



Continuous Cover Forestry at Dunranhill Forest, County Wicklow, Ireland

Edward Wilson^{1,2}, Rainer Wirz³ and Liam Byrne⁴

This report describes recent developments at Dunranhill Forest, County Wicklow, Ireland. The forest was established in the early 1980s as a commercial Sitka spruce plantation. Currently it is being transformed to continuous cover forestry (CCF). The owners are among the first to join the new CCF Woodland Improvement Scheme (WIS) that was launched in 2019 by the Irish Forest Service.

Introduction

There is growing interest in Continuous Cover Forestry (CCF) in Ireland. In recent years, a range of new initiatives and programmes have been introduced that are stimulating wider engagement among owners and managers (Wilson et al. 2020). Many established productive woodlands are now at a stage where thinning can take place in line with technical guidance on stand transformation to CCF (Teagasc 2016). In this report we describe recent experience at Dunranhill Forest, near Newtownmountkennedy, County Wicklow, Ireland. This productive Sitka spruce woodland has been under active CCF management since 2014 and is one of the first woodlands to join the CCF Woodland Improvement Scheme, administered since 2019 by the Irish Forest Service (Department of Agriculture, Food and the Marine (DAFM)) (DAFM 2019).

Location and Site Information

County Wicklow is located in the south-east of Ireland, immediately to the south of Dublin. It is known as the Garden of Ireland but also has a rich tradition of forestry, including the Avondale Estate, which is considered the 'cradle' of Irish forestry. There are over 44,500 hectares of woodland across the county, which gives County Wicklow the largest percent forest area (22%) among all the counties in Ireland.

Dunranhill Forest (53.058°N, 6.121°W) is located approximately 5 km (3 miles) south of the village of Newtownmountkennedy, and approximately 2 km west of the N11 Dublin to Wexford (and Rosslare) highway. It is typical of productive forests in the region, occupying high ground in a landscape matrix of farmland, open moors and woodland (Figure 1).

Figure 1. A view of Dunranhill Forest from the north. The unplanted area is visible on the skyline to the left-centre of this scene. Photo: E. R. Wilson 2020.



Dunran Hill (342 m) is a prominent landscape feature, with farmland to the west and north, and open moorland to the south. To the east, Dunranhill forest adjoins a mature woodland area (Dunran Demesne) that is managed by Coillte (the state-owned forestry company) (Figure 2). Overall, the altitudinal range for the forest is from 170 to 342 m.

The total area of the Dunranhill property is 88 ha. The majority of the productive forest is located to the north and east of the hill and is relatively sheltered from prevailing winds. The soils are mostly shallow brown earths over shales, with frequent rocky outcrops. The soil nutrient regime is moderate, except in compartment 2 which is richer. The site is free draining throughout. Slopes are generally moderate, although there are several steeper areas that are more challenging to operate with harvesting machinery. Most of the site was unimproved upland pasture, except for two fields in the west and northwest of the property (compartments 1 and 2) that were actively farmed until the property was converted to forestry. Yield Class (maximum mean annual increment, m³/ha/y) ranges from 24 (lower, sheltered areas) to 16 (upper, exposed areas), with a significant area of the forest averaging YC 20-22.

