A Quick Guide to **Continuous Cover Forestry Practice** in Ireland

03

CCF and biodiversity

PRO SILVA IRELAND

www.prosilvaireland.com

The forest ecosystem

Forests are complex, dynamic ecosystems composed of living organisms — plants, animals and microorganisms — that interact with the physical environment of soil, water and air.

The long-term, sustainable production of timber, as well as all other forest functions that benefit society, depend on a functioning ecosystem.

In Ireland, where many forests are relatively young and often managed as even-aged plantations, the challenge is to create forests that not only produce timber but are vibrant, resilient and full of life.

Continuous cover forestry (CCF; also known as close-to-nature forestry) is an approach to forest management that maintains forest conditions permanently without clear-felling.

How CCF management promotes forest biodiversity

In a forest ecosystem, biodiversity includes everything from soil fungi and insects to birds, mammals, trees, understorey shrubs and herbaceous plants.

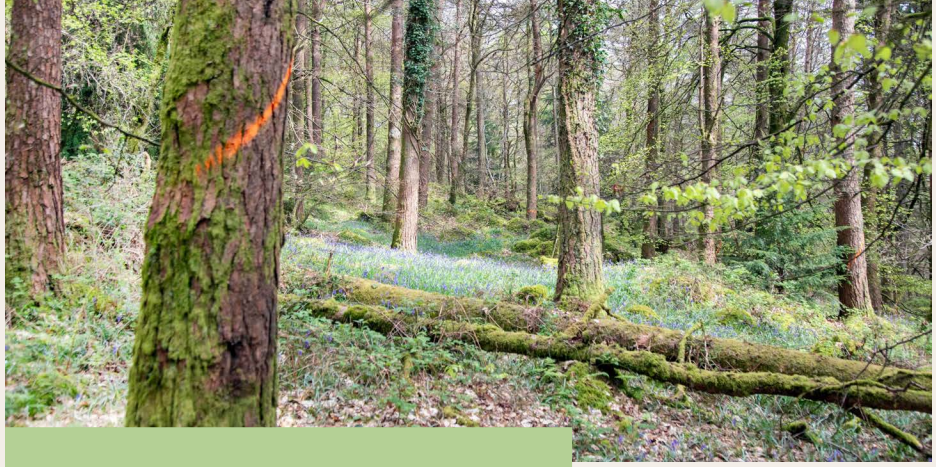
For biodiversity to flourish, a forest needs variation in light levels, tree sizes, deadwood, species composition, habitats and microclimates. CCF actively creates and protects these conditions.

By maintaining permanent forest conditions through CCF management, the forest ecosystem and its associated biodiversity are conserved.

By allowing natural forest dynamics to develop, supported by felling interventions, a succession of forest environments is present within the same CCF forest. This supports a wide range of biodiversity.

Targeted felling interventions produce gaps where natural regeneration can develop, creating, over time, a continuous succession of forest environments within the same CCF forest. This supports a diverse spectrum of microhabitats, enabling a wide range of species to thrive.

This adaptive approach creates forests that are more stable, more varied and better able to support a wide range of species. CCF can also contribute to the delivery of wider Nature Restoration objectives.



Key CCF principles that support biodiversity

Permanent forest cover

The defining feature of a CCF forest is that the forest canopy is never removed in its entirety. This is important because forest soils are protected from erosion, the forest microclimate persists, forest habitats are conserved and ecological processes continue.

The continuity of forest conditions allows woodland species, such as mammals, birds, lichens, mosses, woodland plants, fungi and insects, to persist.

Natural forest dynamics

The selective felling of trees in CCF management mimics the natural creation of canopy gaps, such as those created by wind or other disturbances, allowing light to reach the forest floor.

This light creates the conditions for seed germination and growth, promotes natural regeneration of trees, supports the development of a rich herb layer, and helps create different habitats that support distinct plants and animals.

Manipulating light is key to managing natural forest dynamics in CCF forests.

Structural diversity

A developed CCF forest includes mature high-canopy trees, middle-storey trees, emerging saplings and ground-layer vegetation. This multi-layered, uneven structure creates a diversity of habitat niches that support a range of associated flora and fauna, improves stability and forest resilience, and supports a rich understorey of high biodiversity value.

