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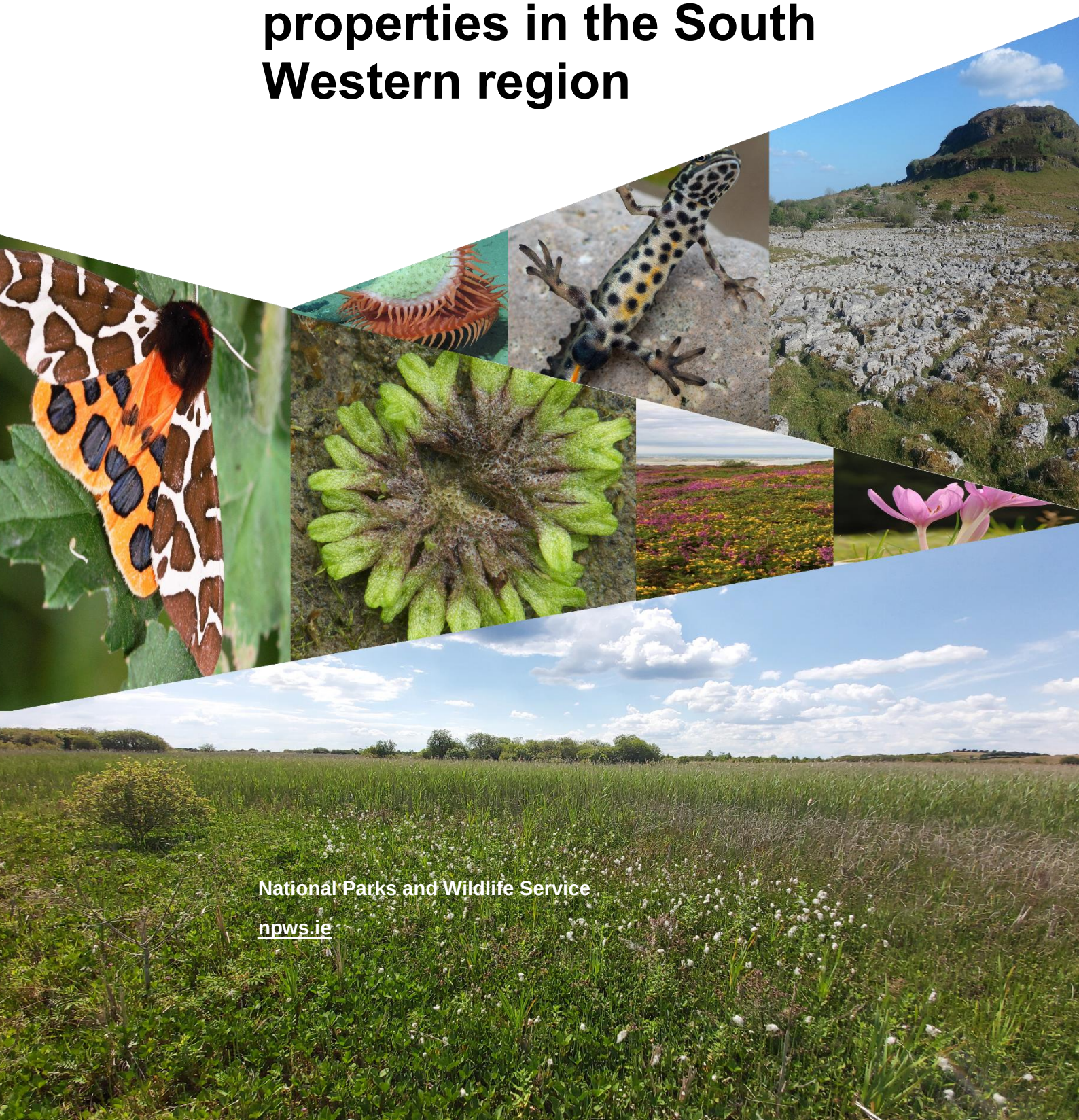
Survey of NPWS woodland properties in the South Western region



National Parks and Wildlife Service

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Citation: Perrin, P.M., Barron, S.J., Hamilton, J.J., Woods, K.M.S. & Daly, O.H. (XXXX) Survey of NPWS woodland properties in the South Western region. Irish Wildlife Manuals, No. 1xx. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

Keywords: Ireland, native woodland, old-growth forests, woodland conservation management, natural regeneration, invasive species, deer grazing, Annex I habitats, *Quercus petraea*, ash dieback disease

Front cover, small photographs from top row:

A deep-water fly trap anemone *Phelliactis* sp., Yvonne Leahy; **Common Newt** *Lissotriton vulgaris,* Brian Nelson; **Limestone pavement**, Bricklieve Mountains, Co. Sligo, Andy Bleasdale; **Garden Tiger** *Arctia caja,* Brian Nelson; **Violet Crystalwort** *Riccia huebeneriana*, Robert Thompson; **Coastal heath**, Howth Head, Co. Dublin, Maurice Eakin; **Meadow Saffron** *Colchicum autumnale*, Lorcan Scott

Bottom photograph: **Old sessile oak woodland**, Ullauns, Killarney National Park, Simon Barron

Survey of NPWS woodland properties in the South Western region

Philip M. Perrin, Simon J. Barron, Jessica J. Hamilton, Katharine M.S. Woods & Orla H. Daly

Botanical, Environmental and Conservation Consultants Ltd, 65 Holywell, Dundrum, Dublin 14

The NPWS Project Officer for this report was: Jenni Roche; jenni.roche@npws.gov

This IWM was edited by INSERT NAMES HERE

ISSN 1393 – 6670

An Roinn Tithíochta, Rialtais Áitiúil agus Oidhreachta, 90 Sráid an Rí Thuaidh, Baile Átha Cliath 7, D07 N7CV

Department of Housing, Local Government and Heritage, 90 North King Street, Dublin 7, D07 N7

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Executive Summary

NPWS is responsible for c. 4,570 ha of native woodland in addition to some extensive areas of conifer plantations transferred from the former Forest and Wildlife Service. To allow NPWS to deliver conservation measures in line with the EU Biodiversity Strategy for 2030, it is vital that these measures are underpinned by sound scientific evidence. A survey of these properties is therefore needed to provide comprehensive and up-to-date information on their ecology, condition and conservation management requirements. This information can enable planning and prioritisation at national and regional levels. Furthermore, NPWS has a duty to employ best practice in habitat management on the properties that it owns or manages, to demonstrate the standards that it seeks other landowners to attain.

This project was commissioned as a pilot survey of NPWS woodland properties and had a remit of six properties in the South Western NPWS region: Killarney National Park (which, for practical purposes, was divided into 41 survey sites), Glengarriff Woods Nature Reserve, Derrynafulla, Uragh Wood Nature Reserve, Knockomagh Wood Nature Reserve and St Gobnet's Wood. In the summer of 2023, woodland habitat at each of these properties was surveyed and mapped. A total of 566 floral taxa were recorded during project, comprising 315 native vascular plant taxa, 63 non-native vascular plant taxa, 187 native bryophyte taxa and 1 non-native bryophyte taxa.

The area surveyed totalled 2602.3 ha. Less than half, 49.7%, of this woodland habitat comprised native (or semi-natural) woodland with a large proportion, 43.9%, comprising highly modified/non-native woodland and the remaining 6.4% being scrub. Oak-holly-birch woodland was by far the most abundant type of native woodland recorded, accounting for 39.6% of the total woodland area. Significant areas of wet willow-alder-ash woodland (5.6%), yew woodland (2.7%) and bog woodland (1.4%) were also recorded. Modified broadleaved woodland accounted for 16.1% of total woodland habitat, conifer plantation accounted for 16.0% and mixed broadleaved/conifer woodland for 9.7%. Scrub dominated by the invasive shrub Rhododendron represented 5.7% of the total habitat resource.

Pressures and threats were identified and necessary site-level conservation measures were prescribed. The two major management issues are severe overgrazing (primarily by deer) and infestation of woodland by Rhododendron, with measures to address these issues needed at 91.5% and 95.7% of sites respectively. Other significant issues that require actions are other invasive species (40.4%), habitat fragmentation (38.3%) and the risks posed by wildfires (68.1%). Converting non-native woodland habitats to native woodland is recommended for 53.2 % of sites.

A comparison of the mapping from this project with earlier aerial imagery reveals small but measurable losses in woodland habitat extent within the Killarney National Park, primarily loss of oak woodland in the west of the park. These losses have two main root causes, (i) damage from wildfires and (ii) the demise of veteran trees, none of which are being replaced due to a chronic lack of natural regeneration. Extrapolating from the current situation, it can be expected that loss of habitats will accelerate in future.

The national monitoring network for habitats listed under Annex I of the EU Habitats Directive was expanded during this survey with monitoring stops established at seven sites for 91A0 Old oak woodland and two sites for 91E0 Alluvial woodlands*. Three of these sites were assessed as being in Unfavourable – Inadequate condition and six as being in Unfavourable – Bad condition. None were assessed as Favourable. The assessment criteria most frequently failed concerned regeneration of non-native species, cover of the native shrub layer, regeneration of native trees and indications of high-grazing pressure, reflecting the two major issues previously highlighted.

The broad conservation value of each site surveyed was also calculated, using an adaptation of the methodology used in the National Survey of Native Woodlands 2003-2008. The top five

sites, classified as Excellent, were Reenadinna, Camillan, Derrycunnihy and Ross Island, all from the Killarney National Park, plus Uragh Wood Nature Reserve. These are all large, ancient woodland sites with high levels of species diversity. Similarly, a threat score was calculated for each site. Sites that score highly on both scales—such as Derrycunnihy which was classified as having a Severe threat level—should be prioritised by managers.

The EU Biodiversity Strategy for 2030 includes the objective of defining, mapping, monitoring and strictly protecting all the EU's remaining primary and old growth forests. This project field-trialled a methodology for identifying old-growth forest stands in Ireland using recently published guidelines. Old-growth forest stands must be highly native, with large, old trees and a high proportion and diversity of deadwood. To support decisions regarding old-growth forest status, subjective samples of 744 large trees and 607 instances of large-scale deadwood were measured within the survey sites. Further supporting information was gathered by recording tree-related microhabitats (TReMs) from the large trees. The most frequent types of TReMs recorded were epiphytic bryophytes/lichens (89.0%), breakage (78.6%), microsoils (55.5%), epiphytic ferns (45.2%) and branch holes (45.2%). Based on the data gathered, a majority of the native woodlands surveyed were deemed to be old-growth forests.

The survey also assessed the impact of ash dieback disease on these woodlands by assessing a subjective sample of 476 mature Ash (*Fraxinus excelsior*) trees from across the range of sites. Only 2.7% of trees were assessed to exhibit no defoliation but only 0.6% of assessed trees were dead. The modal range for defoliation was >0% and ≤10% observed in 40.3% of assessed trees. The two symptoms most frequently observed were the presence of epicormic branching (77.1% of trees) and diseased leaves on the tree (74.8% of trees).

Immediate action is needed to address the significant challenges facing the native woodlands covered by this survey. However, implementing the prescribed measures without the support of a new, broader strategy will greatly reduce their efficacy as evidenced by the chronic nature of many of the issues. Woodland management strategies akin to the one recently written for Glenveagh National Park are required for the Killarney National Park and each of the other sites, with Derrynafulla being fully embraced within the strategy for Glengarriff Woods Nature Reserve. These strategies should include vision statements which set out bold, long-term, landscape-scale objectives and they should be based on the implementation of a GIS-based spatial planning system for the NPWS estate, incorporating mapping, management records and work schedules. Dedicated woodland management staff are required to ensure that there is continual maintenance of woodlands and consequently considerable increases in regional staff levels are required.

It is strongly recommended that this pilot survey is rolled out to all remaining NPWS woodland properties. Possession of accurate habitat maps and up-to-date field survey data is a prerequisite for managing the NPWS estate towards favourable conservation status

Acknowledgements

We extend our particular gratitude to Aedín Lewis and Claudia Pascali for assisting with fieldwork. We also thank Jenni Roche, NPWS Project Officer, together with James Doherty, Éamonn Meskell, Tim Cahalane, Sean Forde, Clare Heardman, Declan O'Donnell, Pádraig O'Sullivan and Mary Sheehan of NPWS for facilitating the project.

