

# Forestry Commission

Adaptation Reporting Power:

Fourth round report

December 2024

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# Executive summary

Adaptation to climate change is essential to secure the services provided by our woodland resource. Since our third round Adaptation Reporting Power report (ARP3) was released:

- extraordinary payments received in exceptional circumstances were released to replace trees impacted by drought and heatwaves
- findings of the most destructive European pest of spruce are increasing as the climate of the southeast of England becomes more suitable
- extreme wind and flood events have affected England's woodland resource

Woodland net zero, wildlife, water quality, flood protection, access, wellbeing and timber production aspirations will only be achieved if woodland management and creation result in resilient landscapes.

The Forestry Commission has made substantial progress to address climate change risks to forests and challenges previously identified in ARP1 to ARP3.

1. The fifth edition of the UK Forestry Standard (2023) will enhance resilience and adaptation measures across the sector.
2. Clear and agreed climate change adaptation guidance is now available, including:
  - a. Managing for resilience case studies
  - b. [Climate Change Hub](#)
  - c. Improved decision support tools
  - d. UKFS practice guidance, such as [Adapting forest and woodland management to the changing climate](#)
3. Capability and capacity within the forestry sector workforce to adapt to climate change has been increased through our training, the Forestry Arboriculture Training Fund, and the degree level Professional Forester Apprenticeship Programme.
4. The availability and diversity of trees for planting has been improved by our suite of tree production, innovation and capital grants.

Challenges highlighted within this ARP include:

- balancing the demands placed on England's limited and crowded land
- persistent use of a limited number of tree species and structural homogeneity increasing woodlands vulnerability to the variety of threats exacerbated by climate change
- a lack of incentives and sector capability to encourage the use of a wider range of silvicultural systems

Different objective-based approaches to adaptation are appropriate. However, static and strict interpretation of which tree species are native, even extending to regional

specifications, is limiting the adaptive capacity of our semi-natural woodlands during a time of dynamic change. Resistance to the planting of conifer species, exacerbated by incentives design which favour slower-growing broadleaf species, is also impacting on the ability to meet net zero targets. This is because 30% of the new woodland planting set out in the statutory tree canopy target should comprise conifer species to meet its net zero contribution.

Stewarding and cherishing centuries-old irreplaceable habitat poses conflicting arguments given the uncertainty associated with implementing adaptive actions. More widely, the resistance to planting a wider range non-native species is limiting adaptation. Lastly, ensuring that sufficient, diverse and appropriate planting stock is available to support ambitions for woodland expansion continues to be a challenge.

The Science and Innovation Strategy for Forestry in Great Britain research programmes continue to improve our understanding of climate risks and mitigating actions. Forestry England's resilience approach continues to demonstrate adaptive and sustainable forestry. Adaptation will be further embedded as a cornerstone within our strategy through the development of our Environmental Sustainability Strategy and Climate Change Adaptation Strategy.

It is critical that we continue to work closely with Defra to embed forestry and woodland adaptation into the Environmental Land Management schemes, the forthcoming Land Use Framework and further policy development.

# 1. Introduction

## 1.1 ARP reporting history

The Forestry Commission prepared a Climate Change Risk Assessment published in March 2012 under the Adaptation Reporting Powers of the Climate Change Act (2008). We were invited to report as: 'England's woodlands are important national assets which are both vulnerable to climate change and have a valuable role mitigating its effects'. We produced second and third round ARP reports in 2017 and 2022, but to improve the alignment of adaptation reporting with the statutory cycle for the Climate Change Risk Assessment (CCRA) and the National Adaptation Programme (NAP), we were asked to submit our fourth-round report (ARP4) by the end of 2024.

## 1.2 Organisational profile

### Forestry Commission and forestry policy

The Forestry Commission is a non-ministerial department sponsored by the Department for Environment, Food & Rural Affairs (Defra) and overseen by the Forestry Commissioners. Strategic forestry policy in England is the responsibility of Defra. The then Government's long-term vision for the treescape it wanted to see in England by 2050 and beyond is set out in the [Environment Act \(2021\)](#), [Net Zero Strategy \(2021\)](#) and [England Trees Action Plan 2021-2024 \(ETAP\)](#). A list of relevant policy documents published since ARP3 is given at Annex , which provides context for the actions reported here.

### Forestry Commission's strategic objectives

The Forestry Commission comprises Forest Services, Forestry England and Forest Research and sets out its vision and goals in the [Forestry Commission Strategy: thriving for the future](#). We are tasked to work with a wide range of stakeholders to deliver functions and priorities set out in Defra's Single Departmental Plan, [ETAP](#), [Tree Health Resilience Strategy \(2018\)](#) and [GB Biosecurity Strategy \(2023\)](#).

We are responsible for:

- managing the nation's forests
- protecting the health of trees across Great Britain from pests and diseases
- providing world-leading research and analysis
- promoting forestry training, forestry careers and sustainable forest management
- expanding, managing and improving woodland and tree cover (through grant processing, administration and advice)
- regulating forestry in England

The core of the Forestry Commission comprises the Commissioners' Office – responsible for supporting the Commission and both its agencies with work on parliamentary matters, open information, data protection and governance – and what is known internally as 'Forest Services.'

**Forest Services** supports and regulates forestry in England and acts as the government's forestry and woodland experts, contributing to the past government's 25 Year Environmental Plan (and Environment Act) objective of being the first generation to leave the environment in a better state than we found it. This is done by encouraging and supporting landowners and the sector to protect, improve, expand and connect people with England's trees, woods and forests. This part of the Commission is also responsible for protecting tree health across Great Britain (GB) as part of the UK Plant Health Service by agreement with the GB devolved administrations. Since ARP3, a new statutory tree canopy and woodland cover target has been legislated for through the powers of the Environment Act (2021).

**Forestry England** manages the nation's forests on behalf of the Forestry Commissioners. The estate covers 253,000 hectares (ha) of land (2% of the total land area of England) including 208,000 ha of wooded habitat. The nation's forests have more than 68,000 ha of Sites of Special Scientific Interest (of which 94% are in favourable or recovering condition). All the forests and woodlands are independently certified as sustainably managed through the [UK Woodland Assurance Standard \(UKWAS\)](#). The nation's forests are also the largest outdoor recreation provider (an estimated 300 million visits per year) and timber supplier (approximately 1.2 million m<sup>3</sup> timber harvested per year) in England. Forestry England is the country's largest land manager, employing around 1,200 people.

**Forest Research** is the research agency of the Forestry Commission and Great Britain's principal organisation for forestry and tree-related research. It is internationally renowned for the provision of science, research, evidence, data and services in support of sustainable forestry. Forest Research's vision is to be a world leader in applied forest science and a trusted and recognised provider of expertise, data, products and services for government and the tree, wood, forest and natural resources sectors.

## 1.3 Governance, management and strategy

### Cross-border level governance

Since the previous report (ARP3) there have been no further fundamental changes to the governance of forestry in England. However, the Memorandum of Understanding that covers cross-border functions (research commissioning and monitoring, plant health and the regulation of forestry reproductive material (FRM), UK Forestry Standard, Woodland Carbon Code and forestry economic advice) expired on 31 March 2024. It has been agreed that the current document will be rolled over to 31 March 2026, with a refreshed memorandum applying after that date.

### Governance in England

The Forestry Commission is headed by the Board of Commissioners, which consists of a chair and up to 10 other members appointed by His Majesty the King. The Commissioners, through administrative action, have delegated relevant and appropriate functions to the sub-boards of the delivery arms of the Forestry Commission namely Forestry England, Forest Services and Forest Research. Officials

from Defra and the devolved administrations act as members of the sub-boards where appropriate. Overall responsibility, however, remains with the Board of Commissioners. In addition, the Forestry Commission Executive Board draws upon the executive leadership of all parts of the Forestry Commission to take strategic decisions on common issues.

The Board of Commissioners has also established a Forestry England and Forest Services Audit and Risk Assurance Committee (ARAC) to support it in assuring itself of the effectiveness of the internal control, governance and risk management frameworks.

### **Commitment to adaptation and governance concerning climate change**

The [Forestry Commission Strategy \(2023-2028\)](#) sets out our commitment to achieve net zero and includes actions specific to climate change adaptation. Our core business managing the nation's forests drives environmental sustainability and consideration of adaptation to projected climate impacts. These priorities are interwoven with the positive impacts on people and the economy that our work supporting sustainable forest management delivers.

The Forestry Commission is currently developing both an Environmental Sustainability Strategy and a Climate Change Adaptation Strategy with the intention to align with the timescales set within a Net Zero Strategy planned for implementation in 2025. We are working through transition to ISO 14001-2015 standard and re-certification, and are currently partially aligned against the Task Force on Climate-Related Financial Disclosures reporting requirements under Phase 1.

The evaluation of Forestry England's, Forest Services' and the Commissioners' Office's combined performance against the Greening Government Commitments (GCC) is reported in [Forestry Commission Annual Report and Accounts 2023-24](#) p31-34. We now exceed the GCC target of a 15% reduction in direct emissions by 2025, but several reported issues remain.

In 2024 the [Forestry and Climate Change Partnership](#), a key delivery partnership for ARP3 actions, elected to increase their remit to work more closely with Defra to implement a revised Tree Health Resilience Strategy (THRS) through combining with the THRS stakeholder group. This will likely widen the group's vision to include trees outside woodlands. Forestry England, Forest Research and Forest Services anticipate continued active participation in the group, helping government and stakeholders to deliver the new Trees and Woodland Resilience Strategy, once published.

The UK Forest Genetics Resources Group was established in 2024 to provide oversight, facilitate information exchange and deliver technical advice and co-ordination of activities covering all aspects of future species selection to inform government policy development and support delivery of resilient woodlands and forests across the UK. In addition to a steering group, 2 sub-groups have been established:

- species prioritisation and seed and sapling supply technical working group
- genetic understanding, conservation and use technical working group



The fifth edition of the [UK Forestry Standard \(2023\)](#) (UKFS) strengthened requirements for enhanced resilience and implementation of adaptation measures through UKFS requirements underpinning forestry grants, regulations, certification and the management of the nation's forests.

## 2. Understanding risks and challenges

Climate change risk assessment in the Forestry Commission's ARP4 mirrors ARP3 as a description of climate risks to the organisation and the ability to deliver its objectives. The Board considers climate risk and environmental issues at a strategic level as evidenced through our ['Thriving for the Future' FC Strategy 2023-28](#) which prioritises climate action. Climate risks are overseen by the ARAC governance structure across the Forestry Commission and delegated to respective bodies – Forest Services, Forestry England, and Forest Research. However, we recognise that more work is needed to strengthen appropriate processes that enable our Board to assess climate risks and impacts for our organisation in coming years.

Within this ARP, discussion of climate change risks (section 2) and our mitigating actions (section 4) are aligned to NAP3 climate risks. Changes and updates to these risks (section 2.2) and uncertainty (section 6) are also highlighted. Risks are addressed in a discussive format for the minor revision from ARP3 to ARP4. A full, formal, risk assessment will be provided in our fifth-round report, building on and updating the comprehensive risk assessment set out in our first ARP report in 2012.

Each successive ARP has reviewed the risks that climate change presents to the functions and activities of the Forestry Commission and there have been no major changes. Note that specific greenhouse gas emissions scenarios/pathways and climate projections have not been considered in detail. The approach has been adopted because of the long timeframe considered for adaptation in forestry and the need for any action to be appropriate to current and future climates. This is consistent with an adaptive approach to woodland management within the public and private sector, focused on the general direction of climate change and that this thinking is incorporated into forest management decisions. We have concluded that a more prescriptive approach would not be appropriate given the uncertainty in how climate change will unfold.

### 2.1 Climate change risks relevant to forestry identified in NAP3

The [Independent Assessment of UK Climate Risk evidence report](#) identified risks relevant to forestry, which informed the [2023 National Adaptation Programme \(NAP\) climate risks and opportunities](#) that are government's priority actions for the next 5 years. The following are directly associated with, or related to, forestry.

**N5** – Risks to natural carbon stores and sequestration from changing climatic conditions (forestry)

**N6** – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions

**N8** – Risks to forestry from pests, pathogens, and invasive non-native species

**N9** – Opportunities for forestry productivity from new/alternative species becoming suitable

#### Wider NAP3 risks that also relate to forestry

**N1** – Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology

**N3** – Opportunities from new species in terrestrial habitats colonisations: Facilitate the movement and expansion of native species within the UK in response to climate change opportunities

**N4** – Risk to soils from changing climatic conditions, including seasonal aridity and wetness

**N5** – Risks to natural carbon stores and sequestration from changing climatic conditions, including temperature change and water scarcity (peatland)

**N18** – Risks and opportunities from climate change to landscape character

## 2.2 Changes in the understanding and interactions of NAP risks

The following section highlights current background information regarding the NAP forestry-related risks.

### **N1 – Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology (including water scarcity, flooding and saline intrusion)**

1. Forest Research has led a range of projects to increase knowledge about the water-related benefits of woodlands, and to evaluate the costs and benefits of associated investments, which are informing the targeting of woodland creation and development of a Woodland Water Code.
2. Woodland expansion can pose a threat to ground-water dependent terrestrial ecosystems through using more water than other land covers.
3. Increasing the connectivity of woodland habitat within the landscape will enhance the ability of more mobile species to migrate as the climate changes.

4. In most cases, the quality of woodland habitat is enhanced by being brought into management, benefitting woodland species.
5. Targeted tree planting can reduce floodwater impacts on other habitats by increasing infiltration rates, evaporating and transpiring more water than other land covers and slowing peak flood flows in the floodplain due to the high hydraulic roughness of woodland.

## **N5 – Risks to natural carbon stores and sequestration from changing climatic conditions (forestry)**

1. Accurate prediction of tree species suitability remains a concern with many woodland owners and managers. This is confounded by the reliance on low resolution soil maps rather than site specific information.
2. Across the sector persistent use of single species dominated even-aged silviculture continues to risk landscape scale impact. A lack of experienced silviculturists, and incentives to promote change, limit progress away from this dominant silvicultural system.
3. Tree species-specific data reporting establishment success for most woodland creation schemes is not available.
4. Although, in general, there is an insufficient diversity of species being planted, where 'emerging forestry species' are proposed, silvicultural requirements are rarely considered, and large numbers of tree species are being included in some woodland creation grant applications with limited consideration of their compatibility for intimate planting.
5. Wildfire remains on the government's National Security Risk Assessment and National Risk Register and has been defined as a priority risk by Forestry England for the nation's forests.