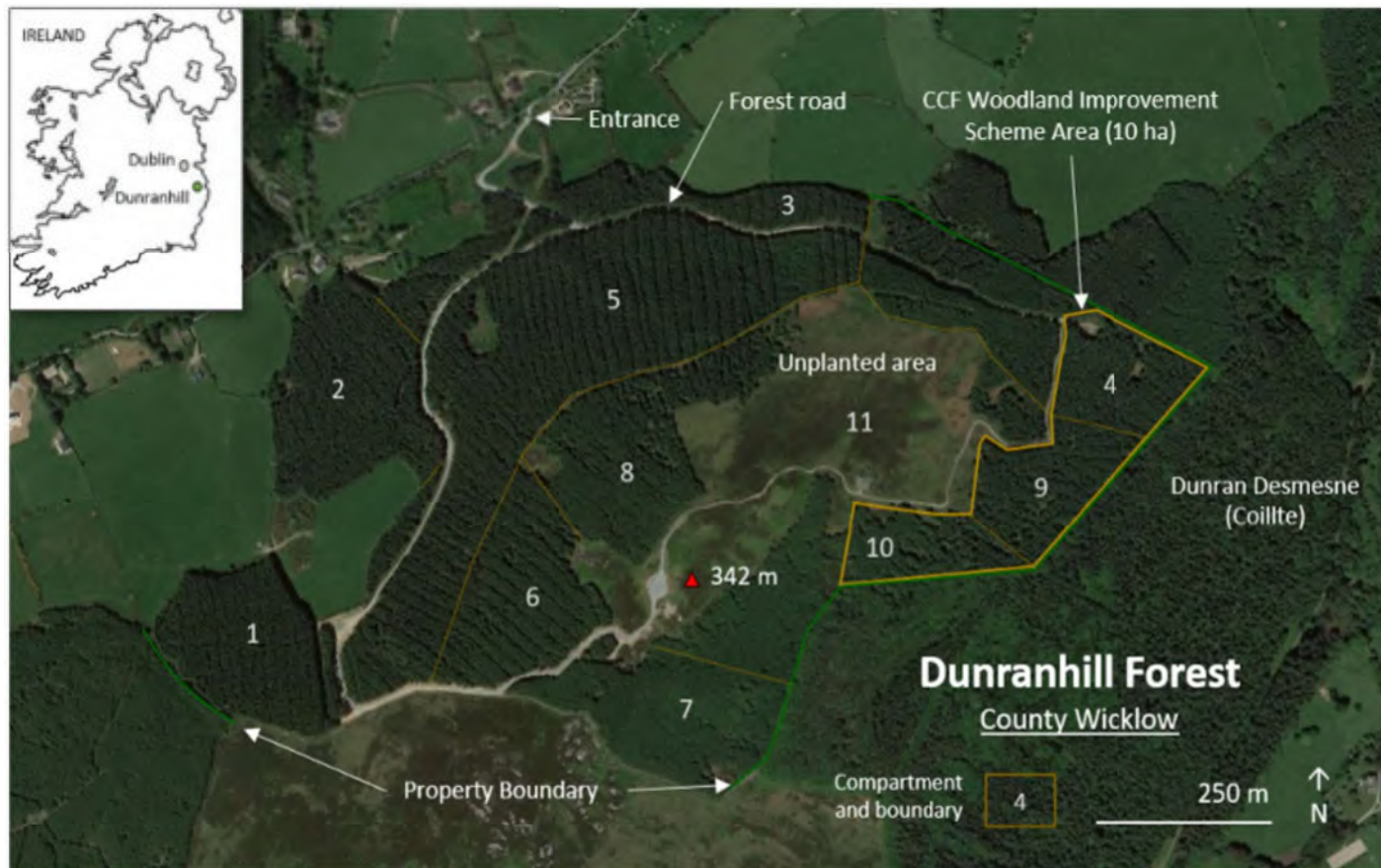


Figure 2.

Aerial view of Dunranhill Forest showing the boundaries, compartments and main features of the property. The boundary of the area included in the CCF Woodland Improvement Scheme is identified. Image: Google Earth.

Ownership and Management Policy

The Dunranhill property was owned by a local farming family until around 1980, when it was sold to a German family with Irish connections in the local farming community. The new owners decided to convert the land to forestry, and planning was initiated in 1981 under the woodland establishment scheme in operation at that time. The original plan was to establish a productive even-aged forest, which would be clear-felled on a rotational management system. However, the forest was sold again in 2013 to the present owners, another family with roots in Germany. The current manager has experience of German forestry practices and traditions (*Naturgemaeßer Waldbau*), and opted to embrace a CCF management policy following Pro Silva principles (see Pro Silva Europe 2012). The objectives are to sustain a steady income from timber and deliver other ecosystem services, including biodiversity and landscape conservation.