1 Introduction

1.1 Rationale

NPWS is responsible for c. 4,570 ha of native woodland in addition to some extensive areas of conifer plantations transferred from the former Forest and Wildlife Service. The National Survey of Native Woodlands (NSNW; Perrin *et al*., 2008) was undertaken from 2003-2008 and covered 1,217 sites, representing the range of native woodland diversity in Ireland, and included many NPWS woodland properties. These sites were surveyed, described and classified, their boundaries and habitats were mapped using Fossitt (2000), and conservation and threat scores were assigned. The Provisional Inventory of Ancient and Long-established Woodland (Perrin & Daly, 2010), two rounds of Annex I woodland habitat monitoring (Cross & Lynn, 2013a, 2013b; O'Neill & Barron, 2013; Daly *et al*., 2023), and the Woodland Reassessment Survey (Perrin *et al*., in press) have all built upon the NSNW dataset. The NSNW did not, however, include all NPWS woodland properties and it has now been 20 years since the NSNW was initiated.

To allow NPWS to deliver conservation measures in line with the EU Biodiversity Strategy for 2030, it is vital that these measures are underpinned by sound scientific evidence. A survey is needed to provide comprehensive and up-to-date information on the ecology, condition and conservation management requirements of all NPWS woodland properties. A comprehensive baseline is needed to facilitate comparison across all of these sites, enable planning and prioritisation at national and regional level, and inform site-specific conservation management. Furthermore, NPWS has a duty to employ best practice in habitat management on the properties that it owns or manages, to demonstrate the standards that it seeks other landowners to attain.

1.2 Aims

This project was commissioned as a pilot survey of NPWS woodland properties and had a remit of six properties in the South Western NPWS region.

This project sought to:

- conduct NSNW-style site surveys of the woodland at the six properties,
- map this woodland using Fossitt (2000) and EU Habitats Directive Annex I woodland categories,
- expand the network of Annex I woodland habitat monitoring plots,
- record additional relevés to supplement the relevé dataset from the NSNW,
- record the current management of the woodland and relevant pressures and threats,
- evaluate the restoration potential of the woodlands and prescribe necessary conservation measures,
- calculate conservation and threat scores for the woodlands following the general approach of the NSNW,
- identity old-growth forest stands following guidelines recently defined by the EU,
- assess the impact of ash dieback on the population of Ash (*Fraxinus excelsior*).

1.3 Old-growth forests

1.3.1 Definition

The EU Biodiversity Strategy for 2030 includes the objective of defining, mapping, monitoring and strictly protecting all the EU's remaining primary and old growth forests. Guidelines for achieving this objective have recently been published (European Commission, 2023). These guidelines define primary forests as those '*which have been almost devoid of human activity*' and it is unlikely that any of Ireland's remaining woodland would meet this definition. It is plausible, however, that some Irish stands could be classified as old-growth forests which the guidelines define as follows:

'*A forest stand or area consisting of native tree species that have developed, predominantly through natural processes, structures and dynamics normally associated with late-seral developmental phases in primary or undisturbed forests of the same type. Signs of former human activities may be visible, but they are gradually disappearing or too limited to significantly disturb natural processes*.'

Additional notes in the guidelines state:

'*Old-growth forest stands do not include stands for which there is evidence that they are under active productive management. This includes low-intensity silvicultural regimes and coppicing.*'

'*Old-growth forest stands…have acquired these structural features and dynamics through several decades of natural development without significant human intervention.*'

'*An old-growth character is a feature of the state and structure of a forest. It should not be confused with forest ancientness, which indicates a temporal continuity without a change in land use. Areas showing old-growth characteristics and ancientness may often overlap.*'

1.3.2 Indicators

The guidelines also present a list of indicators for identifying old-growth forest stands with the instruction that '*All the main indicators and at least two complementary indicators need to be met*.' The indicators are listed here, quoting the associated notes from the guidelines and with some interpretation for the Irish context. Numbers 1-3 are main indicators while numbers 4-7 are complementary indicators.

1. Native species. '*Old-growth forests are composed of native species. However, the presence of a small number of non-native trees should not disqualify a forest from being designated as old-growth if they do not significantly disturb ecological processes.'*

   Applying this indicator would restrict consideration of old-growth forest status to a subset of stands classified as WN Semi-natural woodland per Fossitt (2000).

2. Deadwood. '*Old-growth forests are characterised by a high proportion and diversity of standing and lying deadwood. The amount and type of deadwood can vary greatly between old-growth forests depending on the forest type, the local environmental conditions and the area's recent disturbance history.*'

   Calculating appropriate numerical thresholds would be very difficult due to the high degree of variation between stand types and locations. Certainly, no timber should be extracted from old-growth forests. The abundance of large-scale deadwood will be a critical factor when applying this indicator as such deadwood will only be present in stands of sufficient maturity. Deadwood derived from non-native trees should receive a lesser weighting.

3. Old or large trees. '*Old-growth forests are often characterised by a high volume of standing trees relative to earlier development stages for the given forest type and local growing conditions and by the presence of old or large trees some of which may reach the maximum age known for the species under the local site conditions.*'

The first part of this indicator excludes early successional stands. These would include birchwoods classified as WN1 Oak-birch-holly woodland per Fossitt (2000). Regarding the second part of the indicator, it is highly unlikely that for any given site the maximum age for any species will be known, but the presence of senescent specimens would be a positive indication. Old or large specimens of Birch (*Betula* spp.), Willow (*Salix* spp.) and Alder (*Alnus glutinosa*) could still contribute to meeting this indicator even if, arguably, they are representative of pioneer woodland. The application of this indicator should give more weight to the presence of old/large native trees than to the presence of old/large non-native trees.

4. Stand origin. '*Most old-growth forest stands originate from natural regeneration, but some sown or planted forests can meet the definition, if given enough time to develop the characteristics of old-growth forests.*'

   In isolation, this indicator appears to have no diagnostic value and is therefore redundant.

5. Structural complexity. '*Old-growth forests are generally characterised by structural complexity. This can include a multi-layer canopy structure, horizontal structural diversity and soil microrelief structures such as mounds caused by uprooting.*'

   This indicator would not be met by even-aged stands or stands where the understorey or sub-canopy was missing, perhaps due to past or chronic overgrazing. Additionally, the contribution of non-native species to structural complexity should be down-weighted. Soil microrelief structures resulting from human activities should be disregarded. Natural regeneration is not explicitly mentioned here. If it were to be considered under this indicator, the early stages of regeneration should receive lesser weighting.

6. Habitat trees. '*Old-growth forests are often characterised by the high density and high diversity of tree-related microhabitats. These are defined as a "distinct, well-delineated structure occurring on living or standing dead trees, that constitutes a particular and essential substrate or life site for species or species communities during at least a part of their life cycle to develop, feed, shelter or breed."*'

   Setting thresholds for density and diversity of tree-related microhabitats (TReMs) would be very difficult due to the variation between stand types and locations. Perrin *et al.* (in press) have already trialled recording TReMs within Irish woodlands. That work suggested that some of the TReMs are common throughout Irish woodlands and would not be exclusively associated with mature trees. TReMs associated with non-native trees should receive lesser weighting.

7. Indicator species. '*Old-growth forests often host species of late-seral developmental phases that are specific to a certain forest type. These can include species on the red-list of the International Union for Conservation of Nature (IUCN).*'

   Late-seral or late-successional woodland species should not be confused with ancient woodland indicators. The latter tend to be species with limited dispersal that are often obligate woodland species and indicate long periods of woodland continuity. The former are species which dominate or depend upon the late-successional phase in woodland development. In general, late-successional species tend to have a high competitive ability, but a low colonizing ability (Zhang *et al.*, 2018). Late-successional tree species tend to be shade-tolerant, slow-growing and long-living (Hanberry, 2019; O'Brien *et al.*, 2021). Much of the literature on late-successional forest species concerns trees, although the term is not limited to tree species. O'Brien *et al.* (2021), in discussing old-growth forests, categorise a selection of European trees according to successional stage. Native Irish species are defined by them thusly:

   - Pioneer: Alder (*Alnus glutinosa*), Silver Birch (*Betula pendula*), Downy Birch (*Betula pubescens*), Aspen (*Populus tremula*), Wild Cherry (*Prunus avium*), Bird Cherry (*Prunus padus*)

- Mid-successional: Ash (*Fraxinus excelsior*), Scots Pine (*Pinus sylvestris*), Sessile Oak (*Quercus petraea*), Pedunculate Oak (*Quercus robur*), Wych Elm (*Ulmus glabra*)
- Late-successional: Yew (*Taxus baccata*)

Application of this list in an Irish context appears troublesome. There is only one late-successional species, Yew, which is scarce in Irish woodlands. Oaks, have been placed in the middle group as they are not as shade tolerant as true late-successional species, for example, Beech (*Fagus sylvatica*), yet Oaks are dominant in many mature native Irish woodlands. Furthermore, this list seems to be focused on drier woodlands; Alder is classed as pioneer, which would make it more difficult for many Irish wet woodlands to be classed as old-growth forests. Possibly, due to the relatively depauperate Irish flora, this indicator is of limited use.

2 Methods

2.1 Survey sites

The six properties surveyed are shown in Figure 1 and information pertaining to Special Area of Conservation (SAC) status is presented in Table 1.

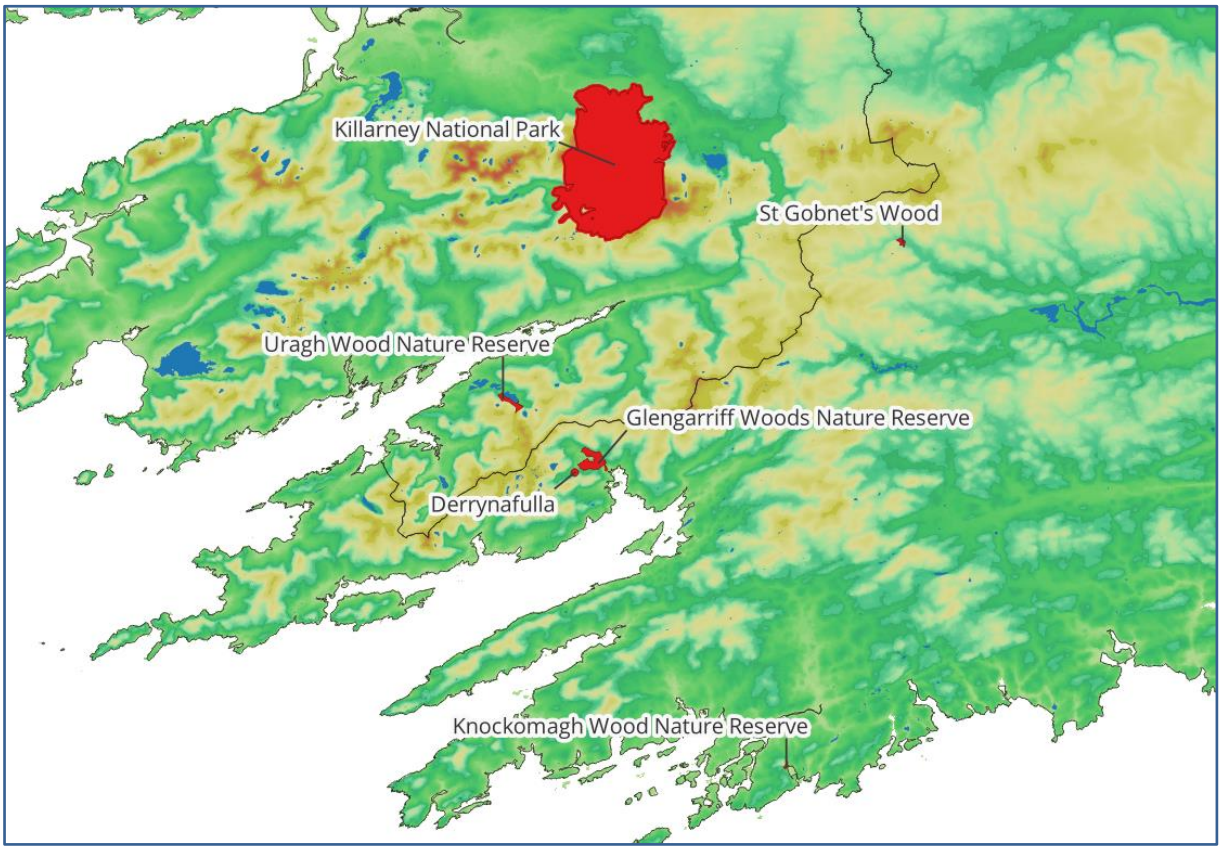

Figure 1 The location of the six NPWS properties that were surveyed in the South Western region. A dark line indicates the boundary between Co. Kerry and Co. Cork.

