the case for the English context.

[9] There is a lack of quantitative evidence on biodiversity outcomes for different woodland types in England, which is a clear gap in the literature. More research should be undertaken linking dominant tree species mixes to the biodiversity achieved (using any relevant measure or index) to better inform analyses around the future contributions of woodland actions to biodiversity targets.

values chosen for biodiversity. This means that in aggregate, the sensitivity to species and biodiversity outcomes may not be critical evidence for policy. Rather, it is the alignment of the scenarios to the biophysical targets that is more critical to policy making and target setting.

Table 5: Illustrative sensitivity factors applied to biodiversity values by broad woodland type and management

Woodland type and management	Area contribution towards habitat target[1]	High sensitivity to dominant species	Moderate sensitivity to dominant species	Low sensitivity to dominant species	No sensitivity to dominant species - eftec (2026)
Conifer unmanaged	0%	0%	25%	50%	100%
Conifer short rotation	0%	0%	25%	50%	100%
Conifer medium rotation	0%	0%	25%	50%	100%
Conifer CCF	0%	0%	37.5%	75%	100%
Broadleaf unmanaged	100%	100%	100%	100%	100%
Broadleaf light management	100%	100%	100%	100%	100%
Broadleaf rotational	100%	100%	100%	100%	100%
Broadleaf CCF	100%	100%	100%	100%	100%
Mixed unmanaged	50%	50%	75%	100%	100%
Mixed light management	50%	50%	90%	100%	100%
Mixed CCF	50%	50%	90%	100%	100%
TOW	0%	25%	50%	100%	100%

Table notes: (1) see Table 2 for details of area contribution assumptions towards habitat target

Table 6: Cultural benefits of increased biodiversity provision from 2025 to 2100 – all woodland (£ billions, PV75, 2026 prices) (only central values reported for sensitivity to dominant species)

Scenario	eftec (2026)	High sensitivity to dominant species	Moderate sensitivity to dominant species	Low sensitivity to dominant species
Increase of current trends	£17 (£15 to £23)	£11.1	£13.7	£17.5
Increased management	£21 (£17 to £24)	£12.6	£15.6	£19.9
Increased conifer proportion *(30% of woodland planted is conifer)*	£19 (£16 to £24)	£9.4	£12.7	£17.3
Increased agroforestry proportion	£20 (£18 to £23)	£13.0	£15.6	£19.8

Table note: each scenario has a mix of woodland types and management, regardless of the scenario focus. See the main report (eftec, 2026) for the full specification for planting and management in each scenario.

Table 7: Cultural benefits of increased biodiversity provision from 2025 to 2100 - new woodland only (£ billions, PV75, 2026 prices) (only central values reported for sensitivity to dominant species)

Scenario	eftec (2026)	High sensitivity to dominant species	Moderate sensitivity to dominant species	Low sensitivity to dominant species
Increase of current trends	£15.0 (£13.0 to £17.2)	£11.1	£12.5	£14.2
Increased management	£15.2 (£13.0 to £17.3)	£11.1	£12.6	£14.5
Increased conifer proportion *(30% of woodland planted is conifer)*	£15.0 (£13.0 to £17.1)	£8.7	£10.7	£13.0
Increased agroforestry proportion	£15.2 (£13.1 to £17.2)	£11.6	£12.8	£14.6

Table note: each scenario has a mix of woodland types and management, regardless of the scenario focus. See the main report (eftec, 2026) for the full specification for planting and management in each scenario.

7. Discussion

Biodiversity is difficult to measure and assess. It is a complex, multifaceted concept, and data on biodiversity is typically patchy and incomplete (although it is improving; e.g., the government's multi-species index, the forest biodiversity index (Bellamy et al., 2024)). Given this complexity and the existing data gaps, biodiversity indicators and metrics all have shortcomings, especially at large spatial scales (e.g, Defra, 2026b). The selection of biodiversity indicators can also have a material influence on the results of ecological and economic analyses. This note demonstrates that influence in relation to biodiversity proxies used for the assessment of current and future woodlands.

The valuation evidence presented in eftec (2025) and used in eftec (2026) use woodland condition as a proxy indicator for woodland biodiversity. This choice of metric allowed comprehensive existing datasets to be used (Forest Research, 2020) and was aligned to measures used in policy and assessments (the NFI ecological condition score and the related WCA metric). Both reports acknowledge the limitations of condition as a proxy for biodiversity, but also recognise that it is one of the few widely available and understood proxies that could be used in a UK wide context. The management of woodland for condition, as scored across several criteria, is also a clear policy target in itself, and many of the scoring criteria do relate to biodiversity potential (e.g., the presence of deadwood and the canopy structure of the woodland).