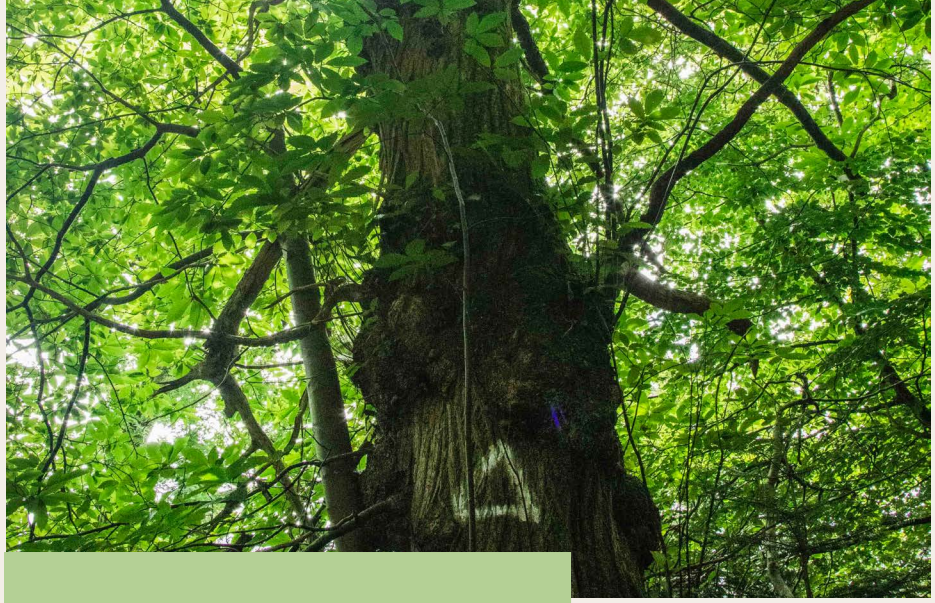
Understorey species like hazel, holly, elder, blackthorn and hawthorn have both high biodiversity value and silvicultural value, in their promotion of vertical growth and suppression of side branching of commercial tree species.

Mix of tree species

CCF management promotes tree species diversity within the forest and, where practical and within the management aims, favours locally adapted native trees.

A forest of mixed species supports a greater range of associated organisms, is more resistant to pests, diseases and climate pressures, and provides varied food sources and nesting habitats.

Native trees such as oak, birch, willow, rowan and hazel are especially valuable because many Irish plants and animals have evolved to depend on them.



Bio trees

Within a CCF forest, some trees have a particularly high ecological and/or biodiversity value. These are known as bio trees, and generally fall into two categories:

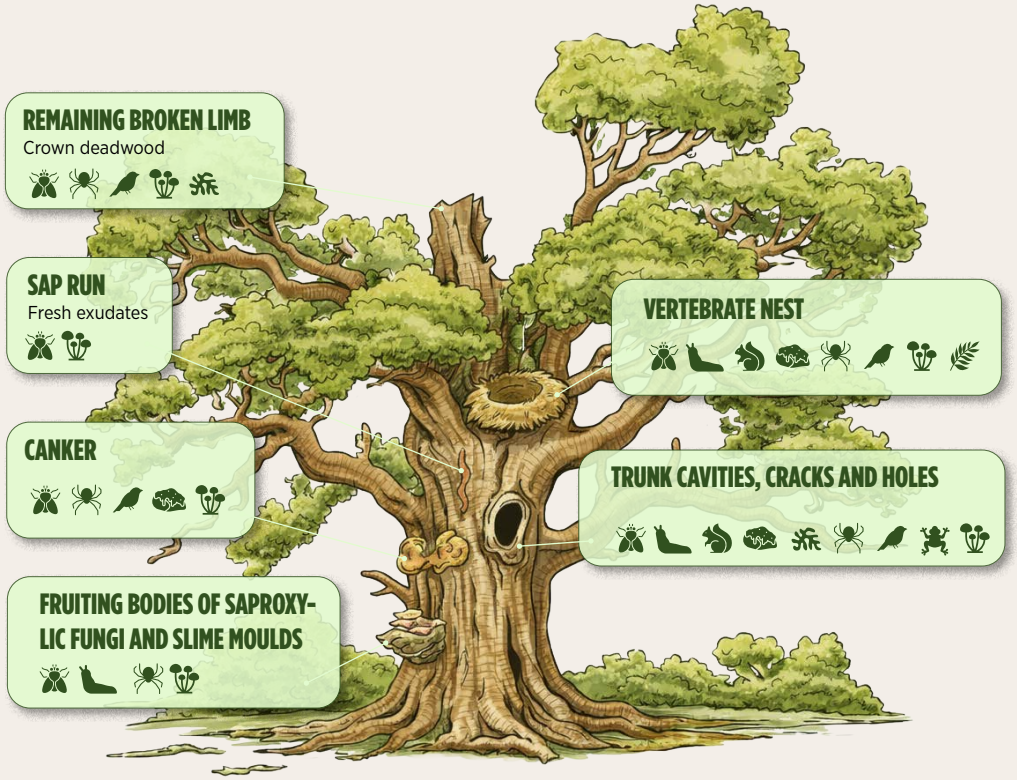
Trees for diversity

These are trees of underrepresented species retained for the diversity they contribute to the forest—for example, a broadleaf growing in a gap within a conifer plantation. Such trees may also serve as current or future seed sources, supporting further diversification over time.

Trees of high ecological or biodiversity value

This category includes large veteran trees, native trees, dead or dying trees, and trees with structural features such as cavities, hollows, cracks, broken limbs, rot holes or bark pockets.

Although these features may seem like defects from a timber production perspective, they are essential for wildlife. Bats roost behind loose bark, owls nest in cavities, insects burrow in decaying wood, and species such as pine martens, squirrels and birds make use of old crowns and knot holes.

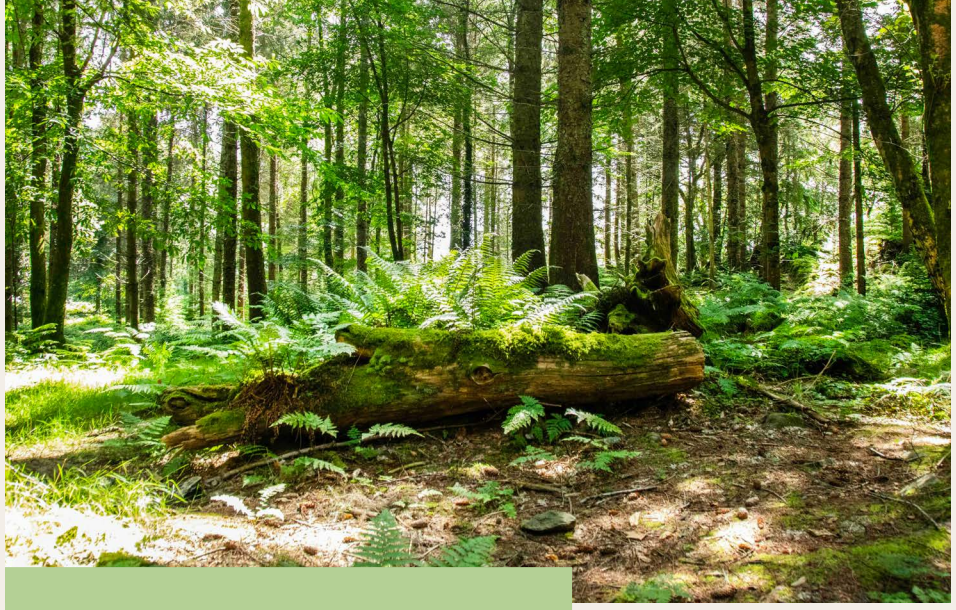


Associated species

- INSECTS
- GASTROPODS
- MAMMALS
- BRYOPHYTES
- LICHENS
- ARACHNIDS
- BIRDS
- AMPHIBIANS & REPTILES
- FUNGI
- VASCULAR PLANTS & FERNS

Adapted from:

Martin, M., Paillet, Y., Larrieu, L., Kern, C.C., Raymond, P., Drapeau, P. and Fenton, N.J. (2022) Tree-Related Microhabitats Are Promising Yet Underused Tools for Biodiversity and Nature Conservation: A Systematic Review for International Perspectives. *Frontiers in Forests and Global Change* 5:818474. doi: 10.3389/ffgc.2022.818474



The importance of deadwood

Deadwood supports a wide range of species and is a defining feature of natural forests. It makes a significant contribution to forest biodiversity and has an essential role in nutrient cycling within the forest ecosystem.

The presence of both standing and lying deadwood is important because it:

- Provides food and habitat for insects that depend on deadwood for their life cycles; these insects are, in turn, an important food source for many birds and mammals
- Supports a diversity of lichens, fungi, mosses and other organisms
- Improves soil fertility as it decomposes
- Offers homes for burrowing or den-making creatures, including rodents, foxes and badgers

Standing dead trees are particularly valuable, as they serve as feeding and nesting sites for species such as woodpeckers, owls and bats. Fallen logs, meanwhile, create moist microclimates that support amphibians, invertebrates and fungi.