2.1.1 Killarney National Park

A shapefile delineating the boundary of the Killarney National Park (v103) was provided by NPWS. This was used to clip the habitat map shapefile for the park produced by Barron & Perrin (2011). From the resulting layer, polygons not classified by Barron & Perrin (2011) using Fossitt (2000) as a category within 'W Woodland and scrub' were deleted. Next, polygon boundaries along public roads—principally the N71—and major rivers were snapped to basemaps based on Ordnance Survey Ireland's Prime2 vector data. Contemporary satellite imagery was then used to refine woodland boundaries where necessary. Changes made at this stage could have reflected gains or losses in woodland cover or lack of clarity in the 2005 aerial photographs used by Barron & Perrin (2011).

Due to the large extent of woodland in the Killarney National Park, the resulting layer was divided into 41 survey sites (Figure 2) based on an initial list provided by NPWS. This division broadly followed the management zones defined by the KNP Rhododendron Survey (Barron 2018). In several cases, multiple management zones were amalgamated within one survey site. In the case of the Muckross Peninsula management zone, it was split into two sites, Reenadinna and Camillan.

Table 1 Special Area of Conservation (SAC) information for the six properties surveyed. The woodland habitat Qualifying Interests for those SACs are indicated. The Caha Mountains SAC (000093) also partially covers Derrynafulla but none of the overlapping area is wooded habitat. The numbering of the properties for the purposes of this project is indicated in the first column.

#	NPWS property	SAC (Code)	91A0 QI	91D0 QI	91E0 QI	91J0 QI
1	Killarney National Park	Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365)	✓		✓	✓
2	Glengarriff Woods Nature Reserve	Glengarriff Harbour and Woodland SAC (000090)	✓		✓	
3	Derrynafulla	Glengarriff Harbour and Woodland SAC (000090) (small area only)	✓		✓	
4	Uragh Wood Nature Reserve	Cloonee and Inchiquin Loughs, Uragh Wood SAC (001342)	✓			
5	Knockomagh Wood Nature Reserve	Lough Hyne Nature Reserve and Environs SAC (000097)			✓	
6	St Gobnet's Wood	St. Gobnet's Wood SAC (000106)	✓			

2.1.2 Other properties

The other five properties comprised just one site each, numbered as indicated in Table 1. This resulted in a total of 46 survey sites. The boundaries for these sites were not available in an appropriate digitised format and so had to be digitised. This was done by snapping where appropriate to basemaps based on Ordnance Survey Ireland's Prime2 vector data.

For the three Nature Reserves, the preliminary extent of the survey site was as indicated in the Statutory Instruments that established them, these being: (i) the Nature Reserve (Uragh Wood) Establishment Order, 1982, (ii) the Nature Reserve (Knockomagh Wood) Establishment Order, 1989 and (iii) the Nature Reserve (Glengarriff) Establishment Order, 1991. For Knockomagh Wood, the survey site was extended to include a Coillte-owned compartment on the eastern side of the site that is in the process of being transferred to NPWS. For Glengarriff Woods, the survey site was extended to include the Big Meadow and the Limehouse Field, these being areas purchased by the state subsequent to publication of the Statutory Instrument. The extent of the survey site for Derrynafulla and for St Gobnet's Wood was as indicated by property maps exported from landdirect.ie and provided by NPWS. Satellite imagery was then used to digitise separate polygons for non-wooded habitats within each of these sites. Note that, in contrast, the protocol used for the Killarney National Park meant that no non-wooded habitats were included within its sites.

2.2 Site survey

2.2.1 Timing of survey

All field work was conducted in 2023. Survey work in the Killarney National Park started on the 22nd May and was concluded on the 8th September. Survey work on the other sites started 31st July and was concluded on 25th August.

2.2.2 Habitat mapping

A meandering walk around each site was made to map the woodland habitats present using Fossitt (2000) categories and Annex I habitat woodland categories (91A0, 91D0, 91E0 or 91J0). Any necessary amendments to the site boundaries were recorded on field maps for

later digitisation. These amendments comprised corrections to any errors that had occurred during preparatory digitisation and genuine gains or losses in woodland extent.

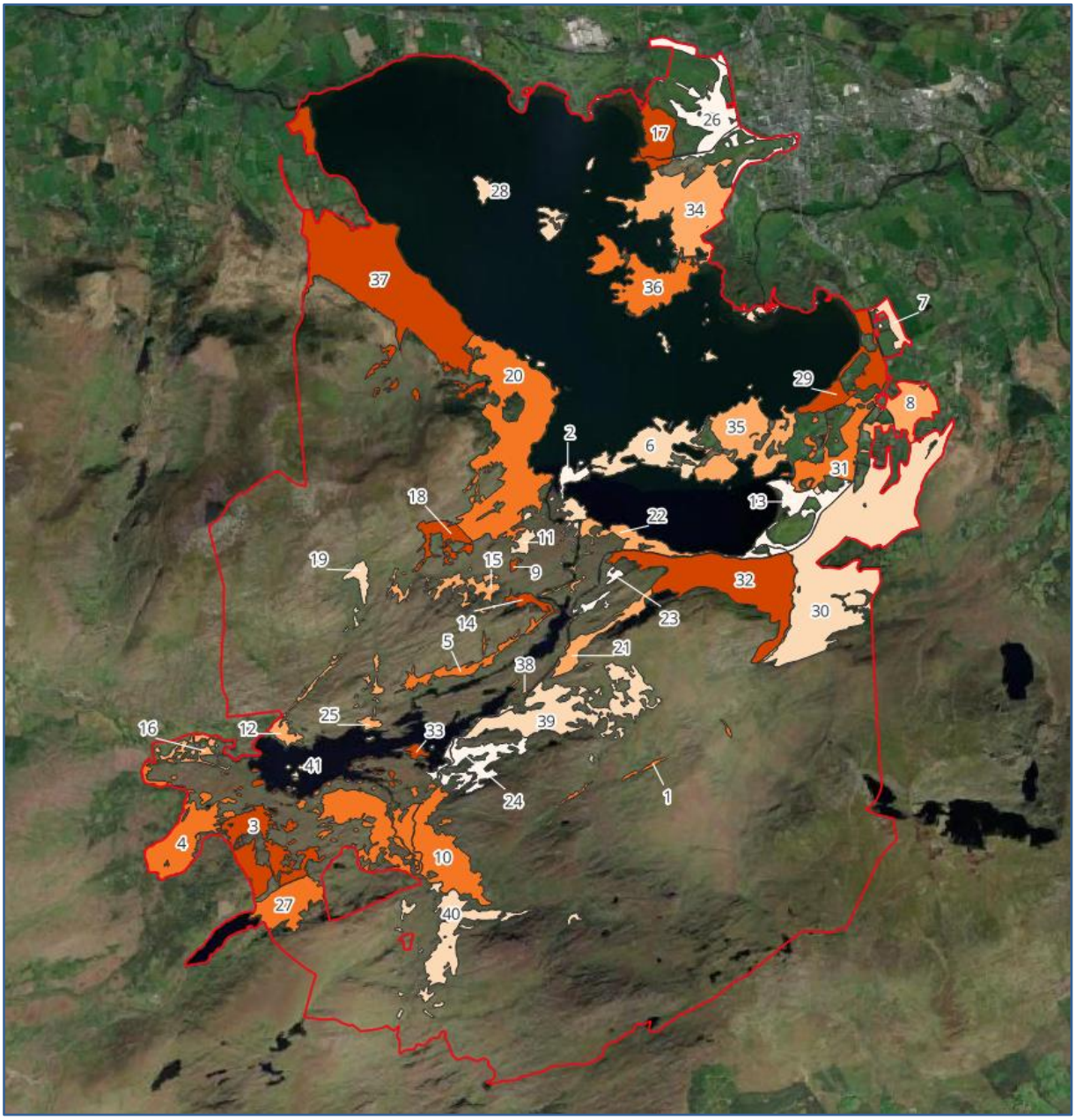

Figure 2 The division of woodland habitats within the Killarney National Park (red line indicates boundary) into survey sites (shades of orange). Numbering as follows: 1=Ash Valley, 2=Brickeen Island, 3=Cahernabane, 4=Cahernaduv, 5=Cahnicaun Wood, 6=Camillan Wood, 7=Carrigafreaghane, 8=Cloghereen, 9=Cuckoo Wood, 10=Derrycunnihy, 11=Dinis, 12=Doogary Wood, 13=Drumrougher, 14=Eagles Nest, 15=Eamonn's Wood, 16=Gallavally, 17=Game Wood, 18=Glaisín na Marbh, 19=Glasha Wood, 20=Glena, 21=Gortderraree, 22=Gortracussane Lower, 23=Gortracussane Upper, 24=Gortroe Woods, 25=Kingsboro Wood, 26=Knockreer, 27=Looscaunagh, 28=Lower Lake Islands, 29=Muckross Abbey, 30=Muckross Forest, 31=Muckross House, 32=North Face Torc, 33=Oak Island, 34=Reen Wood, 35=Reenadinna, 36=Ross Island, 37=Tomies Wood, 38=Tower Bog, 39=Tower Wood, 40=Ullauns, 41=Upper Lake Islands. These numbers were combined with the property number (1) to produce a site code, for example site 1.20 was Glena.

The habitat survey broadly followed the guidelines detailed in 'Best Practice Guidance for Habitat Survey and Mapping' (Smith *et al.*, 2011). Minimum mapping units of 400 m² for polygons and 20 m for linear features were used, with lines being used if a feature was <4 m wide. For each polygon, Data Quality was recorded as follows:

- 'S' for polygons that had been surveyed in detail through a walkover survey,
- 'V' for polygons that been field validated in less detail, perhaps with binoculars or from a boat,
- 'DA' for polygons not observed in the field but where information from recent high-quality data has instead been used,
- 'DD' for polygons not observed in the field, but where satellite imagery has instead been used.

2.2.3 Species lists

The presence of all vascular plants found within woodland habitats at each site was recorded in a Turboveg database. For tree species, presence was recorded separately for the field, shrub and canopy layers. For other species, it was noted if species were recorded from the sides of tracks, the woodland interior or both.

The presence of bryophyte species found within woodland habitats at each site was also recorded in the Turboveg database including epiphytes up to a height of 2 m. As an exhaustive bryophyte survey was not possible, the aim here was to record all species forming patches of at least 30 cm × 30 cm and less prolific species where possible.

2.2.4 General site data

Data were recorded on the following range of a site-level attributes which are specified on Sheet A in Appendix 2 of Perrin *et al.* (2008).

- Slope. The general slope for the site as a whole was recorded using a clinometer or a mobile app.
- Aspect. The aspect for the site was recorded as cardinal or intercardinal points. More than one aspect could be recorded, for example for sites on opposite side of a valley.
- Topography. All appropriate topographical descriptors were selected from this list: flat, summit (angular), summit (rounded), upper slope, mid-slope, terraced slopes, lower slope, depression. Other descriptors could be specified.
- Geography. All appropriate geographical descriptors were selected from this list: esker, drumlin, hill, valley, lakeside, bogland. Other descriptors could be specified.
- Soil moisture regime. The regime that was predominant over the greatest part of the site was selected from this list: freely draining, moderately free, impeded, strongly impeded.
- Hydrological features. All appropriate descriptors for internal features (not boundary features) were selected from this list: seasonal flooding, lakes/pools, rivers/streams, damp cleft/ravines. Other descriptors could be specified.
- Management and land use. All appropriate management descriptors were selected from this list: old native planting, recent native planting, recently felled natives, old broadleaf exotic planting, new broadleaf exotic planting, old conifer planting, new conifer planting, recent exotic felling (broadleaf or conifer), mature coppice, recently cut coppice, pollards, amenity, dumping. Other descriptors could be specified. The type of any amenity activity was specified.