## **N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions**

Use of fine-scale temporal data in process modelling of tree species performance is demonstrating that short-term extreme events, such as drought, present the greatest risk to trees in the UK. Forest Research aims to quantify and predict these risks, and further develop an evidence base for potential adaptation measures to major risks. Updated models within ESC version 4.5 suggest that suitability predictions for species are now less pessimistic than those previously modelled. Caution in interpretation is required as this modelled improvement assumes adaptive use of forest reproductive material (FRM) from locations representing analogues for future UK climate and relies on certain representative concentration pathways (RCP).

1. Extraordinary Payments Received in Exceptional Circumstances were released in 2018 and 2022 to fund the replacement of recently planted trees impacted by the 2022 heatwave and drought.

2. Extensive flooding has become more common in recent years, waterlogging can impact rooting and tree stability and act in-combination with other risks such as wind, pest and diseases.
3. To adapt locally, tree populations need dynamic recruitment on site. 19% and 54% of conifer and broadleaf woodlands are currently unmanaged respectively, limiting the success of site adapted natural regeneration. High densities of deer further limit regeneration due to browsing pressure.
4. Forestry skills shortages and reductions in forestry education opportunities are limiting the practical step change required to meet future woodland management and creation aspirations.

## **N8 – Risks to forestry from pests, pathogens, and invasive non-native species**

### Forestry pests

- Novel pests affecting woodlands have increased dramatically. There were 5 pest incursions between 1970 and 2000, compared to 19 between 2000 and 2021. Live plant material import remains the highest risk pathway for pests to arrive in the UK.
  - The limited richness of our dominant forestry tree species highlights landscape scale susceptibility to several prominent pests.
  - Between 2021 and 2022, 720 statutory plant health notices, used to require the felling of trees to limit pest/disease spread, were issued across the UK covering 4,000 ha of woodland.
  - An *Ips typographus* surveillance and eradication programme has been established. The demarcated area has been expanded, within which restrictions are placed on movement, felling and planting of spruce, along with support for landowners dealing with spruce bark beetle outbreaks.
1. Pests with wide host ranges also pose future threat, for example *Xylella fastidiosa*.
  2. Surveillance continues for prominent pests through Forest Research’s monitoring and diagnostic work, including annual health checks at national arboreta.
  3. Unsustainable populations of deer and grey squirrels remain an increasing threat to regeneration, woodland creation, woodland management. This is exacerbated in urban environments where management (of squirrels) is problematic.

### Compounding factors

1. The lack of genetic diversity (both within and between species) within the main forest tree populations reduces the capacity to resist and recover from pest outbreaks.
2. Stress induced by the warming climate is leading to some tree species’ increased susceptibility to pest/disease outbreaks, while facilitating pests’ spread and survival leading to greater potential for outbreaks. For example, drought stress has made spruce woodland in south-east England increasingly susceptible to *Ips*

typographus (European spruce bark beetle), the most significant forestry spruce pest in Europe.

### Invasive non-native species (INNS)

1. The importation of planting stock carries risk of introducing pests, but plant health controls, phytosanitary certification, and GB Plant Passports reduce this risk.
2. The use of new forestry species for adaptation/species diversification, for which little is known about their performance and growth characteristics in UK conditions, may risk the introduction of INNS.
3. Introduced invasive mammals pose significant risk to targets for woodland expansion and management, for example grey squirrel and non-native deer.
4. Rhododendron ponticum poses a threat to woodland habitats and its management represents a cost to woodland owners.

### **N9 – Opportunities for forestry productivity from new/alternative species becoming suitable (including provenance and genetic diversity)**

(In NAP3, risk actions relating to forest genetic resources and nursery production are nested under NAP risk N8. However, as the opportunities related to new species becoming suitable overlap with NAP risk N9 and its interdependencies, they are discussed here).

1. Lesser-used tree species and more southerly provenances can confer resilience against a wide variety of threats and provide productivity gains. However, there is a potential risk of poor performance, maladaptation or significant environmental impact if their growth characteristics are untested under UK conditions or provenances are moved too far north (see N8 above).
2. Static and strict interpretation of which tree species are considered native limit UK adaptive capacity within the treescape, even at regional scales. This issue also limits progress in addressing NAP3 risk N3.
3. A review (1) suggests that local adaptation can occur through epigenetic modification in trees (suggesting potential specific epigenetic influences over drought, heat, and salinity tolerance, as well as dormancy and dispersal traits). This may enable some degree of phenotypic plasticity to environmental stress.
4. There is a knowledge gap regarding what native biodiversity is supported by near and non-native species.

### Nursery provision

1. Many of the major forest nurseries are now stocking improved genetic material of the main forestry species and a limited number are also supplying more southerly origins for the main native forest species.
2. Suppliers face increased administrative and practical requirements to source appropriate seed, due to biosecurity and import restrictions.

3. Expectations to rapidly plant woodlands and short grant windows mismatch the necessary time demands and securities to build up nursery stock of specific provenance and species diversity.

#### Provenance and suitability of reproductive material

1. Periodic mast years and recalcitrant seed dictate local seed supply for some trees. To ensure continuous supply, seed is sourced from less climatically analogous regions of Europe.
2. The lack of available forest reproductive material of given provenance remains a key risk linked to species diversity and genetic adaptation.
3. Seed of unknown or, potentially, inappropriate provenance is still regularly available online and should be avoided.
4. Valuable insights into seed sourcing policy and practice are available from datasets assembled by Forestry England.

#### References

1. Miryeganeh, M. & Armitage, D. W. Epigenetic responses of trees to environmental stress in the context of climate change. *Biol. Rev.* (2024) doi:10.1111/brv.13132.

# 3. Climate change impacts on our ability to function

The main impacts of climate change on business and corporate activities are common to most organisations, and relate to working conditions, working patterns, energy use and the ability of Forestry Commission's built estate to cope with the changing climate.

## Impact on general functions

- We have contingency plans and Business Continuity Planning (BCP) as well as an all-hazard and all-risks Incident Management System (IMS) to help prepare, prevent, respond and recover from incidents and emergencies.
- Commercial public events such as forest concerts or seasonal light trails are more frequently being impacted by storm events leading to cancellation.

## Climate change policies increasing energy and water costs with the consequent economic impact on the organisation (primarily climate mitigation-related)

- A risk that needs to be considered as part of business sustainability plans.
- Costs to converting to electric fleet vehicles are limiting change and there is limited availability of both the vehicles and charging infrastructure.

## Risk to buildings and staff where offices are subject to flooding or wind risk

1. This remains a risk, but business continuity planning has been shown to be effective.
2. Flexible working is now common, but increased staff numbers now mean there is insufficient office space should more staff work from an office. A wider geographical spread of offices means it is likely that flooding may impact on many home offices, but that fewer staff will be affected at any one time.
3. Storm water flows are damaging culverts and forest roads. Windstorms and tree pest and disease outbreaks are impacting recreational facilities.

## Rising fuel costs (in response to climate change policies) and transport issues (primarily climate mitigation-related)

1. The continued volatility in oil prices since ARP3 remains a risk in the longer term.
2. The policy on private vehicle emissions (maximum CO<sub>2</sub> emissions imposed for business use of private vehicles) continues to present challenges for management and staff.



# 4. Adaptation actions related to NAP3

## 4.1 Overview

The following section highlights actions carried out and ongoing that address NAP3 forestry risks. Please refer to Annex 2 for core Forestry Commission activities listed against NAP3 risks and actions. For a summary of actions from previous ARP reports, refer to Annex 5.

## 4.2 Details of actions addressing NAP3 forestry risks

Summaries of Forestry Commission activities are included against each of the NAP3 forestry risks. These are subdivided by those recently implemented, ongoing, and with longer-term implementation. [Forest Research core research programmes \(CRP\)](#) and work areas (WA) which address the [Science and Innovation Strategy for forestry in Great Britain \(2020\)](#) (SIS) that are related to climate change adaptation actions are included in Annex 3. Refer to this annex for further detail of our research action addressing NAP3 forestry risks.

### **Details of actions to address N1 – Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology (including water scarcity, flooding and saline intrusion)**

Halt the decline in species abundance by 2030 and protect 30% of land in England in a way that recognises and responds to climate change risks by 2030 to reduce the risk to terrestrial species and habitats.

#### Recently implemented

##### [Appropriate species choice and woodlands in the landscape](#)

(It should be noted that the work supporting climate-appropriate species choice will also contribute towards NAP3 risk N3 helping the movement of species within the UK, as well as risks N5 and N6).

1. CRP1 WA1 Environmental Change impacts and susceptibility assessments (see Annex 3)
2. Ecological Site Classification decision support system (ESC) use is required for English Woodland Creation Officer (EWCO) and Countryside Stewardship (CS) woodland creation grant applications ensuring suitable species are selected that match site conditions.
3. EWCO provides additional contributions for the expansion of woodlands (increasing habitat patch size and resilience) with specific design requirements to support nature recovery and flood risk management and water quality/quantity.

4. Natural colonisation is now funded within EWCO with guidance informed by Forest Research's research.
5. ESC has been upgraded to version 4.5 with a new user interface. This includes: UKCP18 data; models for additional species; winter cold risk; and incorporate the output of process-based models for beech, Scots pine, and Sitka spruce.
6. Forest Research produced and launched [new videos in December 2024](#) to build knowledge of impacts of drought and current research.
7. Forestry Commission is collaborating with Natural England, Kew, Defra, DESNZ and the Environment Agency to embed adaptation in the HMT Shared Outcomes Fund Nature Returns project.
8. The National Arboreta are undertaking a study to consider landscape succession in relation to adaptation to climate change.
9. The [Woodland Condition Assessment](#) tool has launched to allow landowners to baseline and assess the condition of their woodland habitat in a standardised way.

## Water

1. EWCO provides additional contributions for expanding woodlands with specific design requirements to support flood risk management and mitigate the effects of diffuse water pollution from agriculture.
2. Forest Research CRP2 WA5 payments for ecosystem services (see Annex 3) and CRP5.
3. Collaboration with the Environment Agency (EA) and priority map revision using new LIDAR data ensures that the catchments of highest priority flood risk and requiring action to improve water quality are targeted with (EWCO) incentives. A similar approach has been adopted to provide EWCO additional contributions (such as up-front payments) for establishing riparian woodland in water bodies and watercourse reaches devoid of shade.
4. Forest Services, Forest Research and the EA have developed a process and decision support tool to identify integrated water bodies either vulnerable or potentially vulnerable to low flows and quantify the impacts of woodland creation on water resources, to inform regulatory screening.
5. Woodland Water Code quality pilots have started (further information below).
6. The following guidance has been published:
  - a. [Designing and managing forests and woodlands to reduce flood risk \(2022\)](#)
  - b. [Creating and managing riparian woodland \(2024\)](#)
  - c. [Assessing the potential hazards of using leaky woody structures for natural flood management \(2019\)](#)

## Soon to be implemented (by 2030)

### Climate and site appropriate species choice

1. Forest Research will add suitability to 2050 and 2080 UKCP18 projections and incorporate updates to species moisture response to ESC.
2. ESC future species updates will be based on species' distribution, and in some cases, process-based modelling accounting for extreme drought impacts.
3. Drought risk maps will be developed using Standardised Precipitation Evapotranspiration Index (SPEI) allowing regional drought frequency and severity identification.
4. Forest Research will develop a Resilience Indicator, including drought risk, for application in Forestry England's sub-compartment database.
5. ESC 5 will be launched introducing further species and additional contextual site data. For example, summer and winter rainfall according to different climate scenarios.
6. Forest Research is mapping UK species distribution using remote sensing and machine learning techniques. This will support the National Forest Inventory (NFI) with regional risk assessment and quantification of adaptation deficit.

### Guidance

The [Ancient and Native Woodland Practice Guide](#) is being reviewed and a new release will incorporate further, appropriate, adaptation measures.

### Water

A Woodland Water Code (WWC) is being developed by Forestry Commission, funded by Defra. This voluntary crediting mechanism will apply across the UK to encourage private investment in trees to improve the freshwater environment.

## Details of actions to address N4 – Risk to soils from changing climatic conditions, including seasonal aridity and wetness

Protect and improve soil health so that soil maintains its multiple functions and is more resilient to impacts from climate change.

### Recently implemented

- The collaborative [Decision support framework for peatland protection, the establishment of new woodland and re-establishment of existing woodland on peatland in England](#) was published with NE and EA (2023)
- The [Forest to Bog tool](#) was launched and updated (2024) to support decision making for peatland protection, restocking and inform Local Nature Recovery Schemes
- [Guidance on cultivation and UKFS compliance for application in England](#) was published (Operations Note 53, 2021)

### Soon to be implemented (by 2030)

- Alongside soil industry experts and Forest Research, Forestry Commission is developing an accredited qualification (LANTRA) to teach and assess our soil classification and survey methods for forest soils
- Improved soil awareness and understanding will help appropriate species choice and strengthen protection for more vulnerable soils from forest operations

### Details of actions to address N5 – Risks to natural carbon stores and sequestration from changing climatic conditions (forestry)

Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions.

### Recently implemented

1. The fifth edition of the [UK Forestry Standard \(UKFS\)](#) came into force in October 2024. The revision provided opportunities to strengthen requirements for enhanced resilience and the implementation of adaptation measures through UKFS requirements underpinning forestry grants, forestry regulations, forest certification and the management of the nation's forests.
2. Forestry Commission regulates all woodland creation in England, including initiatives such as the English Community Forests Trees for Climate Fund developed under the Nature for Climate Fund. We aim to streamline the regulatory process to accelerate planting rates while maintaining environmental and social integrity through initiatives such as [Low Sensitivity mapping for Woodland Creation in England](#).
3. A statutory target to increase tree canopy and woodland cover to at least 16.5% of England's land area was legislated for in January 2023. This will increase the carbon stocks of England's woodlands and provides the opportunity to embed adaptation actions and principles in the comprehensive tree and woodland programme, currently funded by the Nature for Climate Fund. If the statutory tree canopy target is to make its contribution to net zero by 2050, 30% of the new woodland planting will need to comprise faster-growing conifer species. The Forestry Commission is currently exploring opportunity areas for woodland expansion including further development of Low Sensitivity mapping.
4. The England Woodland Creation Offer (EWCO) is a flagship grant scheme for farmers and landowners to encourage investment (£16.8 million 2023 to 24) in targeted woodland creation. These woodlands will help to mitigate climate change, deliver nature recovery and provide wider environmental and social benefits. An ESC assessment is required for all applications to ensure suitable species are selected. Additional contributions are also available for expanding existing woodland and for proposals located on land mapped as low sensitivity for woodland creation.
5. National Environmental Objectives for Local Nature Recovery Strategies were sent to all Responsible Authorities producing the strategies and included

objectives on water quality, flood protection and tree cover. The Forestry Commission, with the Environment Agency and Natural England has been sharing data and advice with Responsible Authorities to support the prioritisation and targeting of nature-based solutions, for carbon sequestration, water quality and flood management in these statutory local strategies (also relevant to risks N5 and H3).