This note begins to quantify some of the implications of the choice of biodiversity proxies and metrics in the specific context of woodlands in England. As shown in Section 2 and 3, there are no coniferous-dominant woodlands that are recognised as priority habitats in England, and this implies that overall, non-native coniferous woodland in England is viewed as contributing less to woodland biodiversity than other woodland types.[10] No England-wide study was identified that systematically estimates comparable overall biodiversity outcomes for broadleaved, mixed and conifer-dominated woodland while controlling for differences in woodland age, structure, management and landscape context. However, several UK and GB studies quantify particular dimensions of biodiversity across tree species or forest types. This evidence indicates that dominant tree species and the identity of species included in mixtures can materially affect the species supported, but that the scale and sometimes direction of the difference varies across taxonomic groups and biodiversity metrics (e.g., Mitchell *et al.*, 2025). Consequently, the relative factors used in this sensitivity analysis should be interpreted as illustrative scenarios rather than empirically estimated biodiversity ratios. The direct implication of this is that pathways for the 2050 woodland target that involve large quantities of coniferous woodland will be less likely to achieve biodiversity targets than pathways which continue current trends or prioritise broadleaf woodlands (all else equal). This note therefore builds on the results and conclusions of eftec (2026) by providing more detail on how woodland types relate to the modelling conducted, and how those types are likely to contribute to stated biodiversity objectives.

This note also demonstrates the sensitivity of the accompanying economic assessments to the assumptions about woodland condition and type. By adjusting the eftec (2025) values across a range for each dominant species type, where coniferous woodlands are assigned lower value based on the alignment to priority habitats and qualitative notes on biodiversity potential, the sensitivity analysis demonstrates that pathways with relatively higher focus on coniferous woodland would produce lower cultural benefits for biodiversity improvements. In the context of the wider cost-benefit analysis these differences are still

[10] Non-native coniferous woodland in England is also typically heavy managed, monoculture woodland of single stand-heights (e.g., plantation woodlands).

relatively small, with all pathways still producing benefits well in excess of costs. This is due in part to conifer planting being a relatively low proportion of total planting in all scenarios, with a maximum of 30% in conifer focussed scenario. However, this result does support the research recommendations made in eftec (2026), particularly: (i) that additional primary research is needed on woodland outcomes by type (in this case, quantified assessments of biodiversity), and (ii) that case studies could be used to better understand the costs and benefits of marginal decision-making (e.g., different kinds of woodland created or maintained in different locations).

Finally, some of the policy recommendations also hold. For one, no matter the pathway, as there are ecological time lags between actions and the impact on species abundance, and given the uncertain nature of the impact of specific actions, front loading activities to achieve higher quality woodlands faster will have more impact on the 2042 species and wildlife-rich habitat targets. This need for action in the near-term is acknowledged in the species target delivery plan, but does not align with the woodland target delivery plan, which sees woodland creation rates only increase significantly after 2030 (and is significantly lower than the amount of woodland creation assumed by the Climate Change Committee under its balanced pathway; see the Carbon Supplement to eftec (2026)). Second, the contribution of woodlands towards species and wildlife-rich habitat targets will increase with the overall amount of woodland delivered, and at the national level woodland delivery produces benefits well in excess of costs.

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Appendix 1 Woodland condition and biodiversity

The original eftec (2026) analysis uses woodland biodiversity values from eftec (2025) analysis, which represents biodiversity via the condition of woodland as assessed using the woodland condition assessment (WCA). This is a woodland level assessment based on 15 criteria. Each indicator is scored as unfavourable (1 point), intermediate (2 points), or favourable (3 points). The scores across all 15 indicators[11] are then added, and woodlands with a total score of less than 26 are considered to be in unfavourable condition, while woodlands with a total score of more than 35 are considered favourable. The NFI woodland ecological condition analysis uses a near-identical assessment criteria. These both assess woodland as either unfavourable, intermediate, or favourable, based on their aggregated score. Biodiversity benefits were calculated based on the change to woodland condition, relative to the current level of woodland condition in English woodlands (reflecting the framing of the choice task in eftec (2025)).

NFI ecological condition data is available at the granularity required for the eftec derived woodland types. Therefore, the average condition level for each woodland type was estimated based on the expected value for each indicator, at different ages bands. This provided a probability matrix of individual woodland units which was used to estimate the probability of a woodland unit changing condition each year (being replanted or lost to risk also affected the condition of the woodland unit). It is this change in condition which is the basis for estimating the change biodiversity benefits of woodlands, covering existing woodlands and new planting.

However, the design of the WCA criteria leads to most woodland being assessed as intermediate, reducing the sensitivity of woodland condition as a proxy for biodiversity, and hence the range of biodiversity values in the analysis.

The following text is a more detailed discussion on quantifying woodland biodiversity. It is taken directly from (eftec, 2025)

ALL TEXT BELOW HERE TO APPENDIX 2 IS TAKEN DIRECT FROM (eftec, 2025)

[11] These indicators are: age distribution of trees; wild, domestic and feral herbivore damage; invasive or non-native plant species; number of native tree species; cover of native tree and shrub species; open space within woodland; proportion of favourable land cover; woodland regeneration; tree health; vegetation and ground flora; woodland vertical structure; veteran trees; amount of deadwood; size of woodlands; and woodland disturbance.

Quantifying forest biodiversity is at the forefront of understanding how forest ecosystems are changing in response to anthropogenic activities and disturbances, most notably climate change and the proliferation of non-native species (Clark et al., 2011; Delavaux et al., 2023; FAO, 2022). A key challenge in biodiversity assessment is reaching consensus on how to quantify biodiversity, and which facets of biodiversity are most closely linked to ecosystem stability, functioning, and human wellbeing. The most general framework for quantifying biodiversity follows that of Díaz *et al.* (2006)which identifies the three broad components of ecosystem diversity: (1) species, (2) functional, and (3) genetic (Bennett et al., 2015; Delavaux et al., 2023; Overcast et al., 2021). For each category, these can also be broken down into organismal types. For woodlands, this is generally: trees, herbaceous plants and shrubs, animals, and microbes. Animals and microbes can further be divided as relevant (birds, insects, mammals, fungi, bacteria).