- Internal features. All appropriate descriptors for internal features (not boundary features) were selected from this list: banks, ditches, cultivation ridges, ruined buildings, exclosures.
- Deadwood. Five categories of deadwood were each scored on the AFOR scale. The categories were: (i) standing dead, being trees still rooted and seemingly entirely dead, (ii) standing damaged, being trees that have suffered major branch loss or crown damage, (iii) uprooted root plates, which may or may not have the main stem still attached, (iv) coarse woody debris, being non-leafy litter with a diameter ≥5 cm, and (v) fine woody debris, being non-leafy litter with a diameter <5 cm.
- Surface cover. The following cover-type categories were each scored on the DAFOR scale: rocks and boulders, stones and gravel, bare soil, litter, bryophytes, herbs, low woody species. Scores related to the actual wooded area only, and did not account for gravel-covered forest tracks or car parks, for example.
- Adjacent habitats. Adjacent habitats observed in the field survey or interpreted from satellite imagery were recorded using level 2 of Fossitt (2000) (e.g., FW, GA, BL). Land separated from the site by boundary features such as roads or rivers was included if those boundary features were not significant in scale.
- Site boundary. All appropriate descriptors for boundary features were selected from this list: rivers/stream, canal, railway, lake, road/track, wall, ditch, bank, fence, none – abrupt, none – diffuse. Where a definite boundary, such as a wall or fence, was lacking, the boundary was described as abrupt if there was a sudden change in vegetation or as diffuse if there were shrubs or saplings at the margin.
- Grazing animals. All appropriate descriptors for grazers were selected from this list: deer, cattle, sheep, rabbits, hares, goats, horses. Other descriptors could be specified. If grazing was evident but species of animal responsible cannot be discerned, 'unknown' as recorded.
- Grazing level. The average intensity of grazing was recorded using a five-point scale as follows: (i) none apparent, (ii) low, where regeneration is abundant, the shrub layer is dense and there is no obvious browse line, (iii) moderate, where saplings are localised in occurrence, the shrub layer is patchy, and the field layer is generally >30 cm tall, (iv) high, where the shrub layer is severely checked or lacking, the field layer is generally <20 cm tall, regeneration is rare or confined to safe sites and some bare soil/poaching is visible, and (v) severe, where the shrub layer and regeneration are almost completely absent, a definite browse line is apparent, bare soil is extensive present, the field layer is confined to well-bitten herbs grasses and bark stripping at least occasional
- Tree size classes. Native and non-native tree species were scored using DAFOR for each of four size classes: (i) seedlings (≤ 25 cm tall), (ii) saplings (26 cm - 200 cm tall, <7 cm DBH), (iii) poles (>200 cm tall, <7 cm DBH) and (iv) mature (≥7 cm DBH). Only species which were Frequent in at least one size class were recorded in this manner.
- Invasive shrubs and herbs. Degree of infestation by each invasive shrub and herb species was recorded on a five-point scale. Scores were an average for infestation levels by that species across the site. The points in the scale were defined separately for Rhododendron (*Rhododendron ponticum*) (Table 2).

2.2.5 Large trees

To support decision making concerning old-growth forest status, a subjective sample of the largest diameter trees found within WN woodland at each site was recorded. Large, non-native trees were recorded, but the aim was for at least two-thirds of records for each site to be from native trees. For each tree, the location, species, diameter at breast height (DBH), growth form, growing position and occurrence of TReMs was recorded. When trees occurred on a slope, DBH was recorded by standing upslope of the tree. When trees had more than one stem, the

largest was measured. Options for growth form were: 'old/gnarly', 'coppice', 'pollard', 'multi-stemmed' or 'straight'. For growing position, a brief description was recorded such as 'on site boundary', 'on internal bank', 'on deeper soils on valley floor', 'on river bank', 'largest of a number of similar trees in locality' or 'part of general woodland'. TReMs were recorded using the eighteen groups in Table 3.

Table 2 Definitions of degrees of infestation for invasive shrubs and herbs.

Degree of infestation	Indicative description for Rhododendron	Indicative description for other invasive species
0 – Absent	None present	None present
1 – Slight	Some Rhododendron, but plants scattered, mostly small (i.e., <80 cm tall) and not flowering	Some present, but plants scattered
2 – Moderate	Rhododendron frequent but not clumping. Some flowering, many seedlings may be present	Frequent but not clumping (may be some flowering and/or many seedlings present)
3 – Severe	Rhododendron abundant, some forming dense clumps, many seedlings may be present	Abundant, some forming dense clumps (many seedlings in some instances)
4 – Very severe	Rhododendron forming dense thickets with almost total absence of ground flora	Abundant, forming dense thickets with almost total absence of ground flora

2.2.6 Ash dieback

A subjective sample of mature Ash (*Fraxinus excelsior*) trees was recorded from each site. For each tree, location, DBH, percentage of defoliation resulting from ash dieback and the presence of a range of ash dieback symptoms and impacts were recorded. Percentage defoliation was recorded using a scale adapted from Teagasc by Perrin *et al.* (in press).

- 0=No evidence of Ash Dieback (0% defoliation)
- 1=Healthy trees (>0-10% defoliation),
- 2=Slightly damaged (11-25%),
- 3=Moderately damaged (26-50%),
- 4=Severely damaged (51-99%),
- 5=Tree is dead.

The list of symptoms and impacts used was as follows:

- basal lesions
- lesions on branches (these may be smaller than basal lesions),
- epicormic branching (excessive side shoots along main stem),
- discolouration of bark (with characteristic diamond shape),
- diseased leaves on the tree,
- diseased leaf/twigs on the ground,
- infection of any nearby Ash seedlings/saplings,
- ground flora influenced by increase light levels.

The above criteria were developed for ash plantations so some elements are difficult to apply to mature trees in a woodland situation. For example, it may be difficult to record basal lesions

due to a high moss cover around the base and lesions on branches may not be evident as the lowest branches are 20 m up. Thus 'Not Evident' was an option in addition to 'Yes' or 'No'.

Table 3 Tree-related microhabitats as defined by Kraus *et al.* (2016) that could be recorded by this project.

Code(s)	Group	Saproxylic microhabitats	Notes
CV31-33	Branch holes	Cavities	Rot holes due to branch breakage
CV41-43	Water-filled holes	Cavities	Includes dendrotelms
CV51-52	Insect bore holes	Cavities	Includes galleries
CV11-26	Other cavities	Cavities	Trunk and woodpecker cavities
IN11-14	Bark loss	Injuries and wounds	>25 cm^2 of exposed sapwood
IN21-24	Breakage	Injuries and wounds	Includes exposed heartwood
IN31-34	Cracks/scars	Injuries and wounds	Includes lightning and fire scars
BA11-12	Bark pockets	Bark	>1 cm wide, >10 cm deep and high
GR11-13	Root buttresses	Deformation/growth form	Cavities or clefts
GR21-22	Deformities	Deformation/growth form	Witches broom and water sprout
GR31-32	Cankers/burrs	Deformation/growth form	Cancerous or decayed
EP11-14	Epiphytic fungi	Epiphytes	Perennial or ephemeral
EP31-32	Epiphytic bryophytes/lichen	Epiphytes	Coverage >25%
EP33	Epiphytic climbers	Epiphytes	Coverage >25%
EP34	Epiphytic ferns	Epiphytes	>5 fronds on a tree
NE11-21	Nests	Nests	Vertebrates or invertebrates
OT11-12	Sap/resin runs	Other	>50 cm of flow
OT21-22	Microsoils	Other	In clefts and on branches

2.2.7 Deadwood

To also support decision making concerning old-growth forest status, a subjective sample of the large-scale deadwood found within WN woodland at each site was recorded. For each instance, the location, species (if known), deadwood type, diameter, and cause of demise were recorded. Options for deadwood type were 'standing dead', 'fallen dead' or 'old/senescent'. Where instances were standing, diameter was recorded as DBH. Where instances were fallen but still had main trunks, diameter was recorded 1.3 m up from the base of the trunk. In other cases, for example fallen boughs, the maximum diameter was recorded. The 'old/senescent' category included fallen trees that were still alive. For cause of demise, a brief description was recorded, such as 'felled', 'old age', 'fallen bough', 'uprooted in wet soil' or 'uprooted in shallow soil on slope'.

2.2.8 Monitoring plots

Annex I woodland habitat monitoring plots had previously been established at several of the sites surveyed by this project (O'Neill & Barron 2013; Daly *et al*., 2023). Within the Killarney National Park, these were Camillan, Derrycunnihy and Eamonn's Wood for 91A0, Game Wood for 91E0 and Reenadinna for 91J0. Outside the park, these sites comprised Uragh Wood Nature Reserve and at Glengarriff Woods Nature Reserve, both monitored for 91A0.

Additional monitoring plots were established as part of this project. At each of the sites where monitoring was established, four 20 m × 20 m plots were subjectively placed. Where possible, these were located in a single woodland block and at least 100 m apart. When placing plots, the permanent woodland quadrat network that has been monitored since 1991 (Hamilton *et al.*, 2022) and NSNW relevés (Perrin *et al*., 2008) was avoided as were, where possible, woodland edges, tracks, rivers, internal banks and roads. The methodology for recording the plots followed that of Daly *et al*. (2023) with four minor amendments:

- Pedunculate Oak (*Quercus robur*) was added to the list of target species for 91A0 as this species is included in the habitat definition.
- Isolated non-native conifers were regarded as negative species rather than a neutral species in 91A0 plots, but a note was made on the infrequency of such species in the broader habitat.
- Scots Pine (*Pinus sylvestris*) was regarded as a native species rather than a neutral species for all habitats.
- The cover of target species within the canopy as a percentage of the plot was explicitly recorded.

Versions of the recording forms used for 91A0, 91E0 and 91J0 plots are presented in Appendix 1 and are self-explanatory.

2.2.9 Relevés

The NSNW recorded relevés (subjectively placed quantitative vegetation plots) in Cahernaduv, Camillan, Derrycunnihy, Game Wood, Reenadinna and Tomies Wood within the Killarney National Park, and also at Glengarriff Woods Nature Reserve, Knockomagh Wood Nature Reserve, Uragh Wood Nature Reserve and St Gobnet's Wood. To complement this existing dataset on woodland communities, additional relevés were recorded as part of this project in areas of native and mixed woodland. When placing these relevés, the permanent woodland quadrat network (Hamilton *et al*., 2022) and Annex I monitoring plot locations (O'Neill & Barron 2013; Daly *et al.*, 2023) were avoided, as were, where possible, woodland edges, tracks, rivers, internal banks and roads.

Relevés were 10 m × 10 m in size. Percentage scores based on cover from vertical projection were recorded for each vascular plant and bryophyte species present. Percentage scores were also recorded for: bare rock, bare soil, litter, deadwood, surface water, the bryophyte layer, the field layer, the shrub strata (2-4 m high) and the canopy strata (>4 m). Location, topography, aspect, slope and habitat per Fossitt (2000) were recorded too. All relevés were photographed.

2.2.10 Pressures and threats

Impacts were recorded on a per habitat per site basis during the walkover survey using the 2019-2024 list of codes developed by the EU. Each impact was categorised as follows:

- Ongoing pressure. The impact is ongoing during the current six-year reporting period and there is no evidence to suggest conservation measures have addressed the pressure.
- Future threat. The impact is not ongoing during the current six-year reporting period but is expected to become a problem within the timespan of the next two reporting periods. An example might be the presence of Japanese Knotweed (*Fallopia japonica*) just outside a habitat but from where it could reasonably be expected to spread into the habitat.
- Ongoing and likely to be in the future. The impact is ongoing during the current six-year reporting period and is likely to continue into future reporting periods.