#### Research addressing risk N5

- The Centre for Forest Protection was launched with Royal Botanic Gardens, Kew to deliver innovative science, interdisciplinary research, expert advice and training.
- CRP1 Sustainable Forest Management in the light of environmental change, CRP2 WA5 Payments for ecosystem services, and CRP5 Achieving multiple ecosystem benefits (see Annex 3).
- ESC was used to develop a demonstrator flood alleviation woodland design tool.
  1. Forestry Commission and the University of Manchester, co-ordinate the UK Wildfire Research Group.
  2. Forestry Commission seconded a Greater Manchester Fire and Rescue Service Fire Investigator to produce a report on the causes and motives of wildfires (2023).
  3. Forestry Commission is a partner in various large NERC-funded wildfire prevention projects with multiple UK universities.

#### External training addressing risk N5

- Private sector training delivery increased to 840 hours in 2023 to 2024, involving approximately 17,000 attendees.
- Forestry Commission provided WCC training across 6 Local Partnership Projects (LPP). Reports have been completed on: carbon prices in voluntary markets in the UK and buyer preferences for ecosystem services.
- Lantra accredited training on wildfire resilience, forest planning and response to wildfire has been developed, and delivered to 1,300 fire and rescue services and land manager participants over the past 3 years.

#### Resources addressing risk N5

- [Responding to the climate emergency with new trees and woodlands](#) as a guide to help local authorities and landowning businesses achieve net zero through woodland creation.
- [UKFS practice guide on adapting forest and woodland management for the changing climate](#) was published in 2022.
- [Diversification of existing forests guidance](#) (2024) is supported by [Forest Development flashcards and guide](#).
- [ForestGALES v3.0](#) (fgr) has been released as an R package, including wind risk modelling at the individual tree level (for example, using LiDAR and similar products), and enabling the use of varied wind data sources including future climate projections.

- [UKFS Practice Guide 'Building Wildfire Resilience into Forest Management Planning'](#) informed Wildfire Management Planning training for 527 people (2018 to 24) and is the reference guide for CS heathland management. It is being revised in 2026/27 supporting by research that is currently underway.

### Soon to be implemented (by 2030)

#### Grants

- The woodland improvement grant and woodland planning grant continue to promote proactive adaptive management according to the latest UKFS revision and incorporating consideration of future risks.
- Funding focused on forest resilience and alternative silvicultural systems is being implemented in the Countryside Stewardship higher tier woodland improvement grant opening for applications in 2025.

#### Wind

- Forest Research is collaborating with Aberdeen University to calculate future wind risk to UK forest resources under NetZero+ scenarios.
- A ForestGALES update to calculate risk from extreme wind speed data will support the [ADD-Trees](#) project with Exeter University.
- Bespoke training on the appropriate use of ForestGALES in forest planning and operations will be delivered across Forestry England.

#### Wildfire:

- Forestry Commission is awaiting confirmation of funding to progress the UK Fire Danger Rating System (UK FDRS), to develop a Wildfire Risk Map and to analyse post-2021 wildfire statistics.
- A business case and project plan were developed in 2024 and submitted to Defra and Home Office to use international best practice to improve wildfire investigation training.
- New Lantra-accredited wildfire courses are being developed in partnership with partners such as the National Fire Chiefs Council.

#### Woodland Carbon Markets

With the involvement of Forestry Commission, Defra is working with the British Standards Institute following the launch of the Nature Markets Standards Programme in 2023, in support of the UK Government's [Green Finance Strategy](#) and [Nature Markets Framework](#) to boost market confidence and increase private sector investment. The foundational Nature Markets – Overarching Principles and Framework was consulted on in 2024 and detailed standards for carbon and nature markets are in development.

### **Details of actions to address N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions**

Maintain average forestry productivity (as a minimum) at current levels to 2080, to ensure that England has healthy and productive woodlands which are resilient to extreme events and have high levels of diversity.

## Recently implemented

Forestry England's Forest Resilience Approach drives the adaptation of the nation's forests to changing conditions, threats and risks. See Annex 6 for a best practice case study and Annex 3 for details of research undertaken by FR to address risk N6 (research programme CRP1: Sustainable Forest Management in the light of environmental change). Forestry Commission contributed to development of the [Timber in Construction Roadmap](#) (published in 2024) with the aim of creating an environment for greater timber market activities under a changing climate.

### Resources and training

- [Adapting forest and woodland management to the changing climate practice guide](#) was published (2022) to guide adaptive forest management.
- Forest Research created a five-step adaptation framework for managers to aid decision making accounting for site specific conditions.
- Forest Research [Climate Change Hub](#) launched in 2023 to encourage changes in UK forestry practice and management to address climate change threats. It's a one-stop-shop that provides practical information and guidance, aimed primarily at landowners and woodland managers.
- Twelve '[Managing for Resilience 2022](#)' case studies and [resilience resources](#) were published by RFS in partnership with the Forestry Commission.
- Forest Research has published additional [climate change factsheets](#).
- Forest Services developed a resource suite of 9 webinars to support training of Woodland Creation Accelerator Fund local authorities including guidance on resilience, management and the UKFS.
- [Forestry and Arboriculture Training Fund](#) facilitated private sector access to forestry training for the second time in 2024.
- [FC Professional Forester Apprenticeship program](#) so far has taken 3 cohorts of apprentices to develop sector capacity (2024).
- Forestry England opened its [Level 3 apprenticeship programme in 2022](#), taking on 8 to 12 trainee forest crafts persons each year. Each apprenticeship lasts for 2 years and the aim of the programme is to help upskill the forestry sector.
- The [Woods into Management Forestry Innovation Funds](#) have delivered 3 rounds of develop and testing of ideas to improve the ecological conditions of woodlands and their resilience to climate change between 2021 and 2024. By 2023, £7.6 million was awarded to 62 projects.

## Soon to be implemented (by 2030)

In January 2023 it was agreed, by the then Government, the Tree Health Resilience Strategy and Woodland Resilience Implementation Programme (WRIP) would merge to produce one comprehensive Tree and Woodland Resilience Strategy (TWRS). The TWRS will additionally include greater emphasis on economic resilience of the treescape in addition to the original 'ecological' focus of the WRIP. Work on drafting the document structure and potential actions and delivery plan is underway.



ESC4.5 is being used to underpin the development of the Economics of Woodland Creation tool which will appraise the economic potential of woodlands for land managers.

### **Details of actions to address N8 – Risks to forestry from pests, pathogens, and Invasive non-native species**

Minimise the risk of increased impacts on forestry from pests, pathogens and INNS in a changing climate.

#### Recently implemented

##### Increased tree health support

1. Forest Services' Plant Health Forestry team is established, working with wider Forestry Commission, Defra, APHA, NE, EA, and major NGOs and the forestry sector towards the Plant Biosecurity Strategy (2023) and Tree Health Resilience Strategy (2018).
2. Forestry Commission continues to assess [CS Woodland Tree Health grants](#) supporting landowners.
3. Forestry Commission continues to support the regional trials of the [Tree Health Pilot](#).
4. Forestry Commission has updated its Incident Management System and has developed Lantra accredited training for Plant Health professionals across Forestry Commission, as well as Defra and Animal and Plant Health Agency (APHA).

##### Limiting introductions and spread of pests and INNS

1. [Plant Health Management Standard](#) nurseries or their equivalent are required for supply to EWCO, CS, and Tree Health Pilot planting. Forestry England Delamere Nursery passed this audit for its 5th time in 2024.
2. [TreeAlert](#) launched a new user dashboard to facilitate the monitoring and surveillance of tree pests.
3. Efforts to eradicate *Ips typographus* in Southeast England and East Anglia are continuing with a dedicated Forestry Commission Ips team within Plant Health Forestry. The Demarcated Area restrictions aim to limit the area of host tree populations prone to wind-assisted spread from established European populations.
4. Six biosecurity [online learning modules](#) were publicly launched for professional development.
5. Forestry Commission's Woodland Resilience Officers have developed and introduced a referral process to record and review the planting of non-native emerging forestry species, and to decide on approval within grant-funded woodland creation schemes along with appropriate control measures where necessary.

##### Ongoing research

Forest Research Tree health and biosecurity research programme (CRP7) addresses N8, this includes work areas:



- WA1 – Diagnostic, advisory and phytosanitary provision
- WA2 – Understanding pest and pathogen threats
- WA3 – Improved detection, monitoring and surveillance
- WA4 – Pest and disease management for resilient treescapes
- WA5 – Interdisciplinary approaches to enhance biosecurity

See Annex 3 for further detail.

### Soon to be implemented (by 2030)

1. The Grey Squirrel Action Plan and Deer Strategy are awaiting ministerial approval. Both are required to establish and sustainably manage woodlands.
2. Tree Health Pilot grants will be transitioned to national grants supported by Forestry Commission.
3. A risk assessment framework, developed for the screening of novel tree species across the Defra-group, will be incorporated into the emerging forestry species referral process and extended to felling licence processing. Therefore, it will apply to restocking, in addition to woodland creation.
4. Invasive species management plans will be incorporated into the Enhanced Countryside Stewardship pre-application process and assessed by Forestry Commission.

### Details of actions to address N9 – Opportunities for forestry productivity from new/alternative species becoming suitable (including provenance and genetic diversity)

Plant a wider range of species, including emerging forestry species, so that timber productivity is maintained or enhanced, relative to a 2023 baseline.

### Recently implemented

1. Ongoing research within Forest Research's research programme, CRP2: Markets for forest products and services (see Annex 3 for work area detail).
2. Through evidence-based analysis, Forestry England have prioritised 30 tree 'Species for Future'. This will provide focus for forest planning, investment and its Plant and Seed Supply strategy.
3. Forest Services is promoting appropriate use of near native and suitable non-native species based on information from ESC, ClimEssence, EUNIS habitat types, US Climate Change Atlas, and European Atlas of Forest Tree Species.
4. [Forest Research species pages](#) have been reviewed and updated (59 species are now included).
5. As part of the UK Forest Genetic Resources group, Forestry Commission is working with industry representatives to produce a list of emerging forestry species that have the most interest with regards to commercial use across the UK. This builds on the

recent parallel process undertaken by Forestry England and a similar process in Scotland.

6. The UK has maintained membership of [European Forest Genetic Resources Programme](#) for Phase VII, with Forest Services acting as national coordinator. [The UK Forest Genetic Resources group](#) (which includes representation from across Forestry Commission) is then communicating this information to the wider forestry sector.
7. In 2024 21 new Genetic Conservation Units were registered across 6 sites and 21 species in collaboration with NatureScot and NRW.
8. Forest Research and Forestry England have developed the Forest Biodiversity Index (FOBI), a bespoke indicator of tree, stand and landscape diversity. A complementary indicator of tree functional diversity has been developed for Forestry England by external consultants. Both the FOBI and functional diversity index use the sub-compartment database and are now starting to be used in monitoring.

#### Soon to be implemented (i.e. by 2030)

1. New Forestry England land acquisitions are being considered for FR species trials.
2. Forest Research has undertaken a 10-year assessment of the 8 species and provenance trials established in 2012. A paper summarising the results so far is being reviewed for publication.
3. Forest Research plan to expand the Genetic Conservation Unit network pending funding from the Centre for Forest Protection.
4. Forest Research is discussing involvement with the Institut Européen des Forêts Cultivées [REINFORCE 2 project](#). If agreed, this could see a further 3 trials established along the less represented east coast of Britain.

## 4.3 Monitoring mechanisms to monitor and evaluate

The summary of Forestry Commission indicators relevant to adaptation and resilience is updated from ARP3 in Annex 4.

Climate change adaptation has been embedded across the Forestry Commission as business as usual, rather than as a bespoke, activity. Where climate change adaptation is treated as a specific activity, evaluation mechanisms are outlined below:

- sector resilience outreach activity: the efficacy of the sector outreach program will be evaluated against the baseline British Woodlands Survey in 2020, when it is repeated (2025)
- adaptation in woodland creation grants: the effectiveness of climate change measures in the Nature for Climate Fund (including EWCO) will be evaluated through the programme's monitoring and evaluation programme
- key performance indicators will continue to monitor progress in woodland expansion, the spatial configuration (and resilience) of the woodland resource, and biosecurity threats (and responses to them)
- the National Forest Inventory provides a longer-term monitoring framework for evaluating the efficacy of adaptation measures, particularly future updates of the woodland ecological condition indicator. The NFI is also considering regular (annual) reporting of the area of woodland affected by windstorm
- NFI800, an extension of the current NFI programme, will increase sampling effort in England allowing for finer geographical scale analysis and providing more detail on trends of NFI attributes
- Forest Services is developing a new corporate KPI on the diversity of species funded through the EWCO woodland creation grant scheme

Forest Research's research programme, [CRP4 Resource assessment and sector monitoring](#), continues to pursue innovative approaches to forest inventories, data acquisition, high-quality forestry statistics and forest modelling in support of forest policy and practice.

# 5. Interdependencies and related actions

## 5.1 Planting stock and nursery supply

Creating resilient woodlands or restocking with alternative species for adaptation to climate change depends on an adaptable nursery sector. The UK has a small number of seed trading businesses and recommendations to diversify species use and provenance has challenged current business models. Long lead times, short term demand, increasing costs, and commercial risk of growing stock for which demand is not proven, stifle progress.

### Actions to address nursery supply

1. [Tree Production Innovation Fund](#) has supported projects that aim to enhance the quality, quantity, and diversity of planting stock available for tree planting in England (£2.5 million 2023 to 24).
2. [Tree Production Capital Grant](#) enhances the domestic production of tree seed and saplings, facilities and equipment investments (£2.2 million 2023 to 24).
3. [Seed Sourcing Grant](#) enhances the quality, quantity, and diversity of tree seed sources in England.
4. Nursery notification is required for large EWCO schemes. However, this is short term compared to the time required when ordering novel species or a specific provenance.

## 5.2 Issues around the use of single use plastic

The UK government is committed to eliminating all avoidable plastic waste by 2042. It is important that Forestry Commission evaluates approaches to the prevention, reduction, re-use, recycling and recovery of plastics in line with the waste hierarchy. Alternative materials that have not been fully tested, may lead to poor establishment rates, while a move toward higher unprotected stocking densities could lead to nursery sector shortages.

1. Alternative methods of establishment are being considered and researched.
2. Preliminary Forest Research trials of innovative tree protection materials indicate that several products may last for less than 2 years on site before breaking down and are therefore not fit for purpose.
3. Forestry Commission has published guidance on [the use of tree shelters and guards](#), which we are currently updating. And we are working actively with the [Forest Plastics Working Group](#).