While species richness is a tangible and (generally) accessible metric for quantifying biodiversity, it needs to be considered alongside the functional and genetic variation of species (Cadotte et al., 2009). Two different woodlands can have identical numbers of species, but fundamentally different levels of functional diversity. For example, one woodland may be composed of three species – all of which are pines – whereas the other may be composed of one pine, one oak, and one larch. This latter system has much higher functional diversity in terms of variation in leaf size and shape, bark thickness, root depth, canopy shape, seed size, and so on. As such, it is generally expected to be more resilient to different disturbances without leading to a total collapse of the ecosystem (Aquilué et al., 2020). Similarly, genetic information is critical for understanding how resilient individual populations are to different environmental conditions, with higher genetic (within-species) variation imparting higher plasticity and greater intraspecific trait variation (Agashe, 2009). These relationships are further mediated by the abundances of species within and across landscapes, such that the abundance distributions (variation, range, mean) comprise an additional aspect of biodiversity across ecosystems (Díaz et al., 2006).

In an ideal setting, species, functional, and genetic diversity and abundance distributions would be calculated across trees, plants, mammals, fungi, etc. However, this approach is severely constrained by a lack of freely available data for UK ecosystems. Instead, a more common approach is to focus on key indicator species that either reflect the "health" of the ecosystem, or which reflect important cultural views. When viewed through the lens of the forest type classification, such an approach is already generally implemented in both classification schemes, either directly (as in the National Vegetation Classification) or via subsequent implementation by outside organisations (e.g. UK priority habitats) where there is relatively good documentation about common trees, plants, and animals within the different woodland types. An important limitation to such an approach, however, is that these indicators are not necessarily consistent, and are thus over-represented in wide-spread habitats and those with high public interest and use. However, through the lens of forest management, this approach provides a feasible way of depicting broad differences in woodland health and diversity. In addition, for trees and plants, our understanding of functional diversity is relatively comprehensive (Maynard et al., 2022), such that this knowledge can easily be translated into broad categories of functional differences across habitats (e.g., high number of tree species with similar leaves and canopy shapes, versus high number of tree species with different leaf shapes and sizes, and different canopy heights).

Lastly, efforts to quantify biodiversity are increasingly focused on landscape properties (e.g. stand structure diversity, connectivity, size, connectedness) (Díaz et al., 2006) or structural aspects of woodland habitats (canopy diversity, tree size diversity). While these metrics are important aspects of habitat quality (and are

indeed often correlated with biodiversity), they are not true measures of "biodiversity". For this reason, landscape and structural features can be considered as indicator variables reflecting different management and habitat properties.

A1.1 Aspects of forest biodiversity

Direct quantification and measurement of biodiversity is difficult, and assessments of woodlands often rely on characteristics that are indicative of forest structure and health. When selected appropriately, these metrics relate to the potential to support biodiversity, along with the resilience and stability of biodiversity in the face of disturbances. From the perspective of economic valuation of forest biodiversity, a focus on structure provides a natural link between individuals' "visual" perception of woodlands and the underlying biodiversity it supports.

Using the existing classifications and condition assessment methods as a starting point, Table A1.1 sets out some of the characteristics that could be used to describe forests.

Table A1.1: Long list of forest characteristics for developing and defining forest profiles

Characteristic	Description	Related characteristics
Dominant tree species	The species that occupy the upper canopy position often dictate the resilience, health, ecosystem services, and successional trajectory of the woodland.	Number of tree species, vertical structure, presence of ancient/veteran trees
Number of tree species present	The number of trees species is closely linked to the resilience of a woodland and the number of niches and habitats it provides to non-woody plants and wildlife.	Number of native tree species present, vertical structure, animal species, fungal species, understory species
Number of native tree species present	Protecting and conserving native species is critical for overall landscape management and ensuring sufficient genetic and functional diversity across broad regions.	Dominant tree species, number of tree species
Vertical structure	Woodlands with variable tree heights and canopy structures can support much higher wildlife biodiversity, and are more efficient at sunlight capture, supporting higher productivity and ecosystem resilience.	Presence of veteran trees, number of native tree species present, number of tree species present
Age distribution of trees	Trees of different ages provide different habitats and are subject to different disturbance pressures. A variety of ages also suggest natural succession is taking place.	Understory plants present (non-tree species), size distribution, amount of regeneration, dominant tree species
Size distribution of trees	Closely related to age distribution, having trees with variable diameters is important for providing different wildlife habitats, efficient light capture, and resilience to variable disturbances.	Age distribution, vertical structure, dominant tree species
Amount of regeneration	Natural regeneration is a key process promoting a healthy forest ecosystem, ensuring stable productivity and habitat availability.	Dominant tree species, number of tree species, vertical structure, age distribution, animal species present
Presence of veteran trees	Veteran/ancient trees have important cultural heritage, while providing key niches for plants, animals, and microbes.	Understory plants present (non-tree species), dominant tree species, vertical structure, animal species, fungal species, understory species