Continuity of personnel has been an important feature of management at Dunranhill Forest. All thinning, harvesting and timber sales from 2007 onwards have been undertaken by Larry Byrne and Sons (Timber) Ltd. Road and other infrastructure operations have been completed by M. and S. Ryan Plant Hire Ltd, Rathdrum, County Wicklow. Since 2013, Forst Service Wirz has provided forest management services and acted as the property manager on behalf of the owners. Silvicultural prescriptions and tree marking activities are jointly implemented by Rainer Wirz and Liam Byrne. Both are active members of Pro Silva Ireland. Deer management is coordinated by Rainer Wirz, working closely with the owners and neighbours. The neighbouring Nugent family provide an important care-taking role at Dunranhill, as they have known the site for many decades.

Woodland Creation

The site was prepared using a shallow plough to create suitable microsites for planting. Furrows were at approximately 1.8 m spacing on the lower ground and slopes. At higher elevations the spacing was more varied due to the roughness of the terrain and increased prevalence of rocky outcrops. Here the spacing extended to 2 m and sometimes 3 m (particularly in compartment 8). Following establishment, trees in this higher area were adversely impacted by deer browse and vegetation competition. The initial plan was to maximise the productive forest area and to plant the entire site with Sitka spruce. A small number of larch seedlings were mixed in with the spruce during planting. This was a common practice at the time to enhance the aesthetic and amenity value of the woodland.

A combination of rocky outcrops and a shortage of planting stock resulted in an area of 14 ha of higher ground being left open and unplanted. Several years after the initial planting, a grass fire jumped the fence and into the forest along the southern margin of the property. This destroyed a significant area of thicket-stage woodland, most of compartment 7 and part of compartment 10, which was subsequently re-stocked. Taking into account roads and landing areas, the total woodland area amounts to 70 ha.

More recent assessments of the forest have shown that timber quality is good in sheltered areas and at lower elevations. This is likely a function of genetics (although no nursery records have been retained) and the high planting density. At higher elevations, where the trees are more widely spaced and exposed, the timber quality is noticeably more variable. Trees are generally shorter and coarser in appearance; stem straightness is lower and branches are heavier than in more sheltered areas.

Thinning Strategies

The first thinnings were initiated in 2007-2008. This was later than normal recommended practice due to logistic difficulties with establishing roads and infrastructure. At this time, stand top heights were 15+ m in the sheltered and more productive areas. This dictated a conservative thinning policy. The key consideration was to initiate density management without adversely reducing stand stability. Wherever possible, a harvester and forwarder team was engaged to fell and extract the timber. However, manual felling was also necessary in some of the steeper areas.

The forest has always been nurtured with an adaptive management philosophy aimed at keeping options open for the future. Conventional thinning regimes were applied in the early stages, but some consideration was given to CCF from the start. Rack spacings are mostly 1-in-9 rows apart (i.e., 16-20 m, average 18 m), although there was significant variation due to site factors and differences in initial tree spacing. In the stand matrix, a proportion of the smallest and poorest trees were removed (low thinning). Some areas, mostly on the south side of Dunranhill, remained unthinned due to their younger age and poor access.

Since 2013 subsequent thinning operations have been planned on a 3-4 year cycle with the aim of extracting 50-80 m³/ha of roundwood at each intervention (Figure 3). This level of production provides consistent quantities of high quality timber that underpins the economic sustainability of the forest. The second thinning took place in some sections in 2011. This was followed by operations in 2014, 2016, 2018, 2019 and 2020. Further expansion of the road network in 2015-16 allowed improved access to the entire forest, so that by 2020 most areas had been thinned 2-4 times.

Figure 3. A view of the stand in compartment 5 after four thinning interventions. The best quality trees have been retained and released from competition. Competitor and poor quality trees are gradually being removed. The stand is being managed on a crown thinning regime, with a conscious effort to create a diversity of microsites so that regeneration can be established in small patches at different stages in the transformation. Photo: E. R. Wilson 2021.



In 2020, it was decided to clear-fell compartment 2 (6.2 ha), one of the most productive areas of the forest. The two main factors for this action were the strong timber markets and the poor prospects of securing natural regeneration. As a legacy of past land use, dense swards of grass had taken hold across the entire compartment. This represented a significant barrier to natural regeneration and the option of under-planting was considered too costly. The compartment will be re-stocked with a mixture of broadleaf and conifer species in group planting with consideration being given to the future potential for CCF.