## 5.3 Land use priority and food production

The need to maintain/increase food production, in part because of global climate change, may limit the ability of Forestry Commission to facilitate a step change in the

rate of new woodland planting. Land availability may be further restricted by the need to maintain water resources in areas of low (and declining) rainfall and targets for wildlife-rich habitat creation and restoration.

1. Forestry Commission has developed low sensitivity maps for woodland creation, linked to a EWCO additional contribution, with the aim of promoting planting on less sensitive sites and accelerating grant application and EIA screening processes.
2. Forestry Commission has been supporting the development of Local Nature Recovery Strategies to balance priorities for biodiversity and wider environmental outcomes, including climate change mitigation and adaptation.
3. Forest Research's research programme CRP5 WA2 Methods and tools to assess multiple benefits and trade-offs from trees, woods and forests (see Annex 3) aims to identify the most appropriate sites for woodland expansion.

However, the issue of **timber** security is rarely recognised. It may become more prominent over the coming decades, given that the UK imports 80% of the wood it uses, and global timber demand is predicted to increase four-fold by the middle of the century. Climate change (including an increasing frequency and severity of tree pest and disease outbreaks) may also impact wood production where the UK currently imports timber from.

## 5.4 Payments for ecosystem services

New 'nature markets' are developing following funding being made available through the Natural Environment Investment Readiness Fund. The appeal of market-based mechanisms to attract private investment for afforestation depends on ensuring stability and credibility of the markets themselves.

1. Forest Research's research programme CRP2 WA5 continues to investigate the development of payments for ecosystem service markets (see Annex 3).
2. £50 million funding for the Woodland Carbon Guarantee (WCaG) was announced in the 2018 autumn Budget and provides funding over 30 to 35 years for eligible projects.
3. WCaG has delivered 8 reverse auctions. The latest includes a 'non-grant funded' category to scope the price potential for woodland creation projects in England that are not supported by government grants.
4. WCaG mechanism has had the effect of strengthening the nascent domestic carbon offset market despite recent discrediting of avoided deforestation projects in world-wide markets.

# 6 Uncertainties and actions to address these

## 6.1 Uncertainty

### **Perception of long-term uncertainty in forestry:**

Communicating the urgency of adaptation in forestry is complicated by long timescales, understanding precisely when tipping points will occur, how climate change will progress, or how extreme events will play out. Informed action is needed now to secure England's woodland resource, yet future research might alter the interpretation of the evidence and advice given.

#### Actions

- Forest Research's expert advice informs UKFS practice and ongoing updates.
- Landowner assessment of future risks is incorporated into management plans.
- Operational staff, with national advisors' support, provide bespoke advice.
- Forest Research social research findings are applied to promote climate change adaptation.
- Use of Forest Research/Forestry England Resilience Indicators previously mentioned and incorporating contextual site data, and Standardised Precipitation Evapotranspiration Index (SPEI) to improve the predictive capability of ESC version 5.

### **Tree species suitability predictions**

Trees' reactions to changing local conditions (droughts and longer periods of flooding) could take several years to manifest, and these reactions are likely to be a complex product of multiple factors:

- future improvements to species' models within ESC will be developed based on chorological maps of European tree species distribution as part of process-based modelling developments
- supporting [NewLeaf](#) research to investigate how quickly trees adapt to change

### **Interactions between climate change and forestry pests and diseases**

Strong evidence is emerging of the interaction between the susceptibility of trees under climatic stress and pest outbreaks. The Defra Group Plant Health Risk Register (PHRR) has limited information as to how pests will interact with the changing climate.

Forest Research CRP7 WA2 Understanding pest and pathogen threats of the 2021 to 2026 core research programmes aims to improve understanding of changing pest dynamics (see Annex 3).

## Wind risk

Current climate projections do not include projections of changes in the wind climate. Yet the timing and intensity of extreme wind events is changing, compounding uncertainty in a key area of forest planning and management.

1. R Package ForestGALES v3.0 (FGR) allows the use of future projections of wind climate.
2. FGR allows the use of point cloud datasets, which are becoming increasingly available, to calculate wind risk metrics for individual trees within forests and woodland.

## Wildfire risk

Larger, more spatially dynamic, rapid and multiple incidents are likely with increased impact. Numerous wildfire incidents are likely to occur due to meteorological and fuel factors.

1. The development of wildfire risk maps is planned.
2. Preparedness will be improved through the Fire Danger Rating System (UK FDRS).
3. Wildfire Management Plans will be embedded in Woodland Management Plans, as set out in the UK Forestry Standard.
4. We will work with the sector to better embed wildfire mitigation and adaptation in the design of both the urban and rural tree and woodland planting initiatives.

## 6.2 Evidence gaps

We outlined several critical research questions Forestry Commission as part of the development of the Science and Innovation Strategy (SIS) for Forestry in Great Britain, published in 2014, ARP2 covered these questions. For the period 2021 to 26, the list of critical research questions was revised. Success criteria for each question were also developed. All were incorporated into Forest Research's 7 research programmes for 2021 to 26, which mirror the research themes of the 2020 revision of the SIS, (see Annex 3). We started delivering the research in April 2021, which will run for 5 years.

The process for establishing the next Science and Innovation Strategy (2026 to 2031) has begun. It is led by Forest Services on behalf of all 4 administrations and is due to conclude in autumn/winter 2025. This will provide an opportunity to provide further focus on woodland resilience and climate change adaptation.

## 6.3 Contingency planning and incident management

Forest Services has a tried and tested approach to incident management that is practiced at exercises: Exercise ELM 2018 (Xylella outbreak) and Exercise NOBEL FIR 2019 (major wildfire). The exercise for 2020 was delayed until 2021 and the 2021 exercise was cancelled due to coronavirus. Forestry Commission's Incident Management Team was active from March 2020 to September 2021 responding to coronavirus, with further major exercises not required. Following these exercises, clear roles were established across the organisation (including Forest Research and Forestry

England). This included allocating duty officer responsibilities for a member of the Forest Services Executive Team at all times. Close working with the contingency planning teams in Defra and the Environment Agency, ensures that we are ready to deal with real events when they occur.

The incident management process becomes operational when amber or red alerts are received from the Natural Hazards Partnership and the National Severe Weather Warning System (triggering the establishment of incident-specific requirements), or when a new pest outbreak or infestation arises. Since 2013, the National Incident Management Team (IMT) has been activated 53 times.

Since 2023, the Incident Management approach has been reviewed, updated and developed into Lantra-accredited training. The first Incident Management training workshops will be rolled out in early 2025.



# 7. Opportunities and challenges

## 7.1 Opportunities

The Environment Act 2021, net zero ambitions, and wider public support for tree planting provide an unrivalled opportunity to implement adaptation measures in the forestry sector. The key opportunities can be summarised as:

- the Nature for Climate Fund embeds adaptation principles, resilient woodland enhancement, and landscape recovery to achieve net zero emissions
- it is critical that we work closely with Defra to embed forestry and woodland adaptation into Countryside Stewardship, Sustainable Farming Incentive and Landscape Recovery components of Environmental Land Management schemes
- nature-based solutions at Landscape Scale (Nature Returns), gives us a practical opportunity to embed adapted woodland design into resilient landscapes
- NAP3 emphasises the requirement to embed resilience in terrestrial biodiversity, natural carbon stores and commercial forestry
- guided by Forestry England and Forest Research expertise, the nation's 253,000ha of forests represent exemplars of forest management delivering environmental, economic and social resilience which can be used to promote best practice
- there is scope for closer national and area level involvement in the Catchment Sensitive Farming initiative, integrating our woodland creation advice
- responses to recent pest and disease outbreaks, including the current Ips outbreak, provide the opportunity for exemplars of resilience when restocking/regenerating the woodland

## 7.2 Key challenges

The key challenges that continue to be addressed when implementing the actions set out in this report can be summarised as:

- uncertainty associated with implementing adaptive actions in advance of the full effects of climate change being realised
- clearly communicating that different approaches to adaptation are appropriate for different management objectives
- drawing the forestry sector together so that it speaks with one voice on the need to adapt, putting different management objectives aside
- financial cost of transitioning to more resilient systems, which initially are more costly to manage and less productive than traditional systems
- ensuring that sufficient, appropriate, planting stock is available to support the ambitious planting programmes
- enabling an adaptive view of tree species composition and migration that can dynamically adjust to climate change

- protecting our irreplaceable habitats whilst ensuring that our ancient and semi-natural woodlands can adapt to future climate
- balancing the various demands placed on England's limited and crowded land area, including nature recovery, food production, timber production, transport and development
- establishing the principle that net zero, nature recovery and timber production aspirations from forestry and woodlands will not be achieved in the absence of the woodlands being planted now being resilient and adapted to the future climate
- resistance to the planting of non-native species in the context of enhancing the diversity and resilience of England's woodland resource

# Annexes

# Annex 1 - Policy published since ARP3

Policy and important documents related to, or impacting on, adaption in England's forests since ARP3

- [Designing and managing forests and woodlands to reduce flood risk \(2022\)](#)
- [UK Forestry Standard Practice Guide – Adapting forest and woodland management to the changing climate \(2022\)](#)
- [UK Forestry Standard \(UKFS\) fifth revision published \(2023\)](#)
- [Environmental Improvement Plan \(2023\)](#)
- [Third National Adaptation Programme \(2023\)](#)
- [Decision support framework for peatland protection, the establishment of new woodland and re-establishment of existing woodland on peatland in England \(2023\)](#)
- [UK Forestry Standard Practice Guide - Creating and managing riparian woodland \(2024\)](#)

# Annex 2 - Forestry Commission core actions against NAP3 Risks and planned actions

NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<b>N1 – Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology</b>	Supporting Local Nature Recovery Strategies	<ol style="list-style-type: none"> <li>1. Defra will work with stakeholders to create and restore habitats and ecosystem functions, including those most at risk from climate change.</li> <li>2. Defra will continue to support stakeholders to carry out ecosystem restoration and management in an integrated landscape context, considering the current and future role of Protected Sites and wider habitats in the wider context of biogeographic change.</li> <li>3. Defra will continue to support stakeholders to use spatial prioritisation for habitat restoration and creation, informed by climate projections, such as projected hazard and land suitability mapping, through the NAP3 implementation period to 2028 and beyond.</li> <li>4. Defra will continue to support stakeholders to target activity to support vulnerable species and habitats</li> </ol>
<b>N1 – Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology</b>	Adaptation of land management to wildfire risk programme	<ol style="list-style-type: none"> <li>7. The Home Office, supported by Defra, will scope out a Wildfire Strategy and Action Plan by mid-2024, reporting on the outcomes of the scoping exercise. Defra will develop ‘adaptation of land management to wildfire risk guidance by 2026. Defra will work with public and private sector land managers to develop wildfire management plans for 20,000 hectares of habitat by 2025.</li> </ol>
<b>N1 – Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology</b>	Wildfire risk research and development, including: <ul style="list-style-type: none"> <li>• England wildfire risk map;</li> <li>• wildfire risk reduction measures;</li> <li>• cause and motives of wildfire ignitions;</li> <li>• statistical analysis of wildfire incidents; economic, social and environmental impacts of wildfires; and</li> <li>• vegetation fire observer and behaviour protocols and products by 2028</li> </ul>	<ol style="list-style-type: none"> <li>7. The Home Office, supported by Defra, will scope out a Wildfire Strategy and Action Plan by mid-2024, reporting on the outcomes of the scoping exercise. Defra will develop ‘adaptation of land management to wildfire risk guidance by 2026. Defra will work with public and private sector land managers to develop wildfire management plans for 20,000 hectares of habitat by 2025.</li> </ol>
<b>N1 – Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology</b>	Woodland for Water Partnership and the Woodland Water Code	Not included in NAP3

NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<p><b>N3 – Opportunities from new species in terrestrial habitats colonisations</b>  <b>Goal: Facilitate the movement and expansion of native species within the UK in response to climate change opportunities.</b></p>	<p>Promoting the use of honorary natives and regional migration of tree species</p>	<p>1. Defra will create and restore habitats and ecosystem functions as set out in N1 Action 1 to establish resilient, functioning and connected ecosystems and habitats and facilitate the natural movement of species within and across landscapes.</p> <p>2. Defra will continue to increase opportunities for the persistence and expansion of native threatened species, including those identified as vulnerable to climate change</p> <p>3. Defra will make Protected Site designation and management more dynamic to promote adaptation to the changing climate. The climate change risk posed to Sites of Special Scientific Interest (SSSIs) will be considered as part of condition assessment.</p>
<p><b>N4 Risk to soils from changing climatic conditions, including seasonal aridity and wetness</b></p>	<p>Promoting cultivation best practice and use of Continuous Cover Forestry systems</p>	<p>3. Defra will encourage landowners to sustainably manage at least 40% of England’s agricultural soils by 2028 so that it will be more resilient to the impacts of drought and flooding and better able to support food and biomass production</p>
<p><b>N4 Risk to soils from changing climatic conditions, including seasonal aridity and wetness</b></p>	<p>Ongoing forest soil survey</p>	<p>1. Defra will establish soil monitoring schemes by spring 2024, collect robust baseline data of soil health across all land use types in England to measure and monitor soil health and inform targeted interventions and land management practices by 2028</p>
<p><b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b></p>	<p>Climate Matching Tool</p>	<p>2. Defra, the Forestry Commission and Forestry Climate Change Partnership will continue upskilling the forestry sector’s understanding of climate change and measures to limit its impact through the NAP3 implementation period and beyond.</p> <p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p>
<p><b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b></p>	<p>Forest Research Climate Change Hub</p>	<p>2. Defra, the Forestry Commission and Forestry Climate Change Partnership will continue upskilling the forestry sector’s understanding of climate change and measures to limit its impact through the NAP3 implementation period and beyond.</p> <p>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow</p>
<p><b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b></p>	<p>UK Forestry Standard <b>Adaptation Practice Guide</b></p>	<p>2. Defra, the Forestry Commission and Forestry Climate Change Partnership will continue upskilling the forestry sector’s understanding of climate change and measures to limit its impact through the NAP3 implementation period and beyond.</p> <p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow</p> <p>5. The Home Office, supported by Defra, will scope out a Wildfire Strategy and Action Plan by mid-2024, reporting on the outcomes of the scoping exercise. Defra will develop ‘adaptation of land management to wildfire risk’ guidance by 2026. Defra will work with public and private sector land managers to develop wildfire management plans for 20,000 hectares of habitat by 2025.</p> <p>6. Defra and the Forestry Commission will support land managers to increase the number of woodlands within high-risk areas that have wildfire management plans within woodland management plans by 2030 to mitigate the risk of this increasing climatic hazard.</p>

NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
		<p>7. Defra and the Forestry Commission will continue to support implementation of Continuous Cover Forestry more widely to maintain forestry habitats and have higher long-term carbon stocks than woodlands managed on a rotational clear-fell basis.</p>
<p><b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b></p>	<p>Woodland Carbon Code</p>	<p>1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.</p> <p>8. Defra will use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk. This will be implemented in the post-Nature for Climate Fund forestry policies, including urban tree cover, by 2026.</p>
<p><b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b></p>	<p>England Woodland Creation Offer</p>	<p>1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.</p> <p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>7. Defra and the Forestry Commission will continue to support implementation of Continuous Cover Forestry more widely to maintain forestry habitats and have higher long-term carbon stocks than woodlands managed on a rotational clear-fell basis. There will be an increase in woodlands in Continuous Cover Forestry management 54 by 2050</p> <p>8. Defra will use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk.</p>
<p><b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b></p>	<p>Nature for Climate Fund tree and woodland creation delivery mechanisms</p>	<p>1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.</p> <p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>8. Defra will use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk.</p>



NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Woodland Creation Planning Grant	<p>1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.</p> <p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>8. Defra will use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk.</p>
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Grey Squirrel Action Plan	<p>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow.</p>
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	National Deer Management Strategy	<p>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow.</p>
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Tree and Woodland Resilience Strategy	<p>2. Defra, the Forestry Commission and Forestry Climate Change Partnership will continue upskilling the forestry sector’s understanding of climate change and measures to limit its impact through the NAP3 implementation period and beyond.</p> <p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow</p>
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Seed Sourcing Grant	<p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow.</p>
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Tree Production Capital Grant	<p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow.</p>



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<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Tree Production Innovation Fund	<p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>4. Defra and the Forestry Commission will set out plans in the updated Tree Health Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow.</p>
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Environmental Land Management schemes	<p>1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.</p> <p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow.</p> <p>7. Defra and the Forestry Commission will continue to support implementation of Continuous Cover Forestry more widely to maintain forestry habitats and have higher long-term carbon stocks than woodlands managed on a rotational clear-fell basis. There will be an increase in woodlands in Continuous Cover Forestry management 54 by 2050</p> <p>8. Defra will use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk.</p>
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Big Nature Impact Fund and Green Finance support	<p>1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.</p> <p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p>
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Biodiversity Net Gain support	<p>1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.</p> <p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow.</p> <p>8. Defra will use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk.</p>
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Natural Capital Ecosystem Assessment	<p>8. Defra will use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk.</p>

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woodlands, which will increase the resilience of these carbon stores for future climate conditions)		9. Defra and the Forestry Commission will improve inter-annual monitoring of tree growth rates and consider more frequent reporting of woodland condition and tree mortality.
N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)	Land use research and analysis support	8. Defra will use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk.
N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)	<i>Ips typographus</i> surveillance and eradication programme	No NAP3 actions specifically address this.
N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)	National Planning Policy Framework support	1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.
N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)	Environmental Impact Assessment regulatory process	1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.  3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.
N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)	Nature for Climate Fund Research and Development Strategy	1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.  2. Defra, the Forestry Commission and Forestry Climate Change Partnership will continue upskilling the forestry sector’s understanding of climate change and measures to limit its impact through the NAP3 implementation period and beyond.  3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.  8. Defra will use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk.  9. Defra and the Forestry Commission will improve inter-annual monitoring of tree growth rates and consider more frequent reporting of woodland condition and tree mortality.

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<p><b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b></p>	<p>Science and Innovation Strategy for Forestry in Great Britain</p>	<ol style="list-style-type: none"> <li>1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.</li> <li>2. Defra, the Forestry Commission and Forestry Climate Change Partnership will continue upskilling the forestry sector’s understanding of climate change and measures to limit its impact through the NAP3 implementation period and beyond.</li> <li>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</li> <li>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow.</li> <li>7. Defra and the Forestry Commission will continue to support implementation of Continuous Cover Forestry more widely to maintain forestry habitats and have higher long-term carbon stocks than woodlands managed on a rotational clear-fell basis.</li> <li>8. Defra will use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk.</li> </ol>
<p><b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b></p>	<p>Forest Development Types decision support tool</p>	<ol style="list-style-type: none"> <li>2. Defra, the Forestry Commission and Forestry Climate Change Partnership will continue upskilling the forestry sector’s understanding of climate change and measures to limit its impact through the NAP3 implementation period and beyond.</li> <li>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow</li> <li>7. Defra and the Forestry Commission will continue to support implementation of Continuous Cover Forestry more widely to maintain forestry habitats and have higher long-term carbon stocks than woodlands managed on a rotational clear-fell basis. There will be an increase in woodlands in Continuous Cover Forestry management by 2050</li> </ol>
<p><b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b></p>	<p>Ecological Site Classification decision support system</p>	<ol style="list-style-type: none"> <li>1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.</li> <li>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</li> <li>8. Defra will use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk. This will be implemented in the post-Nature for Climate Fund forestry policies, including urban tree cover, by 2026.</li> </ol>
<p><b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b></p>	<p>England Trees Action Plan</p>	<ol style="list-style-type: none"> <li>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (<b>including ancient woodland</b>) in 2024 to reduce loss from hazards such as wildfire, drought and windblow.</li> <li>9. Defra and the Forestry Commission will improve inter-annual monitoring of tree growth rates and consider more frequent reporting of woodland condition and tree mortality. With this information on impacts and further analysis, data for woodland wildfire, wind damage and inter-annual variation in growth rates could directly measure the impacts of climate change on our natural carbon stores.</li> </ol>

NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Woodland for Water Partnership and the Woodland Water Code	<p>1. Defra and the Forestry Commission will seek to treble tree planting rates over the current Parliament on a path to achieve the new statutory target of increasing tree canopy and woodland cover from 14.5% to 16.5% by 2050.</p> <p>3. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p>
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	Adaptation of land management to wildfire risk programme	<p>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow</p> <p>5. The Home Office, supported by Defra, will scope out a Wildfire Strategy and Action Plan by mid-2024, reporting on the outcomes of the scoping exercise. Defra will develop ‘adaptation of land management to wildfire risk’ guidance by 2026. Defra will work with public and private sector land managers to develop wildfire management plans for 20,000 hectares of habitat by 2025.</p> <p>6. Defra and the Forestry Commission will support land managers to increase the number of woodlands within high-risk areas that have wildfire management plans within woodland management plans by 2030 to mitigate the risk of this increasing climatic hazard.</p>
<b>N5 Forestry – Risks to natural carbon stores and sequestration from changing climatic conditions (Goal: Create and maintain healthy, functioning woodlands, which will increase the resilience of these carbon stores for future climate conditions)</b>	<p>Wildfire risk research and development, including:</p> <ul style="list-style-type: none"> <li>• England wildfire risk map;</li> <li>• wildfire risk reduction measures;</li> <li>• cause and motives of wildfire ignitions;</li> <li>• statistical analysis of wildfire incidents; economic, social and environmental impacts of wildfires; and vegetation fire observer and behaviour protocols and products by 2028</li> </ul>	<p>4. Defra and the Forestry Commission will set out plans in the Tree and Woodland Resilience Strategy to increase adaptive management of existing trees and woodlands (including ancient woodland) in 2024 to reduce loss from hazards such as wildfire, drought and windblow</p> <p>5. The Home Office, supported by Defra, will scope out a Wildfire Strategy and Action Plan by mid-2024, reporting on the outcomes of the scoping exercise. Defra will develop ‘adaptation of land management to wildfire risk’ guidance by 2026. Defra will work with public and private sector land managers to develop wildfire management plans for 20,000 hectares of habitat by 2025.</p> <p>6. Defra and the Forestry Commission will support land managers to increase the number of woodlands within high-risk areas that have wildfire management plans within woodland management plans by 2030 to mitigate the risk of this increasing climatic hazard.</p>
<b>N5 Peatlands – Risks to natural carbon stores and sequestration from changing climatic conditions</b>	England Peatland Action Plan Implementation Plan	<p>1. Defra will restore 35,000 hectares of peat by 2025 and 280,000 hectares by 2050</p> <p>6. The Home Office, supported by Defra, will scope out a Wildfire Strategy and Action Plan by mid-2024, reporting on the outcomes of the scoping exercise. Wildfire mitigation and risk management will be included in the heather and grass management code to be published in 2025.</p>
<b>N5 Peatlands – Risks to natural carbon stores and sequestration from changing climatic conditions</b>	<p>Wildfire risk research and development, including:</p> <ul style="list-style-type: none"> <li>• England wildfire risk map;</li> <li>• wildfire risk reduction measures;</li> <li>• cause and motives of wildfire ignitions;</li> <li>• statistical analysis of wildfire incidents; economic, social and environmental impacts of wildfires; and vegetation fire observer and</li> </ul>	<p>6. The Home Office, supported by Defra, will scope out a Wildfire Strategy and Action Plan by mid-2024, reporting on the outcomes of the scoping exercise. Wildfire mitigation and risk management will be included in the heather and grass management code to be published in 2025.</p>



NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
	behaviour protocols and products by 2028	
<b>N5 Peatlands – Risks to natural carbon stores and sequestration from changing climatic conditions</b>	Adaptation of land management to wildfire risk programme	6. The Home Office, supported by Defra, will scope out a Wildfire Strategy and Action Plan by mid-2024, reporting on the outcomes of the scoping exercise. Wildfire mitigation and risk management will be included in the heather and grass management code to be published in 2025.
<b>N6 – Risks to and opportunities for agricultural productivity from extreme events and changing climatic conditions</b>	Agroforestry inclusion in CS Higher Tier and support from Forestry Commission	2. Defra will pay for the establishment and maintenance of severable and silvopastoral agroforestry systems in 2024 to encourage and support increased agroforestry
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Climate Matching Tool	<p>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice.</p> <p>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient.</p> <p>5. Defra and the Forestry Commission will support the implementation of Continuous Forestry Cover more widely to support forestry productivity, allow for greater species diversity and maintain forestry habitats.</p> <p>6. Defra will use climate risk forecasts to develop post-England Trees Action Plan and post-Nature for Climate Fund policies from 2025, so that tree planting is spatially targeted to account for climate risk.</p>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Forest Research Climate Change Hub	<p>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice.</p> <p>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient.</p> <p>5. Defra and the Forestry Commission will support the implementation of Continuous Forestry Cover more widely to support forestry productivity, allow for greater species diversity and maintain forestry habitats.</p> <p>6. Defra will use climate risk forecasts to develop post-England Trees Action Plan and post-Nature for Climate Fund policies from 2025, so that tree planting is spatially targeted to account for climate risk."</p>

NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	UK Forestry Standard <b>Adaptation Practice Guide</b>	<ol style="list-style-type: none"> <li>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</li> <li>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient. By 2028, there will be an increase in the uptake of woodland management</li> <li>4. Defra and the Forestry Commission will increase the number of woodlands within high-risk areas that have wildfire management plans within woodland management plans by 2030</li> <li>5. Defra and the Forestry Commission will support the implementation of Continuous Forestry Cover more widely to support forestry productivity, allow for greater species diversity and maintain forestry habitats.</li> </ol>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Woodland Carbon Code	<ol style="list-style-type: none"> <li>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice.</li> </ol>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	England Woodland Creation Offer	<ol style="list-style-type: none"> <li>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice.</li> <li>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient.</li> </ol>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Nature for Climate Fund tree and woodland creation delivery mechanisms	<ol style="list-style-type: none"> <li>7. Defra, in collaboration with DESNZ, DBT, DLUHC, and DSIT will publish Timber in Construction Roadmap in 2023. DLUHC will publish a consultation on Whole Life Carbon assessments in the construction sector in 2023. Defra will also complete a review of the government Timber Procurement Policy in 2023. This will create an environment for greater timber market activities under a changing climate.</li> </ol>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Woodland Creation Planning Grant	<ol style="list-style-type: none"> <li>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</li> <li>6. Defra will use climate risk forecasts to develop post-England Trees Action Plan and post-Nature for Climate Fund policies from 2025, so that tree planting is spatially targeted to account for climate risk.</li> </ol>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Tree and Woodland Resilience Strategy	<ol style="list-style-type: none"> <li>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</li> <li>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient. By 2028, there will be an increase in the uptake of woodland management support through grant schemes.</li> <li>5. Defra and the Forestry Commission will support the implementation of Continuous Forestry Cover more widely to support forestry productivity, allow for greater species diversity and maintain forestry habitats. There will be an increase in Continuous Forestry Cover management by 2050, as evidenced by reduction in the proportion of clear-fell licences applied for.</li> </ol>

NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Environmental Land Management schemes	<p>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient. By 2028, there will be an increase in the uptake of woodland management support through grant schemes.</p> <p>4. Defra and the Forestry Commission will increase the number of woodlands within high-risk areas that have wildfire management plans within woodland management plans by 2030</p> <p>5. Defra and the Forestry Commission will support the implementation of Continuous Forestry Cover more widely to support forestry productivity, allow for greater species diversity and maintain forestry habitats.</p>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Targetted woodland creation grants	6. Defra will use climate risk forecasts to develop post-England Trees Action Plan and post-Nature for Climate Fund policies from 2025, so that tree planting is spatially targeted to account for climate risk.
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	<i>Ips typographus</i> surveillance and eradication programme	No NAP3 actions specifically address this.
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Environmental Impact Assessment regulatory process	1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice.
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Felling Licence Regulations	<p>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient.</p> <p>5. Defra and the Forestry Commission will support the implementation of Continuous Forestry Cover more widely to support forestry productivity, allow for greater species diversity and maintain forestry habitats.</p>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Nature for Climate Fund Research and Development Strategy	<p>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient. By 2028, there will be an increase in the uptake of woodland management support through grant schemes.</p> <p>6. Defra will use climate risk forecasts to develop post-England Trees Action Plan and post-Nature for Climate Fund policies from 2025, so that tree planting is spatially targeted to account for climate risk.</p>

NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Forest Development Types decision support tool	<ol style="list-style-type: none"> <li>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice.</li> <li>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient.</li> <li>5. Defra and the Forestry Commission will support the implementation of Continuous Forestry Cover more widely to support forestry productivity, allow for greater species diversity and maintain forestry habitats.</li> <li>6. Defra will use climate risk forecasts to develop post-England Trees Action Plan and post-Nature for Climate Fund policies from 2025, so that tree planting is spatially targeted to account for climate risk.</li> </ol>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Ecological Site Classification decision support system	<ol style="list-style-type: none"> <li>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice.</li> <li>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient.</li> <li>5. Defra and the Forestry Commission will support the implementation of Continuous Forestry Cover more widely to support forestry productivity, allow for greater species diversity and maintain forestry habitats.</li> <li>6. Defra will use climate risk forecasts to develop post-England Trees Action Plan and post-Nature for Climate Fund policies from 2025, so that tree planting is spatially targeted to account for climate risk.</li> </ol>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	England Trees Action Plan	<ol style="list-style-type: none"> <li>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</li> <li>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient. By 2028, there will be an increase in the uptake of woodland management support through grant schemes.</li> <li>4. Defra and the Forestry Commission will increase the number of woodlands within high-risk areas that have wildfire management plans within woodland management plans by 2030 to mitigate the risk of this increasing climatic hazard.</li> <li>5. Defra and the Forestry Commission will support the implementation of Continuous Forestry Cover more widely to support forestry productivity, allow for greater species diversity and maintain forestry habitats. There will be an increase in Continuous Forestry Cover management by 2050, as evidenced by reduction in the proportion of clear-fell licences applied for.</li> <li>6. Defra will use climate risk forecasts to develop post-England Trees Action Plan and post-Nature for Climate Fund policies from 2025, so that tree planting is spatially targeted to account for climate risk.</li> <li>7. Defra, in collaboration with DESNZ, DBT, DLUHC, and DSIT will publish Timber in Construction Roadmap in 2023. DLUHC will publish a consultation on Whole Life Carbon assessments in the construction sector in 2023. Defra will also complete a review of the government Timber Procurement Policy in 2023. This will create an environment for greater timber market activities under a changing climate.</li> </ol>



NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Timber in Construction Roadmap	7. Defra, in collaboration with DESNZ, DBT, DLUHC, and DSIT will publish Timber in Construction Roadmap in 2023. DLUHC will publish a consultation on Whole Life Carbon assessments in the construction sector in 2023. Defra will also complete a review of the government Timber Procurement Policy in 2023. This will create an environment for greater timber market activities under a changing climate.
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	ForestGALES	<p>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice.</p> <p>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient.</p> <p>5. Defra and the Forestry Commission will support the implementation of Continuous Forestry Cover more widely to support forestry productivity, allow for greater species diversity and maintain forestry habitats.</p> <p>6. Defra will use climate risk forecasts to develop post-England Trees Action Plan and post-Nature for Climate Fund policies from 2025, so that tree planting is spatially targeted to account for climate risk.</p>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	Adaptation of land management to wildfire risk programme	<p>1. Defra and the Forestry Commission will ensure new woodlands have current and future climate conditions considered in their design and species choice. Grant applications for new woodland will be evaluated by 2028 to assess progress against this action.</p> <p>2. Defra will encourage landowners to incorporate climate-smart actions into woodland creation and management plans, making forestry productivity more resilient. By 2028, there will be an increase in the uptake of woodland management support through grant schemes.</p> <p>3. The Home Office, supported by Defra, will scope out a Wildfire Strategy and Action Plan by mid-2024, reporting on the outcomes of the scoping exercise. Defra will develop ‘adaptation of land management to wildfire risk’ guidance by 2026. Defra will work with public and private sector land managers to develop wildfire management plans for 20,000 hectares of habitat by 2025. This will be supported by research programmes beginning from 2023. This action will reduce the risk of wildfires impacting upon social, economic and environmental assets across the chapter themes of NAP3.</p> <p>4. Defra and the Forestry Commission will increase the number of woodlands within high-risk areas that have wildfire management plans within woodland management plans by 2030 to mitigate the risk of this increasing climatic hazard.</p> <p>6. Defra will use climate risk forecasts to develop post-England Trees Action Plan and post-Nature for Climate Fund policies from 2025, so that tree planting is spatially targeted to account for climate risk.</p>
<b>N6 – Risks to and opportunities for forestry productivity from extreme events and changing climatic conditions</b>	<p>Wildfire risk research and development, including:</p> <ul style="list-style-type: none"> <li>• England wildfire risk map;</li> <li>• wildfire risk reduction measures;</li> <li>• cause and motives of wildfire ignitions;</li> <li>• statistical analysis of wildfire incidents; economic, social and environmental impacts of wildfires; and vegetation fire observer and behaviour protocols and products by 2028</li> </ul>	<p>3. The Home Office, supported by Defra, will scope out a Wildfire Strategy and Action Plan by mid-2024, reporting on the outcomes of the scoping exercise. Defra will develop ‘adaptation of land management to wildfire risk’ guidance by 2026. Defra will work with public and private sector land managers to develop wildfire management plans for 20,000 hectares of habitat by 2025. This will be supported by research programmes beginning from 2023. This action will reduce the risk of wildfires impacting upon social, economic and environmental assets across the chapter themes of NAP3.</p> <p>4. Defra and the Forestry Commission will increase the number of woodlands within high-risk areas that have wildfire management plans within woodland management plans by 2030 to mitigate the risk of this increasing climatic hazard.</p>

NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<b>N8 – Risks to forestry from pests, pathogens, and INNS (Invasive non-native species)</b>	Climate Matching Tool	5. Defra will provide guidance on appropriate species choice for planting new woodland which considers the likely impacts of climate change, including a wider range of native species, by 2025. This will ensure the new woodland is resilient to climate change and stock has a wide genetic base.
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	Database for seed stands and input to the UK Forest Genetic Resources group	5. Defra will provide guidance on appropriate species choice for planting new woodland which considers the likely impacts of climate change, including a wider range of native species, by 2025. This will ensure the new woodland is resilient to climate change and stock has a wide genetic base.
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	England Woodland Creation Offer	3. Defra will introduce a bio secure procurement requirement on all government funded tree planting by 2025 to improve the biosecurity of supply chains.
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	Grey Squirrel Action Plan	2. Defra will publish management strategies for deer and grey squirrels in 2023, which will provide measures for reducing their impacts on forestry.
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	Tree and Woodland Resilience Strategy	4. Defra will fund initiatives to increase the quality, quantity and diversity of domestically produced tree seed and planting stock. This will ensure genetically diverse seed of known provenance can be planted for resilience to climate change. From 2025, there will be increased domestic production of tree planting stock and increased numbers of registered seed stands and orchards.
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	Seed Sourcing Grant	4. Defra will fund initiatives to increase the quality, quantity and diversity of domestically produced tree seed and planting stock. This will ensure genetically diverse seed of known provenance can be planted for resilience to climate change. From 2025, there will be increased domestic production of tree planting stock and increased numbers of registered seed stands and orchards.  5. Defra will provide guidance on appropriate species choice for planting new woodland which considers the likely impacts of climate change, including a wider range of native species, by 2025. This will ensure the new woodland is resilient to climate change and stock has a wide genetic base.
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	Tree Production Innovation Fund	4. Defra will fund initiatives to increase the quality, quantity and diversity of domestically produced tree seed and planting stock. This will ensure genetically diverse seed of known provenance can be planted for resilience to climate change. From 2025, there will be increased domestic production of tree planting stock and increased numbers of registered seed stands and orchards.  5. Defra will provide guidance on appropriate species choice for planting new woodland which considers the likely impacts of climate change, including a wider range of native species, by 2025. This will ensure the new woodland is resilient to climate change and stock has a wide genetic base.
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	Environmental Land Management schemes	3. Defra will introduce a bio secure procurement requirement on all government-funded tree planting by 2025 to improve the biosecurity of supply chains.
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	<i>Ips typographus</i> surveillance and eradication programme	No NAP3 actions specifically address this.
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	Tree Alert	8. Defra will work with stakeholders to encourage pest and disease reporting and biosecure behaviour among growers, farmers, animal keepers, vets, importers and the public (2024 to 2028). To prepare for this action, biosecurity e-learning module will be launched for the public in 2023.
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	Environmental Impact Assessment regulatory process	1. Defra will develop a framework to regulate the planting of ‘emerging forestry species’ from 2023, which will improve regulation in woodland creation and restocking proposals.

NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	Promoting appropriate use of alternative tree species	<p>1. Defra will develop a framework to regulate the planting of ‘emerging forestry species’ from 2023, which will improve regulation in woodland creation and restocking proposals.</p> <p>5. Defra will provide guidance on appropriate species choice for planting new woodland which considers the likely impacts of climate change, including a wider range of native species, by 2025. This will ensure the new woodland is resilient to climate change and stock has a wide genetic base.</p>
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	Regulation of emerging forestry species	<p>1. Defra will develop a framework to regulate the planting of ‘emerging forestry species’ from 2023, which will improve regulation in woodland creation and restocking proposals.</p> <p>5. Defra will provide guidance on appropriate species choice for planting new woodland which considers the likely impacts of climate change, including a wider range of native species, by 2025. This will ensure the new woodland is resilient to climate change and stock has a wide genetic base.</p>
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	Regulation of emerging forestry species	5. Defra will continue to regulate, where appropriate, the keeping, breeding, transportation, selling, use or exchange, reproduction, growth, cultivation, or release of INNS that pose the most significant risk through to 2030. The list of species of special concern will be reviewed every 6 years.
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	England Trees Action Plan	<p>3. Defra will introduce a biosecure procurement requirement on all government funded tree planting by 2025 to improve the biosecurity of supply chains.</p> <p>4. Defra will fund initiatives to increase the quality, quantity and diversity of domestically produced tree seed and planting stock. This will ensure genetically diverse seed of known provenance can be planted for resilience to climate change. From 2025, there will be increased domestic production of tree planting stock and increased numbers of registered seed stands and orchards.</p>
<b>N8 – Risks to forestry from pests, pathogens, and INNS</b>	National Deer Management Strategy	2. Defra will publish management strategies for deer and grey squirrels in 2023, which will provide measures for reducing their impacts on forestry.
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	Tree and Woodland Resilience Strategy	<p>2. Defra will support research on the use of appropriate native and non-native tree species and alternative tree growing systems by 2028, which are better suited to England’s future climate. This action is subject to Defra’s development of a regulatory framework for the planting of ‘emerging forestry species’ from 2023 that will improve regulation in woodland creation and restocking proposals.</p> <p>3. Defra will support research on the propagation of alternative species, support nurseries to develop the market for alternative species, develop appropriate licensing, guidance or regulations, and invest in changing capital and infrastructure. This work will be developed through the NAP3 implementation period and beyond, and 5-yearly reviews of Forest Research’s species categories will reflect improving knowledge.</p>
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	Tree Production Innovation Fund	<p>2. Defra will support research on the use of appropriate native and non-native tree species and alternative tree growing systems by 2028, which are better suited to England’s future climate. This action is subject to Defra’s development of a regulatory framework for the planting of ‘emerging forestry species’ from 2023 that will improve regulation in woodland creation and restocking proposals.</p> <p>3. Defra will support research on the propagation of alternative species, support nurseries to develop the market for alternative species, develop appropriate licensing, guidance or regulations, and invest in changing capital and infrastructure. This work will be developed through the NAP3 implementation period and beyond, and 5-yearly reviews of Forest Research’s species categories will reflect improving knowledge.</p>

NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	Woods into Management Forestry Innovation Funds	<p>2. Defra will support research on the use of appropriate native and non-native tree species and alternative tree growing systems by 2028, which are better suited to England’s future climate. This action is subject to Defra’s development of a regulatory framework for the planting of ‘emerging forestry species’ from 2023 that will improve regulation in woodland creation and restocking proposals.</p> <p>3. Defra will support research on the propagation of alternative species, support nurseries to develop the market for alternative species, develop appropriate licensing, guidance or regulations, and invest in changing capital and infrastructure. This work will be developed through the NAP3 implementation period and beyond, and 5-yearly reviews of Forest Research’s species categories will reflect improving knowledge.</p>
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	Environmental Impact Assessment regulatory process	<p>2. Defra will support research on the use of appropriate native and non-native tree species and alternative tree growing systems by 2028, which are better suited to England’s future climate. This action is subject to Defra’s development of a regulatory framework for the planting of ‘emerging forestry species’ from 2023 that will improve regulation in woodland creation and restocking proposals.</p>
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	Nature for Climate Fund Research and Development Strategy	<p>2. Defra will support research on the use of appropriate native and non-native tree species and alternative tree growing systems by 2028, which are better suited to England’s future climate. This action is subject to Defra’s development of a regulatory framework for the planting of ‘emerging forestry species’ from 2023 that will improve regulation in woodland creation and restocking proposals.</p> <p>3. Defra will support research on the propagation of alternative species, support nurseries to develop the market for alternative species, develop appropriate licensing, guidance or regulations, and invest in changing capital and infrastructure. This work will be developed through the NAP3 implementation period and beyond, and 5-yearly reviews of Forest Research’s species categories will reflect improving knowledge.</p>
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	UK Research and Innovation treescape research programmes	<p>2. Defra will support research on the use of appropriate native and non-native tree species and alternative tree growing systems by 2028, which are better suited to England’s future climate. This action is subject to Defra’s development of a regulatory framework for the planting of ‘emerging forestry species’ from 2023 that will improve regulation in woodland creation and restocking proposals.</p> <p>3. Defra will support research on the propagation of alternative species, support nurseries to develop the market for alternative species, develop appropriate licensing, guidance or regulations, and invest in changing capital and infrastructure. This work will be developed through the NAP3 implementation period and beyond, and 5-yearly reviews of Forest Research’s species categories will reflect improving knowledge.</p>
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	Science and Innovation Strategy for Forestry in Great Britain	<p>2. Defra will support research on the use of appropriate native and non-native tree species and alternative tree growing systems by 2028, which are better suited to England’s future climate. This action is subject to Defra’s development of a regulatory framework for the planting of ‘emerging forestry species’ from 2023 that will improve regulation in woodland creation and restocking proposals.</p> <p>3. Defra will support research on the propagation of alternative species, support nurseries to develop the market for alternative species, develop appropriate licensing, guidance or regulations, and invest in changing capital and infrastructure. This work will be developed through the NAP3 implementation period and beyond, and 5-yearly reviews of Forest Research’s species categories will reflect improving knowledge.</p>