Characteristic	Description	Related characteristics
Invasive plant species	Invasive plants are non-native species whose spread cannot easily be contained and which are detrimental to native biodiversity.	Number of non-native tree species, dominant tree species, animal species, fungal species, understory species
Volume of deadwood	Deadwood provides importance niches for wildlife (cavity nesting birds, small mammals), along with many plants, mosses, and lichens.	Vertical structure, age distribution of trees, understory plants present (non-tree species), animal species, fungal species, understory species
Understory plants present (non-tree species)	Understory plants provide a variety of food and habitat sources to animals and are critical for soil stabilization and nutrient cycling.	Presence of veteran trees, age distribution of trees
Animal species present	In addition to contributing to overall biodiversity, animals are key for numerous natural processes, including seed dispersion, pollination, and pest deterrence.	Age distribution of trees, presence of veteran trees, number of tree species, regeneration, fungal species present
Fungi species present	Fungi play critical roles in forest ecosystems, including the decomposition of dead wood and via mycorrhizal symbioses that protect against root pathogens and provide essential soil nutrients.	Dominant tree species, number of tree species, volume of deadwood, animal species present, invasive plant species
Geographic / topographic location	The location of a woodland (upland vs. lowland; coastal vs. inland; slope, mountain, or valley; etc.) is a key determinant of the types of trees, plants, and animal species that can survive. It thus sets the baseline levels of biodiversity for a particular woodland type.	(All of the above)

This is not an exhaustive list, but represents the aspects were viewed as most important based on an assessment of the literature and existing assessment systems. Many of these characteristics are highly correlated and could be grouped into broader aspects. Two primary aspects are:

- Forest "composition" – a description of the general tree species that are present, using either a generalised dominant tree type or common combinations of tree species. Composition provides a direct measure of tree-species taxonomic diversity.
- Forest "condition" – a combined measure that captures most of the other characteristics of the forest given a classification, such as canopy structure or tree health. These are often used as indicators of biodiversity, such as in the Biodiversity Metric 4.0 (e.g., Figure A1.2).

A1.2 Forest composition

Current classification systems for forests tend to follow one of three approaches, based on tree community composition and type (e.g. mixed deciduous forest), dominant overstorey species (e.g. oak woodland), or location/environmental indicators (e.g. soil characterisation such as "gravelly brown earth" or climactic characterisation such as moisture and temperature)[12]. There is substantial overlap between the three

[12] These are the two dominant geographic characteristics included in the "Forest Development Types" (Forestry Commission, 2023, Available at: https://cdn.forestresearch.gov.uk/2022/02/FDT-Flashcards_V1_2021.pdf)

approaches, with most classification systems favouring one approach but also borrowing elements from the others.

In the UK, two of the most widely used woodland composition classification schemes are the UK Biodiversity Action Plan (UK BAP) and the National Vegetation Classification (NVC). Each of these two methods has different advantages, as each was constructed for different reasons. A third system specific to UK forestry, the Forest Development Types (FDTs) uses a similar set of information in a different framing with the intent of providing useful and actionable information to UK foresters.

- **UK BAP and UK HAB classification (Ruddock et al., 2007; UK BAP, 2005; UKHab, 2023)** - a community-composition approach which has been adopted in large part via the UK Habitat Classification (UKHab, 2023). These approaches are a general, hierarchical classification system and identification protocol for all habitats across the UK, including woodlands. Because of its broad scope, UK BAP tends to adopt a typology based on general community composition, but with some elements of location (upland/lowland) and dominant overstorey species (e.g. native pine woodlands, upland mixed ashwood). The UK BAP categories are relatively broad and require little taxonomic knowledge of woodland species or understory plants and can readily encompass novel or non-traditional habitat types (e.g. non-native conifer forests). It is widely adopted by non-governmental organisations as a means of classifying priority forest types to aid in conservation and restoration efforts, leading to some available metadata on wildlife and indicator species that are common across habitats, but drawing some questions on their scientific basis.
- **National Vegetation Classification** (Hall et al., 2004) - a UK-specific plant community classification that is tailored to the unique biophysical features of UK ecosystems (Table A1.2). It takes a purely taxonomic approach to classification (e.g., *'Fraxinus excelsior - Acer campestre - Mercurialis perennis* woodland') and is specific to UK habitats. In contrast to UK BAP classification, the NVC classification is also linked to understory vegetation characteristics (e.g., multiple Fagus sylvatica woodland types are determined by the presence of a *Mercurialis perennis* ground layer) which are indicative of different microclimates and soil conditions (e.g., base-rich soils). Because these categorizations are more closely linked to abiotic growing conditions and habitat requirements, the NVC provides a more ecologically grounded approach to classification and provides a classification key to identify any given woodland based on indicator species. As such, it requires substantial taxonomic knowledge for keying some woodland types, but it also provides direct information on understory vegetation composition and diversity. However, at the highest level, the classification remains relatively simple, focusing primarily on the dominant overstorey tree species and the corresponding soil properties (e.g., acidic, basic, wet mineral, etc) that determine the general habitat type and quality. From the perspective of this study, the advantage of this approach is that it may align better with the public's view of woodlands by focusing on well-known dominant species (e.g. "oak woodlands", "beech woodland") which also have direct historical and cultural interpretations.
- **Forest development types** (Hall et al., 2004) – a “comprehensive list of silvicultural options for a site” (ibid, pg. 7), this framework provides a wide range of potential tree species mixes that could be taken on a site based on ecological suitability and management objectives. Each development type is described in terms of the dominant tree species, as well as secondary and minor species that could also be planted alongside. The climatic and nutrient preferences for that type are also presented alongside the management actions and outcomes in terms of economic, social, and

environmental outcomes. These options and the supplementary information on each are intended to give forest managers useful information to make well-informed decisions for their sites.