The percentage of habitat effected by each impact was also recorded and each impact was assessed as being of high, medium or low intensity. Examples of high intensity impacts are the occurrences of clear-felling or dense Rhododendron (*Rhododendron ponticum*) infestation. Examples of low intensity impacts are the occurrences of scattered invasives or minor roadside dumping.

2.3 Site assessment

2.3.1 Conservation measures

Based on the pressures, threats and other negative aspects observed, a set of management actions were prescribed for each site to increase its conservation status. These actions were selected from the Irish Conservation Measures (IECM) list and presented in the file IECM_Hierarchy_141_04_2022_with_Level_1_IECM_ID_55.html provided by NPWS. Each conservation measure was categorised as follows:

- Implemented. The conservation measure was observed at the site and had successfully addressed the underlying pressure.
- Required. The conservation measure was not observed at the site or if it was observed then it had so far not successfully addressed the underlying pressure.

Following this approach, if Rhododendron plants were found at a site and they were flowering or had set seed, then the relevant conservation measure (code 119) was categorised as 'required' even if there was evidence that Rhododendron management had been conducted at that site. Similarly, if heavy grazing was observed at a site, then the relevant conservation measure (code 156) was categorised as 'required' even if there was evidence of fencing or culling.

2.3.2 Annex I habitat assessments

For each site, the data collected from the monitoring plots were assessed using the criteria and targets used by Daly *et al.* (2023) with some minor amendments. These criteria examine vegetation composition and cover, woodland structure, grazing pressure, regeneration and deadwood. Criteria assessed at the level of individual plots are listed in Tables 4-6 while criteria assessed using a combination of the data from all four plots within a site are listed in Table 7. The amendments made were as follows:

- Targets were added to criterion 1P.1 for all habitats regarding the minimal number of species in different plant groups. This was to avoid scenarios where plots passed the criterion due to diversity in just one plant group.
- Criterion 1P.6 was reworded from 'Proportion of target species in canopy' to 'Proportion of canopy composed of target species'. The application of the criterion, however, remained unchanged.

In the case of 91A0, the size classes used by criterion 4P.1 depended upon the altitude and topography of the site as upland oakwoods can be expected to have smaller trees. If any plot within a site was at ≥150 m in altitude and/or the site, in general, was steeply sloping, the size classes used were as shown below. The terms in brackets indicate how these size classes relate to those on the 91A0 recording form.

- 7-19.5 cm DBH (small)
- 20-29.5 cm DBH (medium1)
- ≥30 cm DBH (medium2+large)

In all other circumstances, the size classes used were:

- 7-19.5 cm DBH (small)

- 20-39.5 cm DBH (medium1+medium2)
- ≥40 cm DBH (large)

Table 4 Criteria used to assess 91A0 habitat at the individual-plot level

Assessment criterion	Target
1P.1 Presence of positive indicator species	≥1 target tree species, ≥2 non-target trees species, ≥2 bryophytes, ≥2 other vascular species
1P.2 Cover of negative indicator species	≤10% of plot
1P.3 Regeneration of negative indicator species of trees or shrubs	Absent
1P.4. Median canopy height	≥11 m
1P.5 Total canopy cover	≥30% of plot
1P.6 Proportion of canopy composed of target species	≥50% of canopy
1P.7 Cover of native shrub layer	10-75% of plot
1P.8 Cover and median height of native dwarf shrub/field layer	≥20% of plot (cover), ≥20 cm (height)
1P.9 Cover of bryophyte layer	≥4% of plot
1P.10 Indications of high grazing pressure	All four indicators absent

Table 5 Criteria used to assess 91E0 habitat at the individual-plot level

Assessment criterion	Target
1P.1 Presence of positive indicator species	≥1 target tree species, ≥6 other positive indicator species, including ≥2 forbs and graminoids
1P.2 Cover of negative indicator species	≤10% of plot
1P.3 Regeneration of negative indicator species of trees or shrubs	Absent
1P.4. Median canopy height	≥7 m
1P.5 Total canopy cover	≥30% of plot
1P.6 Proportion of canopy composed of target species	≥50% of canopy
1P.7 Cover of native shrub layer	10-75% of plot
1P.8 Cover and median height of native dwarf shrub/field layer	≥20% of plot (cover), ≥20 cm (height)
1P.9 Cover of bryophyte layer	≥4% of plot
1P.10 Indications of high grazing pressure	All five indicators absent
1P.11 Cover of Common Nettle (*Urtica dioica*)	<75% of plot

If all targets for a criterion were achieved, that criterion was deemed to have been passed. Conversely, if any target for a criterion was not met, that criterion was deemed to have been failed. For each site, the ‘passes’ and ‘fails’ were combined using the method in Table 8.

Table 6 Criteria used to assess 91J0 habitat at the individual plot level.

Assessment criterion	Target
1P.1 Presence of positive indicator species	≥1 target tree species, ≥6 other positive indicator species, including ≥2 non- bryophytes species
1P.2 Cover of negative indicator species	≤10% of plot
1P.3 Regeneration of negative indicator species of trees or shrubs	Absent
1P.4. Median canopy height	≥10 m
1P.5 Total canopy cover	≥30% of plot
1P.6 Proportion of canopy composed of target species	≥50% of canopy
1P.7 Cover of native shrub layer	10-75% of plot
1P.8 Cover of native dwarf shrub/field layer	≥20% of plot
1P.9 Median height of native dwarf shrub/field layer	≥20 cm
1P.10 Cover of bryophyte layer	≥4% of plot
1P.11 Indications of high grazing pressure	All four indicators absent

Table 7 Criteria used to assess Annex I woodland habitats at the four-plot level.

Assessment criterion	Target
4P.1 Variation in target species size classes	≥1 tree (of any target species) present from each of three size classes (91A0, 91E0) or four size classes (91J0)
4P.2. Regeneration of target species	≥1 sapling (of any target species) ≥2 m tall present
4P.3. Regeneration of other native tree species	≥1 sapling ≥2 m tall present in ≥2 plots
4P.4 Presence of deadwood	≥3 pieces present

Table 8 How the number of criteria 'passes' were combined to produce an assessment result for each site. X=8 for 91A0, 9 for 91E0, 91J0.

Number of plots with ≥X 'passes' for individual-plot criteria	Number of 'passes' at the four-plot level	Assessment result
4	3-4	Green
3	3-4	Amber
4	0-2	Amber
<3	3-4	Red
<4	0-2	Red

2.3.3 Conservation and threat scores

For each site, a conservation score was calculated using a revised version of the scheme used in the National Survey of Native Woodlands (Perrin *et al.*, 2008) (Table 9). Amendments were as follows:

- Woodland continuity. In the original scheme, a site scored a point if woodland was indicated as present at the site on the first edition Ordnance Survey map. Perrin & Daly (2010) later categorised such sites as 'long-established woodland'. Sites for which there is archival evidence that they may have been wooded since the 1660s were

categorised by Perrin & Daly (2010) as either 'ancient woodland' or 'possible ancient woodland' depending upon the strength of the evidence. The scheme was revised to incorporate these three categories and to give much greater weighting to such important sites. As not all of the sites covered by the present survey were considered by Perrin & Daly (2010), additional research was conducted. Details of this research and a summary of the evidence for each site are presented in Appendix 2.

- Area. In the original scheme, sites were scored on their total area. However, the extent of NSNW sites was generally limited to native stands and modified stands that still retained significant native elements. In the present survey, the remit was to survey all areas of woodland and forest habitat within the target properties. These areas included habitats such as conifer plantations that would not have been considered by the NSNW. To retain the original rationale for this criterion, only the extent of WN, WD1 and WD2 habitats per Fossitt (2000) were considered when scoring area.
- Native species regeneration. Consideration was given to omitting this criterion as it could be viewed as a measure of grazing which is already a component of the threat score (see below). However, as it represents an essential dynamic of functioning woodland ecosystems and as there are other reasons which could explain the absence of natural regeneration, it was retained. Perrin *et al.* (2008) had evaluated this criterion using data collected from relevés. These data were not collected by the present project therefore the criterion was instead scored based on a subjective estimate of sapling density across the site.
- Horizontal diversity. Perrin *et al.* (2008) had evaluated this criterion using tree structural data collected from relevés. These data were not collected by the present project therefore the criterion was instead scored based on a subjective estimate of the variation in adult tree diameter across the site. A site with high horizontal diversity would be a stand dominated by one species but which is uneven-aged or where adult trees from a number of species with different growth forms are present. Low horizontal diversity occurs when all adult trees present are of a similar size, such as in an even-aged dominated by a single species. Medium horizontal diversity would be between these two extremes.
- % native basal area. Again, Perrin *et al.* (2008) had evaluated this criterion using tree structural data collected from relevés. These data were not collected by the present project therefore the criterion was instead scored based on a subjective estimate the proportion of the total basal area of adult trees that comprise native trees.
- Man-made features and woodland management. This criterion used by Perrin *et al.* (2008) allowed a site to score a single point for the occurrence of coppice or pollarding, internal banks, boundary banks, ruined buildings or walls. Upon review it was decided to drop this criterion as it is partly concerned with woodland longevity which has now received additional weighting via the woodland continuity criterion.

Each site was given a 'quality class' determined by its total conservation score (x) as follows: Very Poor (x<20%), Poor (20%≤x<40%), Moderate (40%≤x<60%), Very Good (60%≤x<80%), Excellent (x≥80%). The sites were also ranked based on the total conservation score.

Table 9 Revised criteria of Perrin et al (2008) that were used calculate a conservation score for each site.

Criteria	Scoring
Area	**0**: <2 ha, **1**: 2-3.9 ha **2**: 4-6.9 ha, **3**: 7-13 ha, **4**: 13.1-50 ha, **5**: >50 ha
Vascular plant diversity	**1**: ≤50 species, **2**: 51-65 species, **3**: 66-80 species, **4**: ≥81 species
Bryophyte diversity	**0**: 0 species, **1**: ≤11 species, **2**: 12-24 species, **3**: ≥25 species
Notable species	Presence of the following species: *Anemone nemorosa, Arbutus unedo, Bromus racemosus, Campanula trachelium, Cardamine amara, Carex depauperata, Carex strigosa, Cephalanthera longifolia, Frangula alnus, Galium odoratum, Gymnocarpium dryopteris, Hordelymus europaeus, Hypericum hirsutum, Lamiastrum galeobdolon* ssp*. montanum, Melica uniflora, Milium effusum, Monotropa hypopitys, Neottia nidus-avis, Orobanche hederae, Phegopteris connectilis, Prunus padus, Pyrola media, Pyrola minor, Pyrola rotundifolium, Rhamnus cathartica, Sorbus devoniensis, Sorbus hibernica, Stachys officinalis, Trichomanes speciosum, Viola hirta* **0**: 0 species, **1**: 1 species, **2**: 2 species, **3**: ≥3 species
Native species regeneration	Measured as number of saplings (>2 m high, <7 cm DBH) per 100 m² **0**: no saplings, **1**: 1-4 saplings, **2**: ≥5 saplings
Horizontal diversity	Based on variation in the DBH of adult (≥7 cm DBH) trees **0**: Low, **1**: Medium, **2**: High
% native basal area	Based on basal area (DBH × π) of native adults trees as proportion of total **0**: ≤50%, **1**: 50.1 – 75%, **2**: 75.1 – 90%, **3**: ≥90.1%
Frequency of deadwood	Based on AFOR data recorded for deadwood categories **0**: coarse woody debris, standing dead, standing damaged and snags/snapped all recorded as rare or occasional and uprooted root plates recorded as rare, frequent or abundant **1**: ≥1 of coarse woody debris, standing dead, standing damaged or snags/snapped recorded as frequent or abundant or uprooted root plate recorded as occasional
Diversity of Annex I woodland habitats	**0**: no Annex I woodland habitat, **1**: 1 Annex I woodland habitat, **2**: 2-4 Annex I woodland habitats
Diversity of native woodlands habitats	Based on number of WN habitats per Fossitt (2000) **1**: 1 habitat, **2**: 2 habitats, **3**: ≥3 habitats
Presence of petrifying springs with tufa	Based on the presence of Annex I habitat *7220 **0**: habitat absent, **1**: habitat present
Presence of natural hydrological features	Based on (i) adjacency of level 2 Fossitt categories FW and FL, (ii) occurrence of river/stream or lake/pond as boundary features, (iii) presence of hydrological features within the site, (iv) impeded drainage **0**: no natural hydrological features, **1**: ≥1 natural hydrological features
Adjacent semi-natural habitats	Based on adjacency of level 2 Fossitt categories excluding FW and FL **0**: no adjacent semi-natural habitats, **1**: ≥1 adjacent semi-natural habitats
Woodland continuity	Based on classification of Perrin & Daly (2010) **0**: Recent woodland, **2**: Long-established woodland, **4**: Possible ancient woodland, **5**: Ancient woodland

Similarly, for each site, a threat score was calculated based on a revised version of the scheme used in the National Survey of Native Woodlands (Perrin *et al.*, 2008) (Table 10). Three amendments were made as follows:

Non-native species regeneration. Perrin *et al.* (2008) had evaluated this criterion using data collected from relevés. These data were not collected by the present project therefore the criterion was instead scored based on a subjective estimate of sapling density across the site.