Key to the practice of CCF is the retention of naturally occurring deadwood and the creation of new standing and lying deadwood during harvesting interventions.

The role of selective felling

Selective felling is central to CCF management. It is the process through which trees are selected for removal or retention and is used not only to grow quality timber but also to guide ecological processes.

Working for nature

During selective felling operations, CCF practitioners identify opportunities to protect or enhance habitats by:

- Identifying and protecting important habitat features, such as animal dens, nest sites or rare plants
- Maintaining gaps where light-loving species are thriving
- Retaining trees that host important microhabitats
- Refraining from whole tree harvesting and instead, leaving branches and tree tops (brash) on the ground to provide deadwood habitats and improve soil fertility
- Limiting machinery to permanent access routes (racks) to reduce soil compaction and disturbance
- Retaining old or underrepresented tree and shrub species to support genetic and structural diversity
- Creating standing and fallen deadwood where needed

Working with nature

Natural processes can also be harnessed for the sustainable management of CCF forests by:

- Creating gaps to trigger natural regeneration where seed sources are present
- Encourage understorey shrubs such as hazel, holly or hawthorn, which help ‘educate’ young trees by promoting straight growth and suppressing side branching
- Maintaining diffuse light conditions that help seedlings grow upright

Together, these practices help build forests that are healthy, dynamic and rich in life.

Other forest habitats

A biodiverse forest is not just trees. CCF seeks to create and maintain a mosaic of complementary habitats, including:

- **Forest edge zones**

  Transitional areas at woodland margins, where open landscapes meet forest, provide flowering plants, berry-producing shrubs and shelter for birds and mammals.

- **Riparian and wetland habitats**

  These areas act as wildlife corridors and support unique plant and animal communities. CCF helps protect them by avoiding disturbance, reducing sedimentation and maintaining canopy shading.

- **Open areas and glades**

  Sunlit patches encourage a flush of herbaceous plants, supporting butterflies, pollinators and seed-eating birds.

- **Nature reserves or unmanaged patches**

  Leaving some areas to develop naturally adds complexity and allows rare species to persist.

CCF for conservation management

Although timber production is usually a goal in most CCF management, the approach is equally valuable in conservation woodlands. It provides a flexible approach to guide forest development while working with natural processes.

Selective felling can be used to restructure a woodland, favouring native or diverse species. At the same time, the creation of small gaps will allow natural regeneration to establish over time, helping to diversify age structure and species composition.

CCF operations can also enhance habitat quality by creating standing and lying deadwood, retaining habitat trees and promoting the structural complexity typical of old, natural woodlands. These features provide essential niches for a wide range of plants, fungi and animals.

Over time, this approach can restore ecological function and increase biodiversity, making CCF an effective tool in conservation management and nature restoration.

Wildlife management: balancing browsing pressure

In Ireland, the absence of natural predators means deer populations have rapidly increased. Excessive browsing pressure prevents natural regeneration and reduces understorey plant diversity.

For CCF management to be successful, and to protect forest biodiversity, deer numbers must be kept at levels compatible with natural regeneration, particularly of palatable native species. Targeted wildlife management is therefore an important part of supporting biodiversity.