NAP Risk Addressed	How we will do it (Forestry Commission actions and support)	NAP Risk: Actions addressed
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	Forest Research and Forestry Commission species selection guides	<p>2. Defra will support research on the use of appropriate native and non-native tree species and alternative tree growing systems by 2028, which are better suited to England’s future climate. This action is subject to Defra’s development of a regulatory framework for the planting of ‘emerging forestry species’ from 2023 that will improve regulation in woodland creation and restocking proposals.</p> <p>3. Defra will support research on the propagation of alternative species, support nurseries to develop the market for alternative species, develop appropriate licensing, guidance or regulations, and invest in changing capital and infrastructure. This work will be developed through the NAP3 implementation period and beyond, and 5-yearly reviews of Forest Research’s species categories will reflect improving knowledge.</p>
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	Ecological Site Classification decision support system	<p>2. Defra will support research on the use of appropriate native and non-native tree species and alternative tree growing systems by 2028, which are better suited to England’s future climate. This action is subject to Defra’s development of a regulatory framework for the planting of ‘emerging forestry species’ from 2023 that will improve regulation in woodland creation and restocking proposals.</p> <p>3. Defra will support research on the propagation of alternative species, support nurseries to develop the market for alternative species, develop appropriate licensing, guidance or regulations, and invest in changing capital and infrastructure. This work will be developed through the NAP3 implementation period and beyond, and 5-yearly reviews of Forest Research’s species categories will reflect improving knowledge.</p>
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	Regulation of emerging forestry species	<p>2. Defra will support research on the use of appropriate native and non-native tree species and alternative tree growing systems by 2028, which are better suited to England’s future climate. This action is subject to Defra’s development of a regulatory framework for the planting of ‘emerging forestry species’ from 2023 that will improve regulation in woodland creation and restocking proposals.</p>
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	England Trees Action Plan	<p>1. Defra, in collaboration with DESNZ, DBT, DLUHC and DSIT, will publish Timber in Construction Roadmap in 2023. DLUHC will publish a consultation on Whole Life Carbon assessments in the construction sector in 2023. Defra will also complete a review of the government Timber Procurement Policy in 2023. This will create an environment for greater timber market activities under a changing climate.</p>
<b>N9 – Opportunities for forestry productivity from new/alternative species becoming suitable</b>	Timber in Construction Roadmap	<p>1. Defra, in collaboration with DESNZ, DBT, DLUHC and DSIT, will publish Timber in Construction Roadmap in 2023. DLUHC will publish a consultation on Whole Life Carbon assessments in the construction sector in 2023. Defra will also complete a review of the government Timber Procurement Policy in 2023. This will create an environment for greater timber market activities under a changing climate.</p>
<b>N18 – Risks and opportunities from climate change to landscape character</b>	Supporting Local Nature Recovery Strategies	<p>1. Natural England will update its existing (2014) guidance on the Landscape Character Assessment approach by 2025, enabling future local-scale Landscape Character Assessments to embed an assessment of existing and potential climate change impacts and associated guidance into their assessments. Enhanced information on climate change impacts will be included in all National Character Area (NCA) profiles by 2026. This will embed climate change adaptation measures locally and make them appropriate in the context of an area’s landscape character and distinctive qualities.</p> <p>2. Natural England will complete a commission for evidence to further understand the impacts of climate change on landscape character by 2026. This will inform appropriate adaptation and mitigation responses, engaging with local communities and influencing positive land use or management changes to increase landscape resilience.</p> <p>4. Defra will work with all NPAs and AONBs to facilitate the production of Climate Change Adaptation Management Plans. The plans will be embedded in or linked with their management plans by 2028 and in all future plans to support adaptive management of Protected Landscapes (PLs) in the face of a changing climate. This will include actions or objectives designed to adapt to climate change, integrating understanding of climate change risks, opportunities and responses into guidance, strengthening the PLs’ special qualities and maximising wider public benefits.</p>

# Annex 3 - Adaptation in the Science and Innovation Strategy (SIS)

A summary of Forest Research core research programmes related to climate change adaptation, including Work Areas (WA).

## Programme 1 – Sustainable Forest Management in the light of environmental change

### WA1: Environmental change impacts and susceptibility assessments

Bringing together work on forest susceptibility to environmental change impacts, the drivers of responses observed, and risk associated with environmental change and climate extremes.

### WA2: Climate smart forestry

Generating evidence on greenhouse gas balances (GHG), soil carbon function and the environmental change mitigation benefits of different silvicultural systems, forest and peatland management. It will also provide socio-economic evidence supporting the understanding of mitigation/adaptation delivery and barriers to uptake in the forestry sector.

### WA3: SFM (Sustainable Forest Management) and building resilience to environmental change

Delivering an improved understanding of forest management which accounts for resilience to environmental change, and which adheres to sustainable development principles (maintaining production, biodiversity, regenerative capacity, and ability to fulfil ecological, social, and economic functions without damage to other ecosystems).

## Programme 2 – Markets for forest products and services

### WA1: Availability of future markets

Improving the productivity and quality of the softwood and hardwood timber resource to widen future markets. Activities will include tree improvement through selection and breeding, together with the development of timber properties models which will be used to assess the quality of future timber supplies and inform management decisions.

### WA2: Barriers to use of domestic timber

Overcoming barriers to the use of domestic timber, while improving efficiency in the supply chain and building resilience. Activities will include improved methods for assessing quality, use of remote-sensing, and breeding for resistance to disease.

### WA3: Market potential of emerging species

Characterising the properties of timber that will be produced from British forests as managers seek to increase diversity and improve resilience in response to climate change.

#### WA4: Short rotation forestry

Investigating short rotation forestry to improve the productivity of biomass. This activity will reduce the need for imports and contribute to CO2 capture.

#### WA5: Payments for ecosystem services

The aim of this WA is to investigate the development of payments for ecosystem service markets.

### Programme 5 – Achieving multiple ecosystem benefits

#### WA1: Valuing and promoting the benefits from trees, woods and forests

Generating knowledge, data and analysis to evidence, understand and value the ecosystem services from trees, woods and forests. The work will provide an assessment of benefits and how these can be expressed and promoted to achieve multiple benefits.

#### WA2: Methods and tools to assess multiple benefits and trade-offs from trees, woods and forests

Developing methods and tools to assess multiple ecosystem service benefits from trees, woods and forests, and their synergies and trade-offs. This ongoing research will support the Woodland Creation and Expansion programme's work on identifying optimal areas for woodland creation and Societal benefits programme on valuing tree/forest-based solutions for improved health and well-being.

#### WA3: Management choices to achieve multiple benefits from trees, woods and forests over time and space

Developing and using methods and tools to demonstrate and promote how management choices affect the delivery of multiple benefits from trees, woods and forests over time and space.

### Programme 7 – Tree health and biosecurity

#### WA1: Diagnostic, advisory and phytosanitary provision

Operating and evolving Forest Research's Tree Health Diagnostic and Advisory Service (THDAS), providing an early warning system, detecting new biotic threats and prompting reactive research. Reporting will be promoted via the web-based tool TreeAlert, and citizen science surveillance through Observatree. It integrates with phytosanitary work to evaluate risks from new and existing regulated pests and pathogens through horizon scanning and surveillance, thereby informing the responses of Plant Health teams, policymakers, and practitioners.

#### WA2: Understanding pest and pathogen threats

Focusing on understanding new and changing pest and pathogen threats including invasive beetles (such as of *Ips typographus*) and pathogens with changing profiles or altered behaviour (including *Dothistroma* and *Phytophthora*) to determine the vulnerability of UK forest types to their establishment and to identify proactive management actions. There will also be a focus on host species, as part of an integrated approach to understand the susceptibility of new and emerging tree species to pests and diseases.

### WA3: Improved detection, monitoring and surveillance

Develop existing and new methods for monitoring and surveillance of key pests and pathogens, based on a greater understanding of their ecology, dispersal capability, host preferences, epidemiology and genetics. Approaches include use of improved trapping methodologies, development of DNA based diagnostic tools and metabarcoding, and exploration of the use of remote sensing.

### WA4: Pest and disease management for resilient treescapes

Informing forest management to increase resilience to pests and diseases. Work includes refining established management methods such as spatial modelling, chemical treatments and non-chemical or bio-control treatments. Novel methods will also be developed for control, improved prediction of pest spread, and use of viruses to control fungal pathogens. The WP also includes ongoing support and advice for control of mammal pests, particularly grey squirrels.

### WA5: Interdisciplinary approaches to enhance biosecurity

Adopting an interdisciplinary approach on topics relevant to woodland expansion. It will harness natural resistance in tree populations, particularly oak, larch and juniper and explore the social dimensions of tree health including evaluation of biosecurity messaging on public behaviours and improving our understanding of the biosecurity practices of hard-to-reach stakeholder along plant pathways.

Further details of all research programmes developed following publication of the new [Science and Innovation Strategy](#) for forestry in Great Britain are available on the [Forest Research website](#).



# Annex 4 - Indicators relevant to adaptation and resilience

The indicators detailed below provide either a baseline to monitor progress against or a time series giving an indication of woodland resilience or public/sector attitudes to resilience.

## New planting of woodland and trees in England (Forest Services Key Performance Indicator)

There was a total of 4,547 ha of recorded new planting of woodland in England in 2023 to 2024, including that with and without central government support.

## Percentage of woodland that is sustainably managed (Forest Services Key Performance Indicator)

As of 31 March 2024, 57% of all woodland in England was sustainably managed, totalling 760,000 ha of woodland in management. This is a slight decrease since the 31 March 2021 figure of 59%.

## Number of additional tree pests and diseases becoming established in England within a rolling 10-year period (Forest Services Key Performance Indicator)

The number of additional tree pests and diseases becoming established in England within a rolling 10-year period fell from a peak of 7 in the 10-year period 2000 to 2009 to a low of 3 in 2007 to 2016. Three tree pests and diseases became 'established' in England in the most recent 10-year period 2013 to 22.

## Number of high priority forest pests in the UK Plant Health Risk Register

In 2016, a new headline plant health indicator was added to Forestry Commission's Corporate Performance Indicators. The indicator reports trends in forest pests from the UK Plant Health Risk Register that records and rates risks to UK crops, trees, gardens and ecosystems from plant pests and pathogens.

As of March 2024, there are now 408 pests identified as forest pests on the UK Plant Health Risk Register. 15 (4%) of these have been assessed and are considered high priority. Of these 15 pests and diseases, 8 are currently present in England, with 3 being classed as widespread. These are *Hymenoscyphus fraxineus* which causes ash dieback, *Phytophthora alni* which affects all alder species in Great Britain, and *Pseudomonas syringae* pv. *aesculi*, that causes horse chestnut bleeding canker.

## Carbon sequestered by England's woodlands (Forest Services Key Performance Indicator)

The net greenhouse gas sink strength of England's woodlands has decreased slightly from 8.505 MtCO<sub>2</sub>e in 2021 to 8.403 MtCO<sub>2</sub>e in 2022 (based on the updated time-series) but remains broadly stable. If government-funded woodland creation was to cease at the end of the current spending review period, the sink is projected to decline to 5 MtCO<sub>2</sub>e in the 2030s as a result of productive forests planted in the second half of

the 20th century being harvested. The strength of the sink rises again after 2040 because of the subsequent regrowth of forests that were harvested.

#### Wildfire indicator on the nation's forests and other public and private woodlands

This indicator reports the impact (area burnt, number of incidents and duration) of wildfire within forests and woodlands. It uses Department of Communities and local government supplied incident reporting system data provided by England's fire and rescue services and the National Forest Inventory (NFI). We published our report in February 2023. Fire and rescue services attended over 360,000 wildfire incidents in England over the 12 years from 2009/2010 to 2020/21 inclusive: an average of over 30,000 incidents per annum. In total, just over 79,000 ha of land was burnt, an average of over 6,600 hectares per annum. The total duration of the incidents was just under 540,000 hours, an average of just under 45,000 hours per annum.

#### Area of woodland created in areas targeted for flood risk management

This indicator reports the area of woodland created in areas that have been mapped as potentially benefitting from increased tree cover to contribute to flood risk management. The indicator therefore reports the contribution of woodland creation to societal resilience, rather than the resilience of the woodland or the forestry sector. The dataset is restricted to woodland creation funded through the Countryside Stewardship grant scheme (Rural Development Programme) or its predecessor, the English Woodland Grant Scheme (from 2012, when spatial targeting for flood risk management was introduced). Since ARP2 was published, this is no longer an indicator used to measure adaptation within our key performance indicators.

## Diversity of tree species planted within the nation's forests

This indicator was first published in the Adaptation sub-Committee's 2013 progress report (Managing land in a changing climate). A time series has been constructed which shows conifer and broadleaf restock planting between 2014 and 2024, demonstrating diverse planting on the nation's forests. The percentage of each species planted on restocks between 2014 and 2024 is shown in the table below. Note that 2019 is removed due to incomplete data. This table only includes restock sites, not new woodland creation sites.

<b>Tree Species</b>	<b>Group</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>
Sitka spruce	Conifer	33.0	25.7	39.0	30.0	40.3	37.1	36.9	38.4	26.4	23.7
Scots pine	Conifer	14.1	16.4	15.3	17.0	15.5	9.0	13.6	11.1	13.6	13.2
Douglas-fir	Conifer	11.9	13.5	7.8	9.9	11.8	8.6	10.7	8.4	10.9	12.1
Norway spruce	Conifer	9.5	5.1	5.4	8.8	4.2	6.1	3.1	6.3	4.9	7.8
Western red cedar	Conifer	1.6	2.7	1.0	3.2	4.1	1.9	2.6	3.8	4.7	4.9
Hybrid Larch	Conifer	2.7	0.6	1.0	0.7	0.3	0.1	0.3	1.9	1.8	2.9
Lodgepole pine	Conifer	0.5	3.2	1.1	1.1	0.3	1.0	0.0	3.3	3.3	2.7
Birch (downy/silver)	Broadleaf	0.4	3.0	0.3	1.4	0.3	1.7	2.2	1.4	0.4	2.6
Sweet chestnut	Broadleaf	1.2	1.1	1.5	1.5	0.9	2.2	1.6	0.9	1.3	2.1
Downy birch	Broadleaf	0.7	0.1	0.3	0.6	1.4	1.6	1.0	0.7	2.7	1.7
Japanese cedar	Conifer	0.6	0.7	0.2	0.5	0.7	2.5	1.1	1.0	1.0	1.7
Coast redwood	Conifer	0.4	0.2	0.6	1.5	1.0	0.8	0.6	0.8	1.6	1.5
Western hemlock	Conifer	0.6	0.7	1.8	1.7	1.8	2.1	2.3	1.0	1.2	1.5
Rowan	Broadleaf	0.5	0.1	0.2	0.7	0.3	1.2	1.0	0.7	1.6	1.5
Aspen	Broadleaf	0.1	0.1	0.2	0.5	0.3	0.5	0.4	0.6	1.7	1.4
Grand Fir	Conifer	0.2	0.8	0.5	1.3	1.1	0.3	1.3	0.5	1.2	1.2
Sessile oak	Broadleaf	3.4	0.5	1.4	3.2	1.4	0.4	1.5	1.3	4.8	1.1
Serbian spruce	Conifer	1.9	2.6	3.1	2.0	0.8	1.1	2.3	1.3	1.1	1.1
Wellingtonia	Conifer	0.1	0.3	0.6	0.5	0.2	0.1	0.5	0.8	1.0	1.1
Common alder	Broadleaf	0.1	1.1	0.1	0.0	0.5	1.0	0.8	0.7	2.4	1.0
Monterey pine	Conifer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Oak (robur/petraea)	Broadleaf	0.8	3.0	2.5	0.3	0.3	1.1	0.9	1.0	0.6	0.9
European silver fir	Conifer	0.2	0.5	0.8	0.6	0.7	1.2	1.1	0.9	0.2	0.8
Macedonian pine	Conifer	0.5	0.0	0.0	0.0	0.6	2.6	0.1	0.4	0.5	0.8
Pedunculate/common oak	Broadleaf	2.2	0.3	0.9	0.8	0.8	0.3	2.1	1.1	0.7	0.8
Maritime pine	Conifer	0.7	1.0	0.7	0.2	0.3	0.6	1.1	0.6	1.3	0.8
Silver birch	Broadleaf	0.8	0.7	0.7	0.7	0.2	0.2	0.9	1.4	0.9	0.6
Nordmann fir	Conifer	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.8	0.5	0.0
Mixed broadleaves	Broadleaf	4.5	5.7	6.0	3.8	5.5	3.3	2.8	3.7	0.4	0.4
Mixed conifers	Conifer	0.4	1.3	1.4	1.2	0.2	2.6	0.0	0.0	0.4	0.0
Other	-	6.5	9.1	5.6	5.9	4.1	9.0	6.9	5.2	6.6	6.9

# Annex 5 – Summary of actions from the ARP3 outline adaptation plan

Details of these actions are alluded to in the main document in relation to NAP3 risks.