Risk of damage and/or habitat loss due to wildfire. An additional criterion was added to reflect the threat of wildfires as there have been several in the Killarney National Park over the last two decades. The criterion was weighted to reflect the sudden severity of wildfire impacts.

Damaging activities. Piling of brash within a woodland—such as the brash produced when Rhododendron is cleared—was regarded as a damaging activity. Piles of dry brash are a liability in the event of a wildfire as they are easily ignited sources of fuel.

Each site was given a 'threat level' determined by its total threat score (x) as follows: Low (x<20%), Moderate (20%≤x<40%), High (40%≤x<60%), Severe (x≥60%). The sites were also ranked based on the total threat score.

Table 10 Revised criteria of Perrin et al (2008) that were used calculate a threat score for each site.

Criteria	**Scoring**
Occurrence of non-native species	Based on highest degree of infestation recorded for invasive non-natives **0**: absent, **1**: slight, **2**: moderate, severe or very severe
Grazing intensity	Scoring is guided by the intermediate disturbance hypothesis **0**: low or moderate, **1**: none, **2**: high, **3**: severe
Non-native species regeneration	Measured as number of saplings (>2 m high, <7 cm DBH) per 100 m² **0**: no saplings, **1**: 1-4 saplings, **2**: ≥5 saplings
Damaging activities	Based on (i) recording of recently felled native, new conifer planting, new broadleaf exotics planting or dumping, (ii) recording of other negative activities such as quarrying, drain construction or infilling, brash piling **0**: no damaging activities, **1**: 1 damaging activity, **2**: 2 damaging activities **3**: ≥3 damaging activities
Non-native canopy	Based on DAFOR data recorded for tree size classes **0**: no mature non-native species recorded as abundant or dominant **1**: ≥1 mature non-native species recorded as abundant or dominant
Frequency of standing dead or damaged trees	Based on AFOR data recorded for deadwood categories **0**: neither standing dead nor standing damaged recorded as abundant **1**: standing dead or standing damaged recorded as abundant
Risk of damage and/or habitat loss due to wildfire	Based on (i) proximity to large expanses of heath and bog, (ii) previous wildfires in the vicinity **0:** Low risk, **2:** High risk

3 Results

3.1 Summaries of data recorded

3.1.1 Habitat mapping

A total area of 2602.3 ha of woodland habitat was surveyed (Table 11). The majority of this area was covered by a walkover survey (87.3%) with most of the remainder being field validated (12.1%). Existing data and satellite imagery were used for a very small area (0.6%).

Table 11 Area (ha) of each property surveyed by Data Quality. S = walkover survey, V = field validated, DA = recent high-quality data, DD = satellite imagery.

NPWS property	S	V	DA	DD	Total
Killarney National Park	1848.1	303.4	0.0	15.0	2166.5
Glengarriff Woods Nature Reserve	265.4	11.1	0.0	0.4	276.9
Derrynafulla	54.1	0.6	0.5	0.2	55.3
Uragh Wood Nature Reserve	64.0	0.0	0.0	0.0	64.0
Knockomagh Wood Nature Reserve	16.3	0.0	0.0	0.0	16.3
St Gobnet's Wood	23.2	0.0	0.0	0.0	23.2
Total	*2271.2*	*315.1*	*0.5*	*15.5*	*2602.3*

Only 49.7% of the woodland habitat surveyed comprised WN Semi-natural woodland per Fossitt (2000) (Figure 3), with 43.9% comprising WD Highly modified/non-native woodland and 6.4% WS Scrub/transitional woodland.

WN1 Oak-holly-birch woodland was by far the most abundant type of WN woodland recorded, accounting for 39.6% of the total woodland area. Significant areas of WN6 Wet willow-alder-ash woodland (5.6%), WN3 Yew woodland (2.7%) and WN7 Bog woodland (1.4%) were also recorded. WN2 Oak-ash-hazel woodland and WN4 Wet pedunculate oak-ash woodland were minor components.

Almost equal areas of WD1 (Mixed) broadleaved woodland (16.1%) and WD4 Conifer plantation (16.0%) were recorded. WD1 woodland primarily consisted of stands with significant components of Beech (*Fagus sylvatica*) or Sycamore (*Acer pseudoplatanus*) in the canopy and stands were infestation where Rhododendron (*Rhododendron ponticum*) had eliminated most of the native shrub and field layer. Significant areas of WD2 Mixed broadleaved/conifer woodland (9.7%), WD3 (Mixed) conifer woodland (0.9%) and WD5 Scattered trees and parkland (1.3%) were also recorded.

WS3 Ornamental/non-native shrub was by far the most abundant type of WS habitat recorded, accounting for 5.7% of the total woodland area. This predominantly consisted of dense *Rhododendron* scrub. WS1 Scrub, WS2 Immature woodland and WS5 Recently-felled woodland were minor components.

Over half of the woodland habitat area (55.7%) did not confirm to any Annex I woodland habitat (Figure 4). This area comprised all of the stands of WD and WS habitat together with non-Annex I variants of WN1 and WN7 woodland. 91A0 Old sessile oakwoods was the most abundant Annex I woodland type accounting for 35.6% of the total woodland area. There were one-to-one relationships between WN6 and 91E0 Alluvial forests and between WN3 and 91J0 Yew woodlands. A small area of 91D0 woodland was recorded (0.3%).

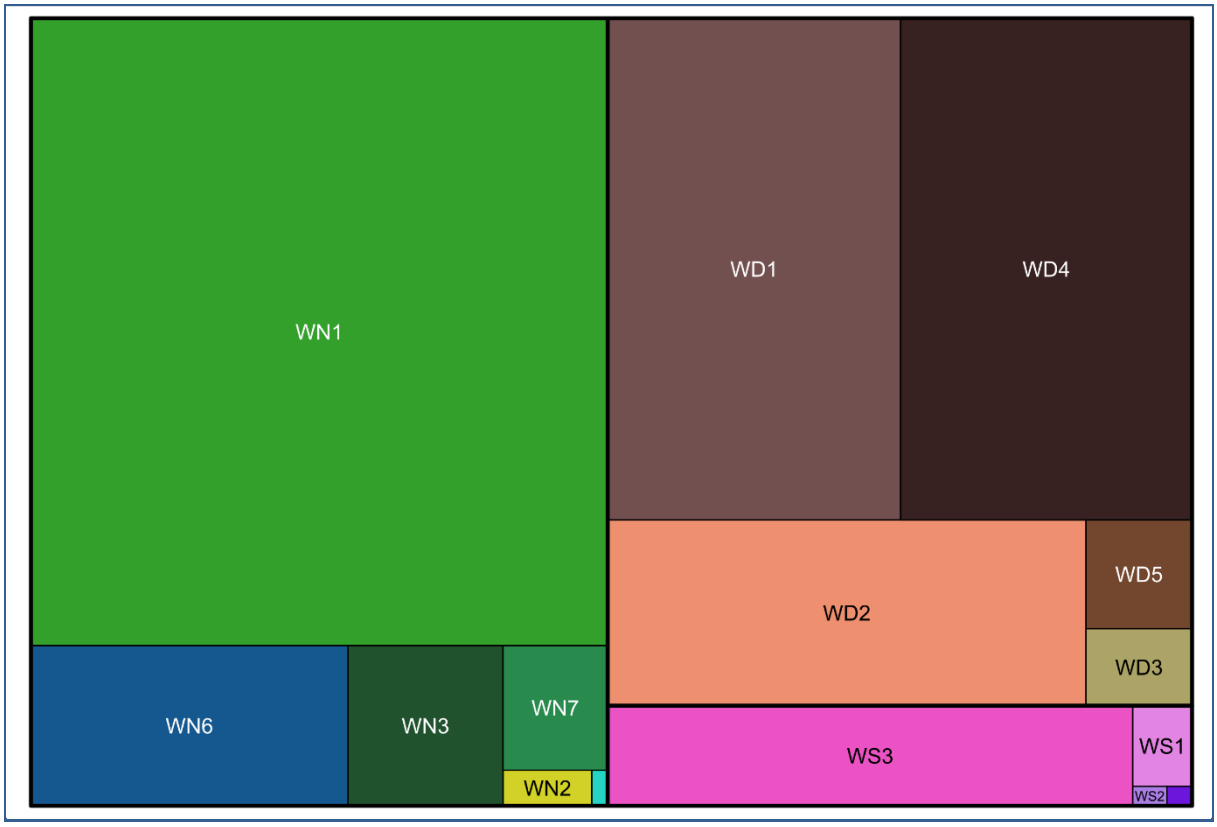

Figure 3 Treemap of recorded woodland habitat types per Fossitt (2000). The area of each rectangle is proportional to the recorded area of that habitat. Unlabelled habitats: ■ = WN4, ■ = WS5

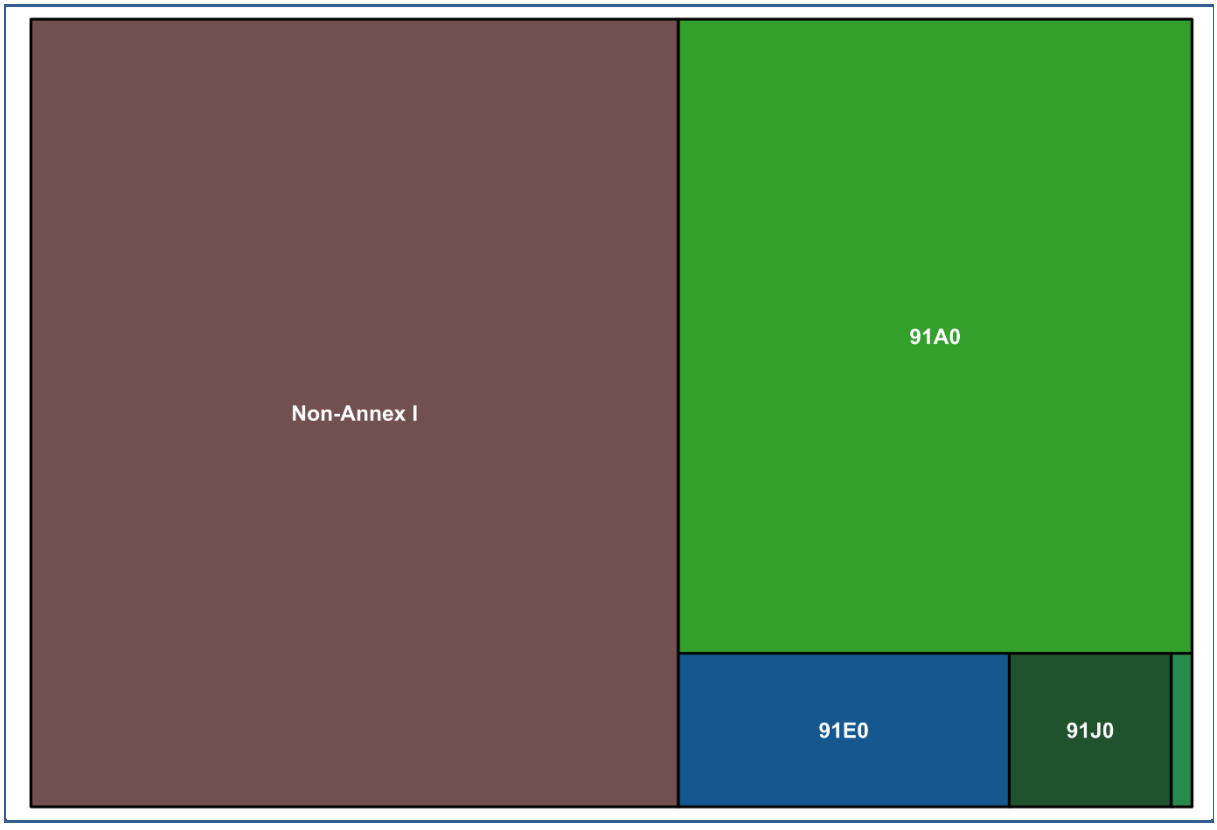

Figure 4 Treemap of recorded Annex I woodland habitats. The area of each rectangle is proportional to the recorded area of that habitat. Unlabelled habitat: ■ = 91D0.