Monitoring biodiversity in CCF forests

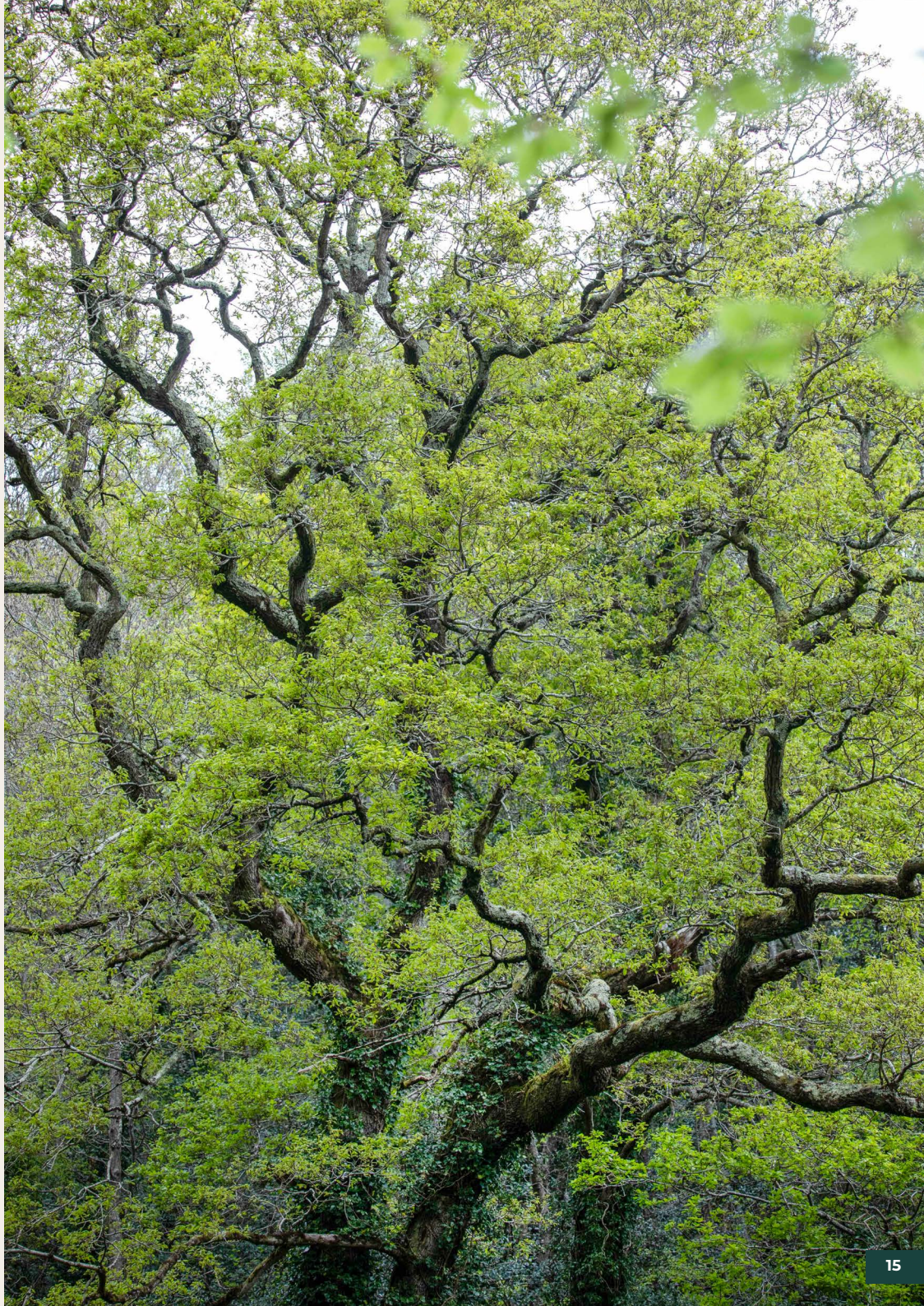
To understand how biodiversity responds to CCF management interventions, monitoring is important. It allows forest owners and managers to track progress, identify actions that need improving to aid biodiversity, and generate data that tracks biodiversity development.

Because counting every species is impractical, current monitoring protocols rely on ecological indicators, such as:

- Volume and types of deadwood
- Presence of tree microhabitats
- Number and condition of veteran trees
- Presence of native tree species
- Vertical structure of the vegetation
- Flora, such as ancient woodland indicator species
- Birds and bats
- Deer pressure, through faecal counts and browse monitoring

Most private CCF forests in Ireland are in the initial stages of transformation and biodiversity monitoring is yet to become a formalized part of management. But as CCF forests develop further, biodiversity monitoring will become increasingly important.

Current monitoring protocols will likely be further optimised for use in the field, which will support wider adoption and use. A fuller picture of the relationship between CCF management and biodiversity in the Irish context will then emerge.



Pro Silva Ireland is a registered charity founded in 2000 to advocate for, and educate on, continuous cover forestry. Part of the wider Pro Silva Europe network, Pro Silva Ireland is an all-Ireland organisation, embracing membership from both Northern Ireland and the Irish Republic.

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An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

Other guides in this series:

- What is CCF?
- Benefits of CCF
- CCF forests for water
- Understanding CCF transformation
- Tree selection and marking in CCF
- Enrichment planting in CCF
- Light forest operations
- Guidelines for CCF harvest operations
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