Further or new action Issue(s) addressed by the action	Timescales for actions	Progress
<p><b>Action 1:</b> Launch the Centre for Forest Protection</p> <p><b>Issue addressed:</b> pests and disease outbreaks and climate change <i>England Trees Action Plan (ETAP) Action 3.1</i></p>	Winter 2021/ Spring 22	Opened Oct 2022
<p><b>Action 2:</b> Develop a Woodland Resilience Implementation Plan (WRIP) to improve the ecological condition of our woodlands and increase their resilience to climate change, pests and diseases.</p> <p><b>Issue addressed:</b> pests and disease outbreaks and climate change <i>England Trees Action Plan (ETAP) Action 3.3</i></p>	Autumn/Winter 2022/23	Superseded by the Tree Health Resilience Strategy
<p><b>Action 3:</b> Improve tree health grants and restocking support in response to pest or disease incidences.</p> <p><b>Risk addressed:</b> loss of tree cover and lack of resilience. <i>England Trees Action Plan (ETAP) Action 3.6</i></p>	Pilot launched summer 2021; Full rollout autumn/ winter 2024	Tree health pilot has been instigated and now extends to cover ADB, <i>Phytophthora</i> , <i>Ips typographus</i> . Coverage throughout the whole country could be improved.
<p><b>Action 4:</b> Publish a new GB Plant Biosecurity Strategy.</p> <p><b>Issue addressed:</b> Lack of common approach to plant health. <i>England Trees Action Plan (ETAP) Action 3.23</i></p>	2022	Published Jan 2023
<p><b>Action 5:</b> Provide dedicated financial support, guidance and pilot new approaches to deliver riparian planting through the new England Woodland Creation Offer.</p> <p><b>Issue addressed:</b> Flooding. <i>England Trees Action Plan (ETAP) Action 1.17 &amp; Action 1.18</i></p>	Ongoing	Ongoing Forestry Commission actions included in the Integrated Plan for Water. New targeting maps developed in partnership with EA.
<p><b>Action 6:</b> FR will publish a UKFS Riparian Woodland Practice Guide.</p> <p><b>Issue addressed:</b> Lack of guidance on riparian woodland creation and management to maintain the thermal regime of freshwater habitats. <i>2014 SIS action</i></p>	Spring/Summer 2022	UKFS Practice Guides <i>Designing and managing forests and woodlands to reduce flood risk</i> and <i>Creating and managing riparian woodland</i> were published in 2022 and 2024 respectively.

Further or new action Issue(s) addressed by the action	Timescales for actions	Progress
<p><b>Action 7:</b> Support the Forestry Climate Change Partnership.</p> <p><b>Issue addressed:</b> Lack of clear guidance and adaptation implementation. <i>England Trees Action Plan (ETAP) Action 3.10</i></p>	Ongoing	Still supporting the group although the remit of the group is widening and currently in a phase of relative inactivity
<p><b>Action 8:</b> Continue actions as agreed under the Climate Change Position Statement 2019 and Future Forests programme.</p> <p><b>Issue addressed:</b> Corporate response to climate emergency. <i>Continuation of new action from ARP2 programme.</i></p>	Ongoing	High level, ongoing, actions
<p><b>Action 9:</b> Forestry Commission will publish a new UKFS practice guide on adapting forest and woodland management for the changing climate.</p> <p><b>Issue addressed:</b> Lack of clear guidance on appropriate adaptation. <i>England Trees Action Plan (ETAP) Action 3.10</i></p>	Winter 2021/22	Published in 2022
<p><b>Action 10:</b> FS will ensure that climate change impacts and adaptation remains at the heart of the Science and Innovation Strategy for Forestry in Great Britain (SIS).</p> <p><b>Issue addressed:</b> Addressing evidence gaps and supporting development of adaptation best practice. <i>Ongoing action from ARP2 programme.</i></p>	2026	Ongoing. New SIS will come into play in 2026
<p><b>Action 11:</b> Delivering nationally accredited training on wildfire resilience.</p> <p><b>Issue addressed:</b> Wildfire. <i>New action from ARP2 Programme.</i></p>	2022-23	Ongoing delivery. Over 1,200 modules delivered
<p><b>Action 12:</b> Forest Services will work in partnership to create a Wildfire Risk Map.</p> <p><b>Issue addressed:</b> Wildfire. <i>Ongoing action from ARP2 programme and 2017 NAP.</i></p>	2024	Awaiting funding to develop and publish
<p><b>Action 13:</b> Develop a national deer management strategy.</p> <p><b>Issue addressed:</b> Increase in distribution and numbers of deer. <i>England Trees Action Plan (ETAP) Action 3.4.</i></p>	Spring 2022	Completed in 2023 but awaiting ministerial sign off
<p><b>Action 14:</b> Update the Grey Squirrel Action Plan (GSAP).</p> <p><b>Issue addressed:</b> Continued threat from grey squirrels. <i>England Trees Action Plan (ETAP) Action 3.5</i></p>	Spring 2022	Completed in 2023 but awaiting ministerial sign off
<p><b>Action 15:</b> Develop new guidance for England that will help determine when afforested peat should be restored to bog and the costs associated with that.</p>	Action 1.23 and 1.24: Spring 2022.	The UKFS trees and peat guidance for England was republished 2023.

Further or new action Issue(s) addressed by the action	Timescales for actions	Progress
<p><b>Issue addressed:</b> Peatland protection and resilience. <i>England Trees Action Plan (ETAP) Actions 1.23, 1.24 &amp; 1.25</i></p>	Action 1.25: by Summer 2024	The forest to bog restoration metric is in an advanced stage of user testing. The tool is also being used to inform the development of Local Nature Recovery Strategies.
<p><b>Action 16:</b> 114 to support Defra in providing funding to support UK public and private sector nurseries and seed suppliers. <b>Issue addressed:</b> Lack of planting stock. <i>England Trees Action Plan (ETAP) Action 1.29 [Package of support for nurseries including capital grants and TPIF launched June 2021]</i></p>	Spring 2022	Tree Production Innovation fund, Tree Production Capital Grant and Seed Sourcing Grant provide this support currently.
<p><b>Action 17:</b> Maintain our membership of the European Forest Genetic Resources Programme. <b>Issue addressed:</b> Lack of genetic diversity in trees and woodlands. <i>England Trees Action Plan (ETAP) Action 3.11</i></p>	Ongoing	Membership still maintained and Phase 7 due to start in 2025
<p><b>Action 18:</b> Support and promote UK plant healthy scheme encouraging more growers to become members. <b>Issue addressed:</b> Biosecurity. <i>England Trees Action Plan (ETAP) Action 3.20</i></p>	Ongoing	Ongoing
<p><b>Action 19:</b> Continue to support research to ensure our forests and treescapes are resilient to current and future threats, including investigating climate adaptation and pests and diseases. <b>Issue addressed:</b> Evidence gaps. <i>England Trees Action Plan (ETAP) Action 5.6</i></p>	2021-2026	Ongoing
<p><b>Action 20:</b> Forestry England to develop a Forest Resilience Strategy. <b>Issue addressed:</b> Enhancing Resilience. <i>New ARP3 action from Future Forests programme</i></p>	December 2022	Ongoing
<p><b>Action 21:</b> Forestry England: Creation of a forest resilience indicator <b>Issue addressed:</b> Lack of Resilience indicator. <i>New ARP3 action from Future Forests programme.</i></p>	December 2022	Ongoing
<p><b>Action 22:</b> Update the woodland management and creation plan templates. <b>Issue addressed:</b> Need to embed adaptation planning as business-as-usual activity.</p>	December 2022	<i>A guide for the planning of new planting in woodland in England</i> has been revised to better reflect adaptation and resilience

Further or new action Issue(s) addressed by the action	Timescales for actions	Progress
<i>Ongoing action from ARP2 adaptation programme.</i>		requirements (publication awaited)
<p><b>Action 23:</b> Advise Defra on how future (ELM) grant support could be effective in implementing the guidance given in 'managing England's woodlands in a climate emergency' and the supporting evidence alongside other woodland creation/management objectives.</p> <p><b>Issue addressed:</b> Need to embed adaptation as business-as-usual activity. <i>New ARP3 action from Future Forests programme.</i></p>	Ongoing	New Countryside Stewardship High Tier – Resilience Supplement being prepared for launch.
<p><b>Action 24:</b> Evaluate the effectiveness of the UKFS Climate Change Guidelines at the next review point (2022).</p> <p><b>Issue addressed:</b> Adaptation requirement strengthened in UKFS, underpinning forestry grants, regulations and best practice. <i>Ongoing action from ARP2 adaptation programme.</i></p>	2023	Reviewed and changes incorporated in version 5 of the UKFS
<p><b>Action 25:</b> Promote and embed adaptation measures in woodland (and other habitats) created through the Shared Outcomes Fund project 'Nature-based solutions at Landscape scale'.</p> <p><b>Issue addressed:</b> Opportunity to integrate adaptation measures across landscapes and habitats. <i>New ARP3 action</i></p>	2022-2024	Ongoing, with funding extended to end March 2025.
<p><b>Action 26:</b> Introduce a condition for all tree and hedgerow planting grants that tree and plant suppliers should be able to demonstrate that they can meet the requirements set out in the published Plant Health Management Standard.</p> <p><b>Issue addressed:</b> Biosecurity. <i>England Trees Action Plan (ETAP) Action 3.21</i></p>	To be confirmed	Implemented through the Biosecure Procurement Requirement pilot
<p><b>Action 27:</b> Introduce procurement criteria for government contracts that tree and plant suppliers should be able to demonstrate that they can meet the requirements set of the Plant Health Management Standard.</p> <p><b>Issue addressed:</b> Biosecurity. <i>England Trees Action Plan (ETAP) Action 3.22</i></p>	2023	Biosecure procurement requirement pilot established



# Annex 6 - Best practice case study: Forestry England's Resilience Approach

Forestry England's Resilience Approach is led by a national steering group providing oversight and strategic direction. Forestry England defines forest resilience as: "the resilience of our natural capital (i.e. the forest ecosystem) against threats and risks that compromise its ecological integrity and ability to deliver societal benefits".

Forestry England are currently refining a detailed national strategy, which sets out their approach (forest resilience principles) and an action plan with specific targets for local and national scales. It will incorporate a strategic risk register that outlines threats to and consequences for the nation's forests, and mitigating actions that Forestry England need to take.

'Growing the Future: 2021-26' plan includes actions for areas which include their sustainable approach and the climate. The organisation has committed to reach net-zero greenhouse gas emissions by 2030. The plan sets out 3 targets in this area:

- more than 2,000 ha of new, high quality, predominantly broadleaf woodlands planted, delivered through partnerships strengthening connections and landscape-scale climate resilience.
- greater structural and tree species diversity in the nation's forests to support adaptation to climate change and securing a sustainable timber supply for future generations
- continued investment in research to support diverse and resilient forests, leading the way in mitigating and adapting to the impacts of climate change

Forestry England led a horizon scan to identify emerging challenges and opportunities that might affect UK forestry within 50 years. We gathered a panel of 47 experts with diverse specialisms and perspectives and followed a tried-and-tested research framework to assimilate and prioritise 180 issues to a final shortlist of 15 topics. These are issues that are currently relatively unknown by the sector but have potential for significant impact in the coming decades. The results have been [made publicly available](#) and [widely promoted](#), including with an ongoing webinar series organised by the Institute of Chartered Foresters and the Forestry Commission. Forestry England will incorporate our response to the horizon scan into future iterations of their corporate strategy.

## Increasing species diversity

Increasing the tree species, structural, functional, and genetic diversity of the nation's forests is a core focus of Forestry England's Forest Resilience Approach.

1. Forestry England's bespoke indicators for tree species diversity and functional diversity assimilate information at local, landscape and national scales, and



identify where and how diversity can be improved through management interventions.

2. Forestry England have also been increasing Forest Development Types (FDT) use through training and integration within forest design plans to transition to more complex silvicultural systems and structurally diverse forests.
3. Plant and Seed Supply Unit investment and modernisation of the glasshouse and plant processing technology, alongside plans for a new seed extractor unit, are delivering technical and capacity developments.
4. Forestry England are increasing the number of plants and diversity of species produced, limiting import of pests.
5. Their 'Species for the Future' project followed a robust evidence-based process to prioritise 30 tree species for future investment across the nation's forests.
6. Forestry England has also been awarded 'Plant Healthy' certification which recognises the highest plant health and biosecurity standards.

Forestry England continue to directly fund research on forest resilience through a bespoke service level agreement (SLA) with Forest Research. Over the past 3 years, Forestry England have commissioned and funded projects to the value of £436,000 and continue to prioritise a significant annual budget for the forest resilience SLA. Projects so far have been diverse, including work on emerging tree species, environmental DNA, developing a drought resilience index, and economic assessments of resilience risk.

### Knowledge and capacity building

Forestry England continues to collaborate with other organisations as much as possible. They are directly contributing actions to Defra's new Trees and Woodland Resilience Strategy. They also continue to be a dedicated member of the Forestry Climate Change Partnership and a signatory of the updated 2022 Forestry and Climate Change Adaptation Accord.