The total length of linear habitats recorded was 14.7 km comprising 10.7 km of WL2 Treeslines and 4.1 km of WL1 Hedgerows per Fossitt (2000). Site-level data on the area of Fossitt habitats, the area of Annex I habitats and the length of linear habitats are presented in Appendices 3, 4 and 5 respectively.

3.1.2 Species lists

Excluding species only found in association with tracks, a total of 566 floral taxa were recorded during project, comprising 315 native vascular plant taxa, 63 non-native vascular plant taxa, 187 native bryophyte taxa and 1 non-native bryophyte taxa. Site-level data are presented in Appendix 6. Particularly high numbers of native vascular taxa were recorded from Reenadinna (135 taxa), Derrycunnihy (105) and Camillan (102). The highest numbers of non-native vascular taxa were recorded from Glengarriff Woods Nature Reserve (18 taxa), Knockreer (18) and Muckross Abbey (15). For bryophytes, the best sites were Gortroe Woods (64 taxa), Camillan (63), and Uragh Wood Nature Reserve (60).

Rare species recorded included Betony (*Betonica officinalis*), Opposite-leaved Pondweed (*Groenlandia densa*) and Killarney Fern (*Trichomanes speciosum*). All are listed on the Flora (Protection) Order, 2022. The latter plant is also listed—under the synonym *Vandenboschia speciosa*—in Annex II of the Habitats Directive

The complete species lists dataset collected during this survey is available in the form of a Turboveg for Windows 2 database.

3.1.3 Large trees

A total of 744 large trees were measured comprising 20 different taxa (Figure 3a). Over half of these trees (51.3%) were Sessile Oak (*Quercus petraea*), with the next most frequent species being Downy Birch (*Betula pubescens*) (10.1%), Holly (*Ilex aquifolium*) (9.8%), Yew (*Taxus baccata*) (6.0%), Grey Willow (*Salix cinerea*) (5.6%) and Alder (*Alnus glutinosa*) (4.2%). The two most frequent growth types were ‘straight’ (56.5%) and ‘old/gnarly’ (34.4%) with a few trees being recorded as ‘multi-stemmed’ (8.7%), but almost none as ‘coppice’ or ‘pollard’ (Figure 3b). The most frequent types of TReMs recorded were epiphytic bryophytes/lichens (89.0%), breakage (78.6%), microsoils (55.5%), epiphytic ferns (45.2%) and branch holes (45.2%). The least frequent types were epiphytic fungi (5.0%), sap/resin runs (4.8%), water holes (2.6%) and nests (0.0%) (Figure 3c).

DBH measurements ranged from 16 cm to 194 cm with a median of 68 cm (Figure 4). All trees with a DBH <30 cm were selected because they were ‘multi-stemmed’ or ‘coppice’ and hence had a larger basal area than this single measured suggests. Downy Birch, Holly, Alder and Grey Willow tended to have DBH measurements lower than the overall median. Sessile Oak and Yew had a broad range of DBH measurements but dominated the records in excess of the overall median.

3.1.4 Ash dieback

A total of 476 Ash (*Fraxinus excelsior*) trees were assessed for ash dieback. DBH measurements ranged from 7 cm to 108 cm with a median of 34.5 cm (Figure 5a). Only 2.7% of trees were assessed to exhibit no defoliation and only 0.6% of assessed trees were dead (Figure 5b). The modal value for defoliation was 1 (>0-10% defoliation), which was recorded for 40.3% of assessed trees. The two symptoms most frequently observed were the presence of epicormic branching (77.1% of trees) and diseased leaves on the tree (74.8% of trees) (Figure 5c). The two symptoms least frequently observed were the presence of basal lesions (5.3% of trees) and branch lesions (4.6% of trees).

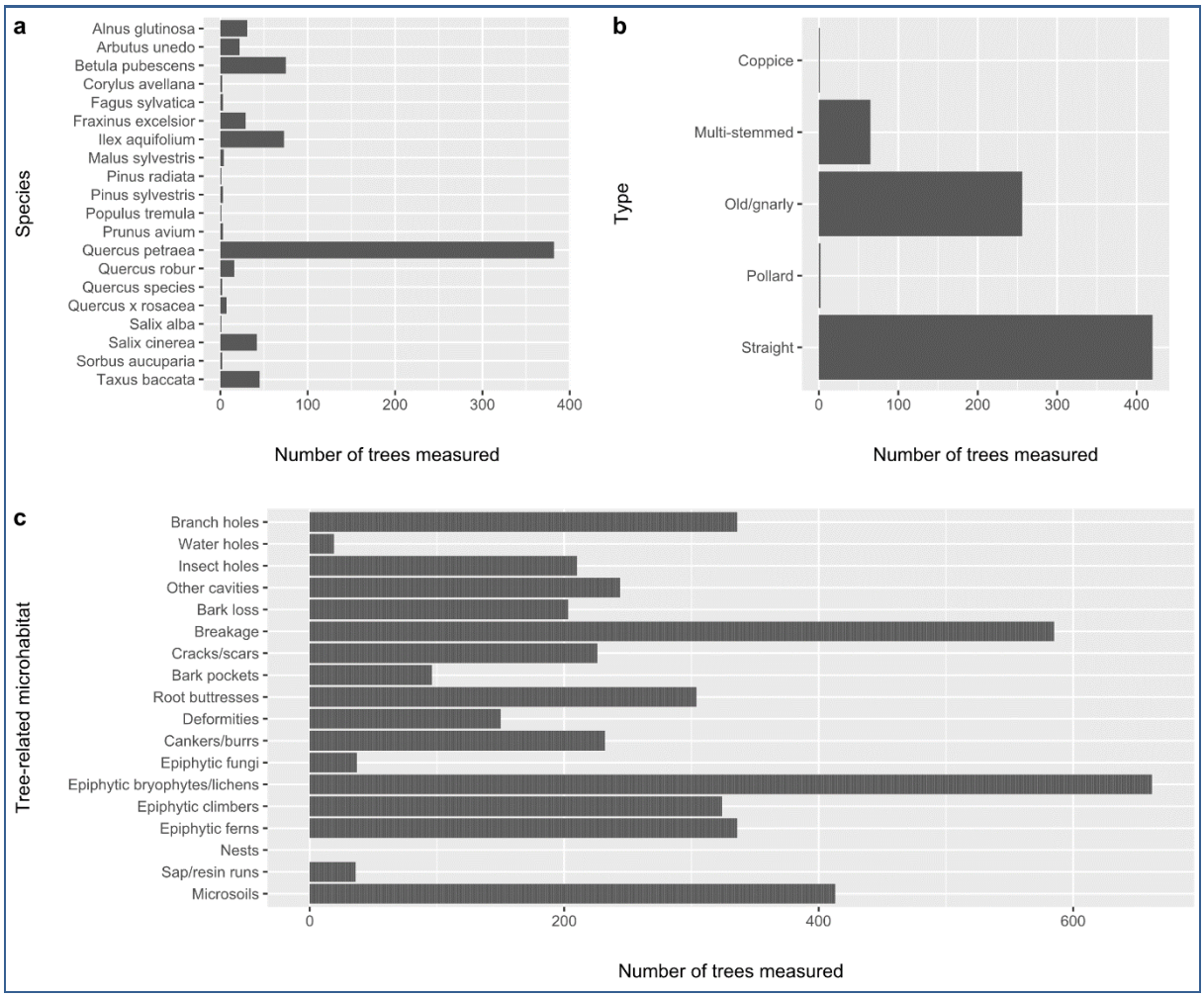

Figure 3 Data pertaining to large trees: (a) frequency of species, (b) frequency of different growth types and (c) frequency of tree-related microhabitats (TReMs).

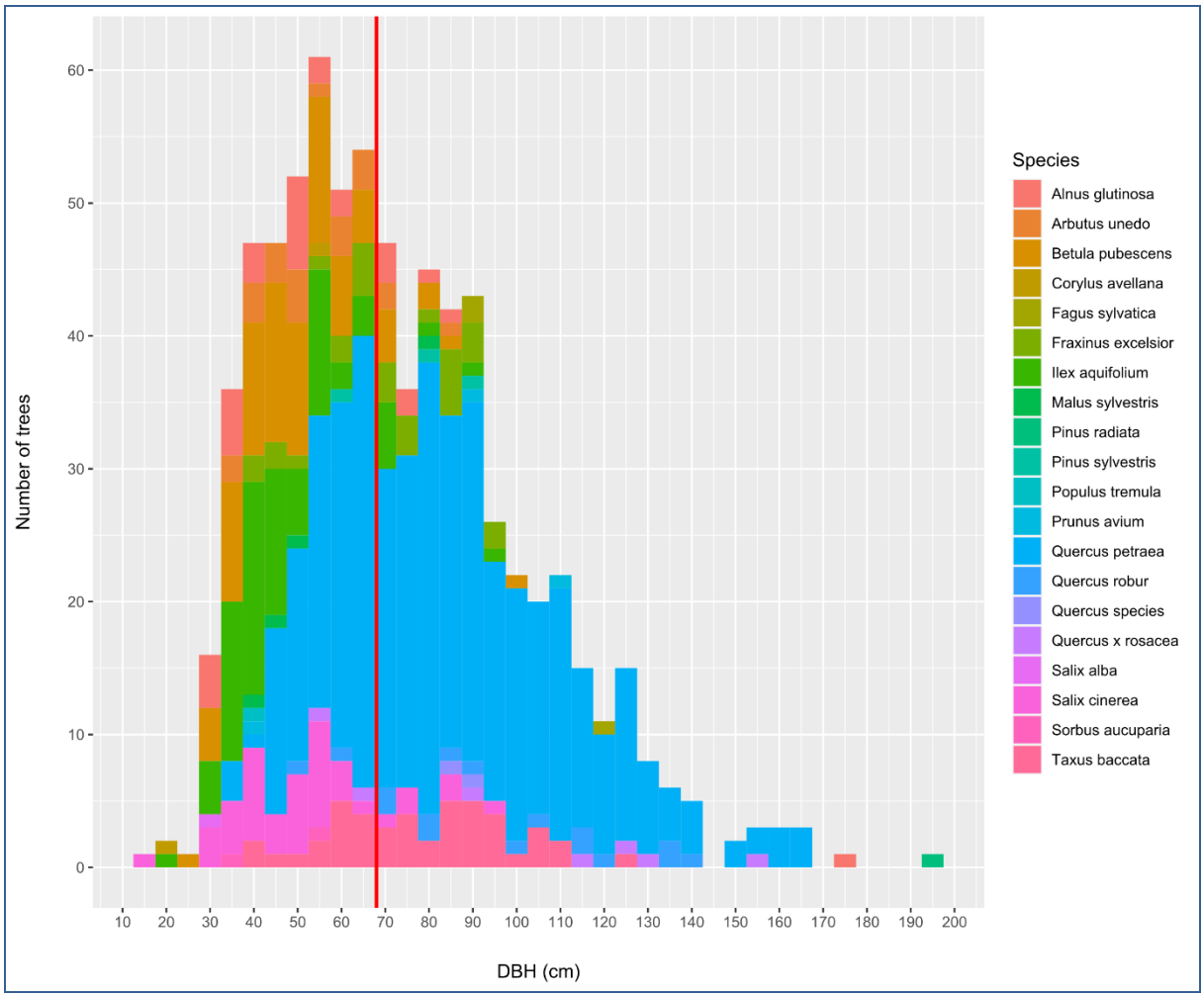

Figure 4 Histogram of large tree DBH measurements (*n*=744) colour-coded by species. The vertical red line indicates the median value.