Although the first two classification systems present very different approaches, they can be translated into each other using a classification code provided by the Joint Nature Conservation Committee (JNCC, 2008). Note, however, that they can be contradictory as well as overlapping, such that the same NVC community may align with multiple UK BAP communities, and vice versa. Thus, from a scientific viewpoint, there is no intrinsic preference for one over the other. The FDTs on the other hand are very specific to the trees that exist on the site. However, the profiles are very specific, such that difference between each may be too nuanced to get sufficient differences for the aims of this study. The decision on classification system should largely reflect the goals of the project, as the typology selected will need to reflect the common forests in the public forest estate, and any potential future types that may be prioritised for management of those lands. Therefore, the system may not directly match any of the systems, but take an adapted approach - such as grouping the FDTs into broader categories, in the spirit of the UK BAP.

Table A1.2: Typology of forest and land types

Forest or land type	Description	Specific habitat examples (UK Hab code)
Broadleaf woodland	Deciduous woodland dominated by a mix of oak, maple, birch, or beech in the canopy or sub-canopy layer. Understory a variable mix of vascular plants, grasses, and shrubs.	• Dry oak-dominate woodland (w1f5) • Oak hornbeam forests (w1f6) • Lime-maple woodlands (w1b5) • Beech forests (w1c5-6)
Coniferous woodland	Woodland with conifer trees as the dominant and sub-dominant species, typically in low diversity (1-2 species). Understory typically dominated by bryophytes or shrubs (in the absence of grazing).	• Native Pine Woodlands (w2a5) • Yew woodland (w1c7) • Non-native conifer plantations and woodland (e.g., Sitka spruce, Douglas-fir)
Mixed broadleaf / conifer woodland	Woodland with broadleaf and needle leaf trees in the canopy or sub-canopy. Typically represents a gradient between broadleaf and coniferous woodlands, often containing non-native conifers (e.g., spruce).	• Beech-yew forests (w1c6/w1c7) • Pine woodland with birch, beech, or oak (w1h6) • Mixed oak/deciduous forests with pine or spruce (w1h5)
Semi-forested land	Managed legacy woodlands containing common and rare native and non-native trees, most frequently oak but also beech, birch, sweet chestnut or Scots pine. Grazing is fundamental to the ecosystem, as is the presence of ancient and/or veteran trees.	• Wood-pasture and parkland
Open land	Land with few to no trees that is being used for productive purposes.	• Agricultural land • Clear cut • Grazing land

A1.3 Forest condition

Categorising the state of forested ecosystems can be divided into three general approaches, based on: (1) land-use indicators; (2) inputs/outputs; and (3) ecosystem properties and attributes (Erb et al., 2013; Gossner et al., 2014).

- **Land-use approaches** are qualitative approaches that group forest types into management categories based on key indicators of land-use intensity or activities, such as the presence and extensiveness of logging or silviculture, grazing, or recreational activities (Duncker et al., 2012). The underlying assumption of these is that different indicators (e.g. selective thinning) have direct ecological outputs related to biodiversity or composition (e.g. removal of non-focal timber species) (Schall and Ammer, 2013).
- **Input/output-based approaches** instead look to quantify intensity based on the extent of inputs into the systems (labour and capital per land area, fertiliser application, cropping frequency) and/or the extent of outputs out of the system (agricultural yield, livestock density, annual merchantable timber volume) (Levers et al., 2014). These approaches can be closely related to land-use indicators, but typically are more quantitative, seeking to provide direct measures of inputs/outputs to assign a land-use value.
- **Ecosystem property approaches** focus on features that capture ecosystem-level properties, such as biodiversity or net primary productivity; or, more commonly, they measure features of the ecosystem that reflect structural and vegetative characteristics that directly indicate management activities (Erb et al., 2013). These approaches can link disturbances to ecosystem properties and can often be done remotely or using spatial proxies, such as canopy cover, human-modification index, landscape intactness, or even local population density (Theobald et al., 2020).

There are existing systems used within Great Britain to classify forest condition. For example, the Biodiversity Metric 4.0 uses thirteen indicators which are evenly weighted to score a forest on an overall condition scale of good, moderate, or poor. The Woodland Condition Assessment use a similar system, but with 15 categories of assessment. While the overall metric is an assessment of condition, the individual indicators tend to overlap with typical land-use and forest management practices. Therefore, a translation from management practices to the expected condition should be possible. The specific indicators used in Biodiversity Metric 4.0 are too numerous to be used independently in the stated preference research – but the overall outcome in terms of forest condition (as measured by the diversity of species present) could be used. It is also recommended that a set of labels present the various conditions neutrally (Table 3.3). Finally, it is important that the condition scale reflects the current public forest estate, and potential future changes to that estate. As such, certain conditions, such as completely unmanaged land, are not included in the classification.