Operations are timed, as much as possible, to avoid both the active growing season and the wettest period. This minimises the risk of damage to the residual standing trees. Extra care is required with operational racks to minimise soil impact and rutting, as most racks are used repeatedly into the future within a CCF management system.

Crown Thinning and Natural Regeneration

Whereas the first two interventions were mostly conventional low thinnings, the more recent policy has been to adopt crown thinning. In this thinning regime, the best quality trees are selected for retention; competitors and poor quality trees are selected for removal. This is an approach that creates a more irregular spacing between trees and starts to open the forest floor to increased levels of light.

Following the third thinning interventions, natural regeneration started to appear in several compartments, most notably in compartments 4 and 5 (Figure 4). Generally, patches of regeneration appeared in some of the more open microsites where larger, dominant trees had been removed. This prompted a more adaptive strategy for tree marking. Small gaps are now being gradually opened to provide the necessary light for continued seedling recruitment and growth; effectively a process of “light management”.



Figure 4. A patch of Sitka spruce seedlings established in a small canopy gap in compartment 5. Thinning prescriptions aim to create a diverse forest canopy with variable light levels on the forest floor. It is anticipated this will support further development of an irregular stand structure. Photo: E. R. Wilson 2019.

At the present time, there is very little competing vegetation in the understorey, and limited evidence of bramble taking hold. Rhododendron and laurel, which are much in evidence throughout County Wicklow, are not significant issues at Dunranhill. Slightly heavier thinnings are now being trialled in some of the sheltered areas to stimulate more prolific regeneration. The absence of significant wind damage is a source of cautious optimism with respect to crown thinning and gap expansion.

Deer Management

County Wicklow is noted for the high number of Sika deer now resident in most woodlands. Ongoing and active control of deer is an essential component of a CCF management policy and is vital if natural regeneration is to be secured. In 2019, a series of mini-exlosures were installed to reduce the risk of deer browse on natural regeneration.

Monitoring the development of seedlings is very important for designing and planning the next cycle of thinnings. Deer management is carried out by Rainer Wirz and the owners.

Figure 5. A mini-exclosure located around a patch of naturally-regenerating Sitka spruce seedlings in compartment 5. The fences are 1.7 m tall and cover an area of approximately 50 m². It is anticipated the fencing will be moved to other locations in the forest once the seedlings are fully established and free from the risk of browsing. Photo: E. R. Wilson 2021.



Amenity Features

The owners have a deep appreciation of the historic and landscape attributes of the forest. The ruins of two ancient farm dwellings have been preserved and stabilised, several wolf trees have been retained for habitat and landscape purposes, and legacy broadleaves have been given more space to grow.



Figure 6. An oak tree finding its way through a boundary wall (compartment 9). Landscape and other natural heritage features are retained wherever possible. They are the source of joy and satisfaction for the woodland owners, and enhance the overall amenity value of the property. Photo: E. R. Wilson 2019.

CCF Woodland Improvement Scheme Area

Dunranhill Forest was among the first applicants to join the new CCF WIS. Details of the scheme are described by Wilson et al. (2020) and on the Teagasc Forestry website ([here](#)). The most important criteria for entering the scheme are: 1. free draining mineral soils (peats, deep peats, wet peats, waterlogged sites and gleys are to be avoided); 2. capability to grow Sitka spruce to Yield Class 14 or greater; 3. sites subject to severe and persistent threats (e.g., rhododendron, deer, etc.) must have a comprehensive action plan; 4. elevations above 300 metres should be avoided due to the increased windblow risk. In terms of financial support, the applicant must devise a CCF Transformation Management Plan that will run for 12 years. Three instalments of up to €750/ha can be claimed for planned activities. The first payment is at year 1 with the final payment at year 12, based on completion of the approved schedule of works. The middle payment can be paid at any stage during the intervening period. A maximum area of 10 ha can be included in the plan.