THRESHOLDS TABLE		Condition Assessment Criteria		
Indicator	**Assessment method**	**Good**	**Moderate**	**Poor**
	Score per indicator	3	2	1
	Total score	Greater than 35 = Good	26–35 = Moderate	Less than 26 = Poor
1 Age distribution of trees	On **woodland walk** record the number of different tree age classes found across the whole woodland. An age class needs to be recognisable across the woodland, so a few saplings is not enough for an age class of young trees	Three age classes present	Two age classes present	One age class present
2 Wild, domestic and feral herbivore damage	Note evidence of significant browsing within survey plots	No significant browsing damage evident in woodland	Evidence of significant browsing pressure is present in less than 40% of whole woodland	Evidence of significant browsing pressure is present in 40% or more of whole woodland
3 Invasive non-native plant species	Record the presence and percentage cover of invasive non-native plant species on **woodland walk** and within survey plots. Assess this for each distinct habitat parcel. If the distribution of invasive non-native species varies across the habitat, split into parcels accordingly	No invasive species present in woodland	Rhododendron *Rhododendron ponticum* or Cherry Laurel *Prunus laurocerasus* not present, other invasive species < 10% cover	Rhododendron and Cherry Laurel present, and/or other invasive species ≥10% cover
4 Number of native tree species	Record the main tree and shrub species present in the upper canopy (>5 m) within each survey plot	5 or more native tree or shrub species found across whole woodland parcel	3–4 native tree or shrub species found across whole woodland parcel	0–2 native tree or shrub species across whole woodland parcel
5 Cover of native tree and shrub species	Record percentage cover in the upper and understorey canopies of native tree and shrub species within survey plots	>80% of canopy trees and > 80% of understorey shrubs are native	50-80% of canopy trees and 50–80% of understorey shrubs are native	<50% of canopy trees and < 50% of understorey shrubs are native
6 Open space within woodland	Note areas of open habitat on map of woodland during **woodland walk**. In addition, highlight any other known / potential areas of open habitat according to aerial photographs. Visit these areas where confirmation is required. Note that the scoring is different for smaller woodlands, given the increased ratio of edge habitat to woodland where the woodland is <10 ha	10–20% of woodland has areas of temporary open space. Unless woodland is <10 ha, in which case 0–20% temporary open space is permitted	21–40% of woodland has areas of temporary open space	<10% or >40% of woodland has areas of temporary open space. But if woodland <10 ha has <10% temporary open space, please see Good category
7 Proportion of favourable land cover	Record percentage cover of favourable land cover within a 5.6 km radius (100 km² circle) of woodland	>20%	10–20%	<10%
8 Woodland regeneration	Record the number of classes of native/non-native regeneration on **woodland walk** and within survey plots. All three classes would fall in the 'young' category of the 'age distribution of trees' indicator, but the regeneration indicator gathers additional information by considering regeneration potential. If seedlings, saplings and young trees are all present then natural regeneration processes are happening	All 3 age classes present in woodland: (A) Trees 4–7cm Diameter at Breast Height (DBH); (B) saplings; (C) seedlings or advanced coppice regrowth	1 or 2 age classes only present in woodland	No age classes or coppice regrowth present in woodland
9 Tree health	On **woodland walk** and within survey plots note and estimate percentage of dead canopy trees and/or trees showing crown dieback across woodland (if present) and presence of pest/diseases	Tree mortality 10% or less, no pests or diseases **and** no crown dieback	11–25% mortality **and/or** crown dieback **or** low-risk pest or disease present	Greater than 25% tree mortality **and/or** any high risk pest or disease present
10 Vegetation and ground flora	Using the NVC key establish whether there is a recognisable woodland NVC community at ground layer in each survey plot and note also whether there are ancient woodland indicators	Recognisable woodland NVC plant community at ground layer present, strongly characterised by ancient woodland flora specialists	Recognisable woodland NVC plant community at ground layer present	No recognisable woodland NVC plant community at ground layer present
11 Woodland vertical structure	Record the number of different canopy storeys present in each survey plots	3 or more storeys across all survey plots **or** a complex woodland	2 storeys across all survey plots	1 or less storey across all survey plots
12 Veteran trees	On a map of the woodland, note the location of veteran trees encountered during the **woodland walk**. Additionally, record on the map any other known veteran trees present in the woodland	2 or more veteran trees per hectare	1 or fewer veteran trees per hectare	No veteran trees present in woodland
13 Amount of deadwood	Record presence of standing deadwood on **woodland walk** by woodland type and within survey plots	50% of all survey plots within the woodland parcel have deadwood, such as standing and fallen deadwood, large dead branches and or stems branch stubs and stumps, or an abundance of small cavities	Between 25% and 50% of all survey plots within the woodland parcel have deadwood, such as standing and fallen deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities	Less than 25% of all survey plots within the woodland parcel have deadwood, such as standing and fallen deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities
14 Size of woodlands	Record total area of woodland	> 20 hectares	5–20 hectares	< 5 hectares
15 Woodland disturbance	Record evidence of nutrient enrichment and/or damaged ground on **woodland walk**	No nutrient enrichment or damaged ground evident	<1 hectare in total of nutrient enrichment across woodland area **and/or** <20% of woodland area has damaged soil	1 hectare or more of nutrient enrichment **and/or** >20% of woodland area has damaged soil.