At Dunranhill, the 10 ha block included in the WIS transformation plan is located in compartments 4, 9 and 10 (part) (Figure 2 above). These are situated along the eastern boundary of the property and adjacent to the woodlands of Dunran Demesne. One of the reasons for selecting this location is the diverse range of species in the neighbouring property, including Douglas fir, grand fir, western hemlock, beech, oak and other native species. Early indications are that seed is spreading into Dunranhill, which will help increase species diversity into the future. In addition, this is the most sheltered part of the forest and at the lowest risk of wind damage, making it possible to apply different intensities of thinning and modify gap sizes in response to the developing natural regeneration (Figures 7 and 8).



Figure 7. A gap created in the CCF WIS area (compartment 9) by removing large, poor quality competitors to release quality trees. Photo: E. R. Wilson 2021.



Figure 8. View of compartment 9 after the completion of a thinning operation in December 2020. The variable size of stumps reflects the evolution of management practices, with some of the smaller trees being removed in the early thinnings, and larger trees being removed more recently. Care in all operations is essential to minimise the risk of mechanical damage to residual standing trees, and also to minimise damage to the site. Photo: E. R. Wilson 2021.

The CCF Transformation Management Plan was approved in 2020. The schedule for compartment 5 is provided in Table 1. Most important is support for the costs of tree marking and deer management. It is hoped that natural regeneration will be the primary method for securing the next generation of trees. Enrichment planting makes it possible to diversify the species composition and enhances the resilience of the forest to threats from climate change, pests and diseases.

Table 1. Example management schedule for 2020-2032 in Compartment 9, Dunranhill Forest, which is part of area within the designated area of the Woodland Improvement Scheme for CCF.

Year	Compartment	Proposed Actions
2020	9	<ul style="list-style-type: none"> - Preparation of a site-specific CCF management plan - Pre-thinning tree marking - Improvement felling of malformed trees - Ground preparation, light scarification - Deer management - Enrichment planting where necessary
2026	9	<ul style="list-style-type: none"> - Pre-thinning tree marking - Improvement felling of malformed trees - Ground preparation, light scarification - Deer management - Enrichment planting where necessary - Management and respacing of natural regeneration
2032	9	<ul style="list-style-type: none"> - Pre-thinning tree marking - Improvement felling of malformed trees - Ground preparation, light scarification - Deer management - Enrichment planting where necessary - Management and respacing of natural regeneration

Final Comments

Dunranhill Forest demonstrates many features of modern sustainable forest management in Ireland. A flexible and adaptive management philosophy has given the owners and forest management team an opportunity to respond to both the forest's development and innovations taking place in the forestry sector. Teamwork and collaboration among all members of the management team have been central to the continuing success of the forest. A flexible approach to tree marking and thinning is facilitating the transformation to a more diverse and irregular structure. The advent of the new CCF Woodland Improvement Scheme is supporting a range of activities and interventions that will sustain the continued production of high quality timber, facilitate natural regeneration and deliver additional ecosystem benefits.

Acknowledgements

We thank the owners of Dunranhill Forest for their support and permission to prepare this report.

Literature Cited

Department of Agriculture, Food and the Marine (DAFM). 2019. Woodland Improvement scheme (Element 2) – Continuous Cover Forestry. DAFM, Dublin. 28 pp

Pro Silva Europe. 2012. Pro Silva Principles. Pro Silva Europe: the Association of European Foresters Practicing Management which follows Natural Processes. Barr, France. 66 pp.

Teagasc. 2016. Continuous cover forestry management. Teagasc Forestry Development Department, Athenry, County Galway, Ireland. 12 pp.

Wilson, E. R., P. O'Tuama and J. Spazzi. 2020. Continuous Cover Forestry in Ireland: update on recent developments and initiatives. CCFG Newsletter 41 (Winter 2020): 71-77

¹ School of Agriculture and Food Science, University College Dublin, Belfield, Dublin 4, Ireland

² Teagasc Forestry Development Department, Ashtown Research Centre, Ashtown, Dublin 15, Ireland; ted.wilson@teagasc.ie

³ Forst Service Wirz, Dorfstraße 21, D-48231, Warendorf, Germany; forst.service.wirz@gmx.de

⁴ Larry Byrne and Sons (Timber) Ltd., Barnbawn Road, Glenealy, Co. Wicklow, Ireland; lbyrneandsons@gmail.com