Figure A1.1: Woodland Condition Assessment (WCA4). ***Source: (Forestry Commission et al., 2024)***

Indicator	Good (3 points)	Moderate (2 points)	Poor (1 point)
Age distribution of trees	Three age-classes[1] present.	Two age-classes[1] present.	One age-class[1] present.
Wild, domestic and feral herbivore damage	**No significant browsing damage evident in woodland[2].**	Evidence of significant browsing pressure is present in 40% or less of whole woodland[2].	Evidence of significant browsing pressure is present in 40% or more of whole woodland[2].
Invasive plant species	**No invasive species[3] present in woodland.**	Rhododendron *Rhododendron ponticum* or cherry laurel *Prunus laurocerasus* not present, other invasive species[3] <10% cover.	Rhododendron or cherry laurel present, or other invasive species[3] >10% cover.
Number of native tree species	Five or more native tree or shrub species[4] found across woodland parcel.	Three to four native tree or shrub species[4] found across woodland parcel.	Two or less native tree or shrub species[4] across woodland parcel.
Cover of native tree and shrub species	**>80% of canopy trees and >80% of understory shrubs are native[5].**	50 - 80% of canopy trees and 50 - 80% of understory shrubs are native[5].	<50% of canopy trees and <50% of understory shrubs are native[5].
Open space within woodland	**10 - 20% of woodland has areas of temporary open space[6].** **Unless woodland is <10ha, in which case 0 - 20% temporary open space is permitted[7].**	21 - 40% of woodland has areas of temporary open space[6].	<10% or >40% of woodland has areas of temporary open space[6]. But if woodland <10ha has <10% temporary open space, please see Good category[7].
Woodland regeneration	All three classes present in woodland[8]; trees 4 - 7 cm Diameter at Breast Height (DBH), saplings and seedlings or advanced coppice regrowth.	One or two classes only present in woodland[8].	No classes or coppice regrowth present in woodland[8].
Tree health	**Tree mortality less than 10%, no pests or diseases and no crown dieback[9].**	11% to 25% mortality and/or crown dieback or low-risk pest or disease present[9].	Greater than 25% tree mortality and or any high-risk pest or disease present[9].
Vegetation and ground flora	Recognisable NVC plant community[10] at ground layer present, strongly characterised by ancient woodland flora specialists.	Recognisable woodland NVC plant community[10] at ground layer present.	No recognisable woodland NVC plant community[10] at ground layer present.
Woodland vertical structure	Three or more storeys across all survey plots or a complex woodland[11].	Two storeys across all survey plots[11].	One or less storey across all survey plots[11].
Veteran trees	Two or more veteran trees[12] per hectare.	One veteran tree[12] per hectare.	No veteran trees[12] present in woodland.
Amount of deadwood	50% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, branch stubs and stumps, or an abundance of small cavities[13].	Between 25% and 50% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities[13].	Less than 25% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities[13].
Woodland disturbance	No nutrient enrichment or damaged ground evident[14].	Less than 1 hectare in total of nutrient enrichment across woodland area and or less than 20% of woodland area has damaged ground[14].	More than 1 hectare of nutrient enrichment and or more than 20% of woodland area has damaged ground[14].

Figure A1.2 Biodiversity Metric (BM) 4.0 scoring for woodlands. Source: Defra (2024)

Appendix 2 Detailed change in condition in woodland modelling

Appendix Table 1 **Change in woodland condition by type and scenario by 2042 (from eftec, 2026)**

Woodland type	Condition	Increase of current trends (ha)	Increased management (ha)	Increased conifer proportion (ha)	Increased agroforestry proportion (ha)
Coniferous unmanaged	Unfavourable	2,300	900	300	1,300
Coniferous unmanaged	Intermediate	-2,200	-900	-300	-1,500
Coniferous unmanaged	Favourable	500	-	-	200
Coniferous short rotation	Unfavourable	-1,300	-800	-100	-600
Coniferous short rotation	Intermediate	1,800	1,800	4,100	1,800
Coniferous short rotation	Favourable	700	1,000	300	300
Coniferous medium rotation	Unfavourable	-1,400	-4,600	-2,600	-1,700
Coniferous medium rotation	Intermediate	7,900	7,500	26,800	4,500
Coniferous medium rotation	Favourable	4,800	9,300	5,700	4,500
Coniferous CCF	Unfavourable	700	200	100	700
Coniferous CCF	Intermediate	-700	-1,300	800	-2,800
Coniferous CCF	Favourable	2,000	2,400	3,400	3,200
Broadleaved unmanaged	Unfavourable	11,500	15,000	17,400	14,800
Broadleaved unmanaged	Intermediate	-4,900	-17,000	-16,500	-14,700
Broadleaved unmanaged	Favourable	-100	2,000	-900	-100
Broadleaved light management	Unfavourable	1,100	2,300	2,800	2,900
Broadleaved light management	Intermediate	31,200	32,200	26,200	48,300
Broadleaved light management	Favourable	9,900	14,700	8,600	15,700
Broadleaved rotation	Unfavourable	-2,400	-2,800	-2,100	-2,000
Broadleaved rotation	Intermediate	19,200	12,400	9,700	8,800
Broadleaved rotation	Favourable	9,800	14,100	13,000	10,100
Broadleaved CCF	Unfavourable	300	500	700	300
Broadleaved CCF	Intermediate	13,100	8,100	5,500	4,100
Broadleaved CCF	Favourable	3,900	7,100	6,300	7,200
Mixed Unmanaged	Unfavourable	1,000	1,200	900	200
Mixed Unmanaged	Intermediate	-900	-1,300	-1,000	-300
Mixed Unmanaged	Favourable	300	100	100	100
Mixed light management	Unfavourable	200	100	100	400
Mixed light management	Intermediate	2,100	1,300	600	-200
Mixed light management	Favourable	600	1,900	1,500	1,700
Mixed CCF	Unfavourable	200	100	-	400
Mixed CCF	Intermediate	2,300	1,600	800	-600
Mixed CCF	Favourable	2,600	3,300	2,800	3,500
TOW	Unfavourable	-13,500	-11,100	-8,400	-10,500
TOW	Intermediate	-20,600	-31,700	-31,900	-23,700
TOW	Favourable	54,700	67,100	62,000	60,400
All woodland and TOW	**Unfavourable**	**-1,300**	**1,000**	**9,100**	**6,200**
All woodland and TOW	**Intermediate**	**48,300**	**12,700**	**24,800**	**23,700**
All woodland and TOW	**Favourable**	**89,700**	**123,000**	**102,800**	**106,800**

Appendix Table 2 Change in woodland condition by type and scenario by 2100 (from eftec, 2026)

Woodland type	Condition	Increase of current trends (ha)	Increased management (ha)	Increased conifer proportion (ha)	Increased agroforestry proportion (ha)
Coniferous unmanaged	Unfavourable	9,500	2,500	2,400	2,700
Coniferous unmanaged	Intermediate	-9,600	-3,400	-2,500	-3,100
Coniferous unmanaged	Favourable	1,400	900	100	400
Coniferous short rotation	Unfavourable	-1,200	-1,100	100	-300
Coniferous short rotation	Intermediate	2,300	3,300	5,800	2,300
Coniferous short rotation	Favourable	900	700	300	100
Coniferous medium rotation	Unfavourable	-600	-1,600	4,100	-1,000
Coniferous medium rotation	Intermediate	8,400	7,400	33,000	5,100
Coniferous medium rotation	Favourable	8,800	12,500	9,000	6,300
Coniferous CCF	Unfavourable	700	400	600	700
Coniferous CCF	Intermediate	-5,800	-5,900	-3,600	-10,100
Coniferous CCF	Favourable	7,600	7,600	9,700	11,000
Broadleaved unmanaged	Unfavourable	59,400	43,600	54,000	49,300
Broadleaved unmanaged	Intermediate	-34,100	-47,800	-55,900	-50,300
Broadleaved unmanaged	Favourable	-9,200	4,200	1,900	1,000
Broadleaved light management	Unfavourable	1,700	1,600	2,200	4,600
Broadleaved light management	Intermediate	14,300	3,500	-24,800	11,700
Broadleaved light management	Favourable	40,900	68,700	77,700	83,500
Broadleaved rotation	Unfavourable	-1,600	-3,200	-1,600	-1,700
Broadleaved rotation	Intermediate	7,800	1,000	-5,600	-10,000
Broadleaved rotation	Favourable	32,900	38,200	36,900	37,000
Broadleaved CCF	Unfavourable	600	400	1,400	1,000
Broadleaved CCF	Intermediate	-3,000	-6,600	-13,800	-18,500
Broadleaved CCF	Favourable	26,300	30,400	31,200	33,800
Mixed Unmanaged	Unfavourable	4,300	3,200	3,000	2,800
Mixed Unmanaged	Intermediate	-3,000	-4,200	-3,400	-3,000
Mixed Unmanaged	Favourable	-300	1,000	400	200
Mixed light management	Unfavourable	500	200	-	400
Mixed light management	Intermediate	-200	200	-1,200	-2,700
Mixed light management	Favourable	3,700	4,100	4,700	4,700
Mixed CCF	Unfavourable	200	200	200	200
Mixed CCF	Intermediate	-1,200	-2,500	-5,400	-7,700
Mixed CCF	Favourable	7,500	10,000	10,700	12,300
TOW	Unfavourable	-9,700	-4,400	-7,300	-6,700
TOW	Intermediate	-107,800	-129,000	-144,700	-134,900
TOW	Favourable	150,400	166,700	183,200	181,700
All woodland and TOW	**Unfavourable**	**63,800**	**41,800**	**59,100**	**52,000**
All woodland and TOW	**Intermediate**	**-131,900**	**-184,000**	**-222,100**	**-221,200**
All woodland and TOW	**Favourable**	**270,900**	**345,000**	**365,800**	**372,000**

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Document evolution

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