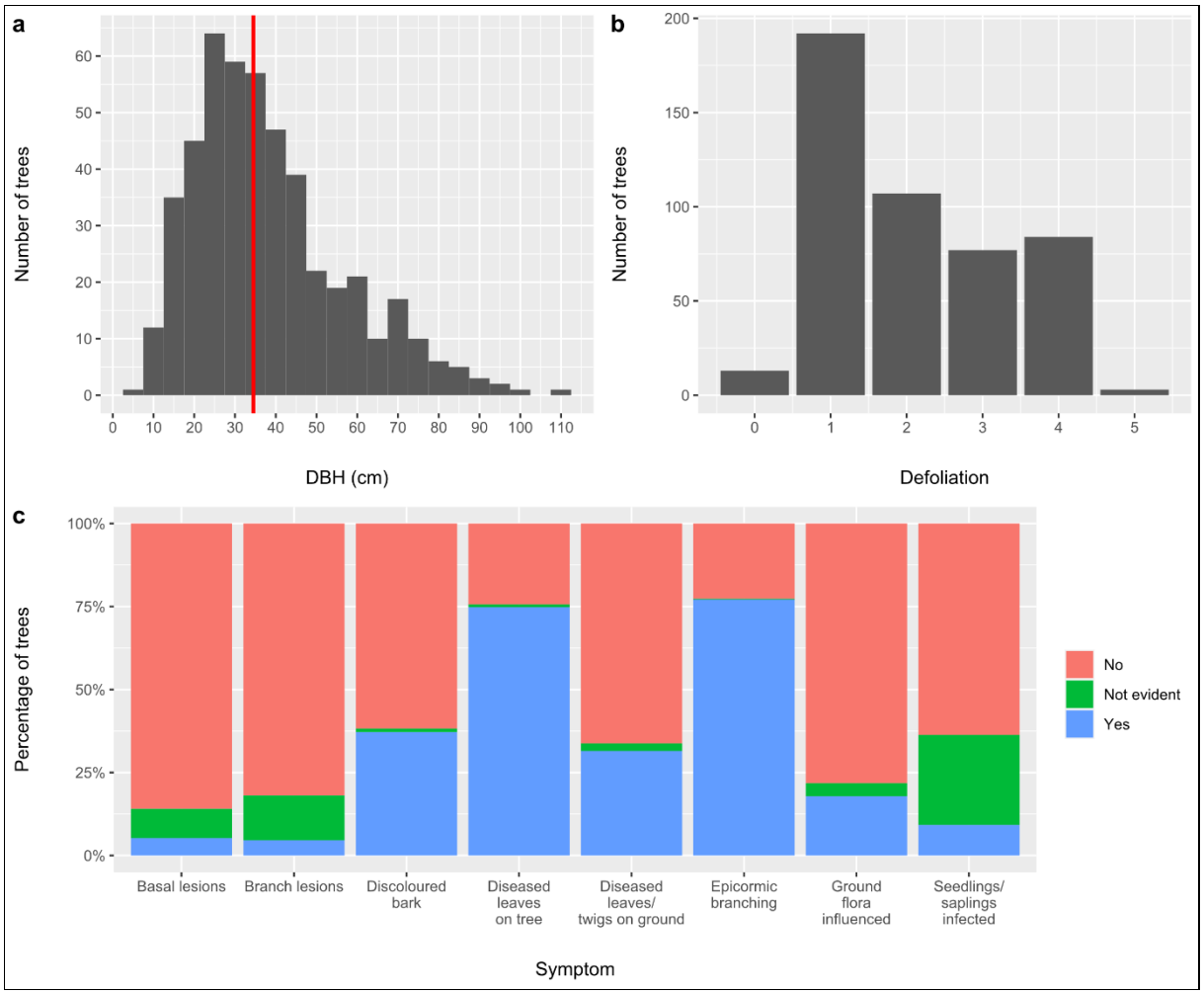

Figure 5 Data pertaining to ash dieback assessments: (a) histogram of DBH of assessed Ash trees with the vertical red line indicating the median value, (b) frequency of different defoliation levels and (c) frequency of recorded symptoms.

3.1.5 Deadwood

A total of 607 instances of deadwood were measured comprising 17 different taxa (Figure 6a). Almost half of these instances (43.8%) were identified as Sessile Oak (*Quercus petraea*), with the next most frequent species identified being Downy Birch (*Betula pubescens*) (12.2%), Holly (*Ilex aquifolium*) (11.9%), Ash (*Fraxinus excelsior*) (5.9%), Yew (*Taxus baccata*) (4.0%) and Alder (*Alnus glutinosa*) (3.6%). For 6.8% of instances, the species was unknown. Almost half of the instances of deadwood (44.3%) were classed as fallen dead, with standing dead and old/senescent instances recorded at similar frequencies (28.3% and 27.3% respectively) (Figure 6b).

Diameter measurements ranged from 14 cm to 168 cm with a median of 48 cm (Figure 7). Amongst instances less than about 60 cm in diameter, there is a good diversity in the contributing species. Amongst instance larger than this, Sessile Oak dominates.

3.1.6 Relevés

A total of 31 relevés were recorded comprising six habitat types per Fossitt (2000), with 30 of these being spread across the Killarney National Park (Figure 8) and one at Derrynafulla. All relevés were classified to communities of the Irish Vegetation Classification using ERICA v6.2 (Table 11). Nineteen relevés were categorised as WN1 Oak-birch holly woodland per Fossitt, with the majority of these being assigned to WL1D *Quercus petraea - Vaccinium myrtillus* woodland and a couple to WL1B *Quercus petraea - Luzula sylvatica* woodland. The WN1 relevé from Gortracussane Lower (relevé code 1.22-1) was from an area that had been badly damaged by wildfires and had very lower canopy cover. It was assigned to HE2B *Calluna vulgaris - Hypnum jutlandicum* heath due primarily to the abundance of Heather (*Calluna vulgaris*) (75%). The WN1 relevés from Derrycunnihy (1.10-1) and Derrynafulla (3-1) was assigned to WL4B *Betula pubescens - Agrostis capillaris* woodland due to relatively high covers of Downy Birch (*Betula pubescens)* and low covers of Sessile Oak (*Quercus petraea*).

Three relevés were categorised as WN6 Ash-alder-willow wet woodland per Fossitt. The one recorded in Game Wood (1.17-1) was assigned to WL4E *Betula pubescens – Salix cinerea* woodland. The WN6 relevés from Reen Wood (1.34-2) and Reenadinna (1.35-2) contained less Downy Birch than the first one and were assigned to WL3F *Salix cinerea - Phalaris arundinacea* woodland and WL3E *Salix cinerea - Galium palustre* woodland respectively. Both relevés were categorised as WN3 Yew woodland per Fossitt were clearly assigned to the WL2F *Taxus baccata – Ilex aquifolium* woodland. A WN7 Bog woodland relevé from Reen Wood (1.34-1) was assigned to WL4A *Betula pubescens - Vaccinium myrtillus* woodland due to in part to the abundance of Hay-scented Buckler Fern (20%) and Wood-sorrel (40%). The relevé from the WN7 stand at Cloghereen (1.08-1) had an unusual abundance (40%) of Greater Tussock-sedge (*Carex paniculata*) and has suffered from *Rhododendron* invasion. It was a weak match for WL4E *Betula pubescens – Salix cinerea* woodland.

Five relevés were classified as types of WD Highly modified/non-native woodland per Fossitt. Notable amongst these is the relevé from Glena (1.20-1) that was assigned to IN1A *Rhododendron ponticum* invasive community due primarily to the abundance of Rhododendron (95%). The relevé from Cahernaduv (1.04-1) was assigned to WL1D woodland despite an abundance of Scots Pine (*Pinus sylvestris*) (65%) as the Irish Vegetation Classification does not yet contain a Scots Pine-dominated community to accommodate such stands.

The complete relevé dataset collected during this survey is available in the form of a Turboveg for Windows 2 database.

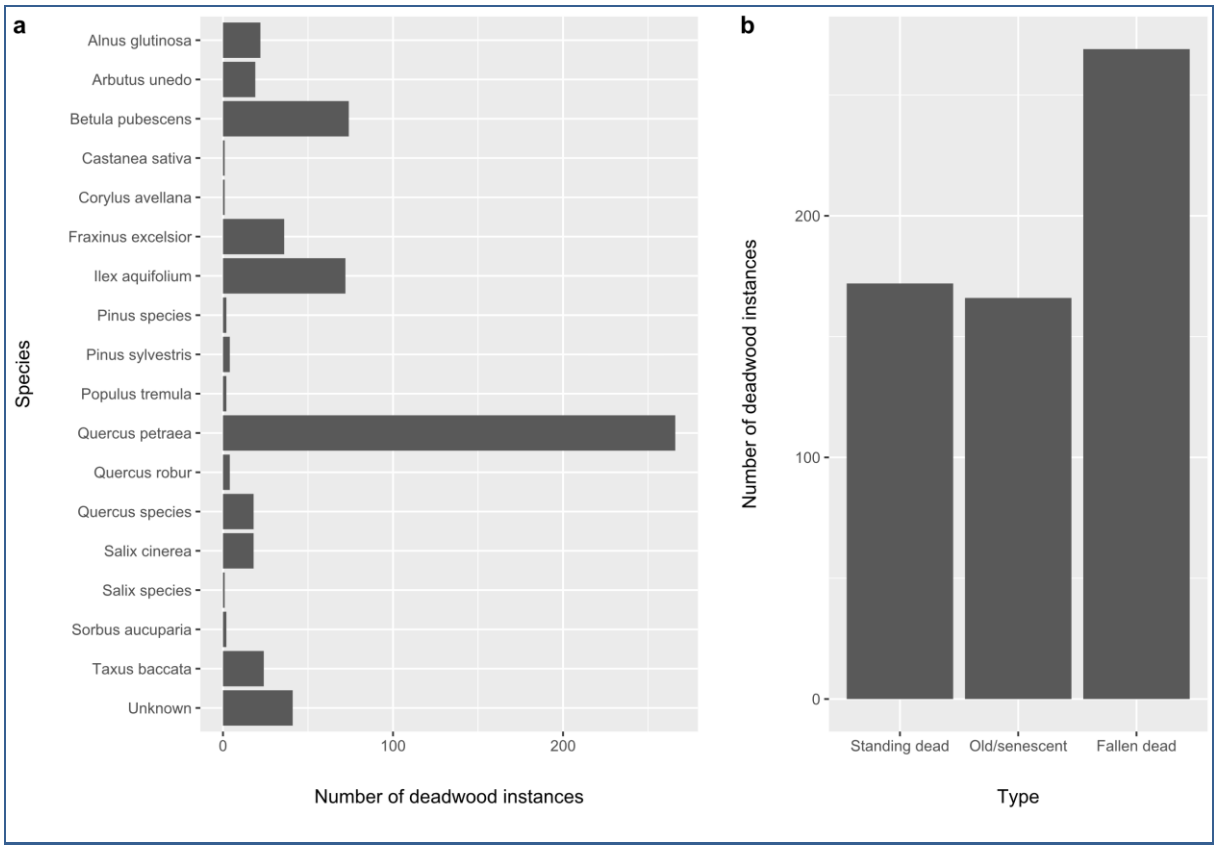

Figure 6 Data pertaining to deadwood: (a) frequency of species, (b) frequency of types.

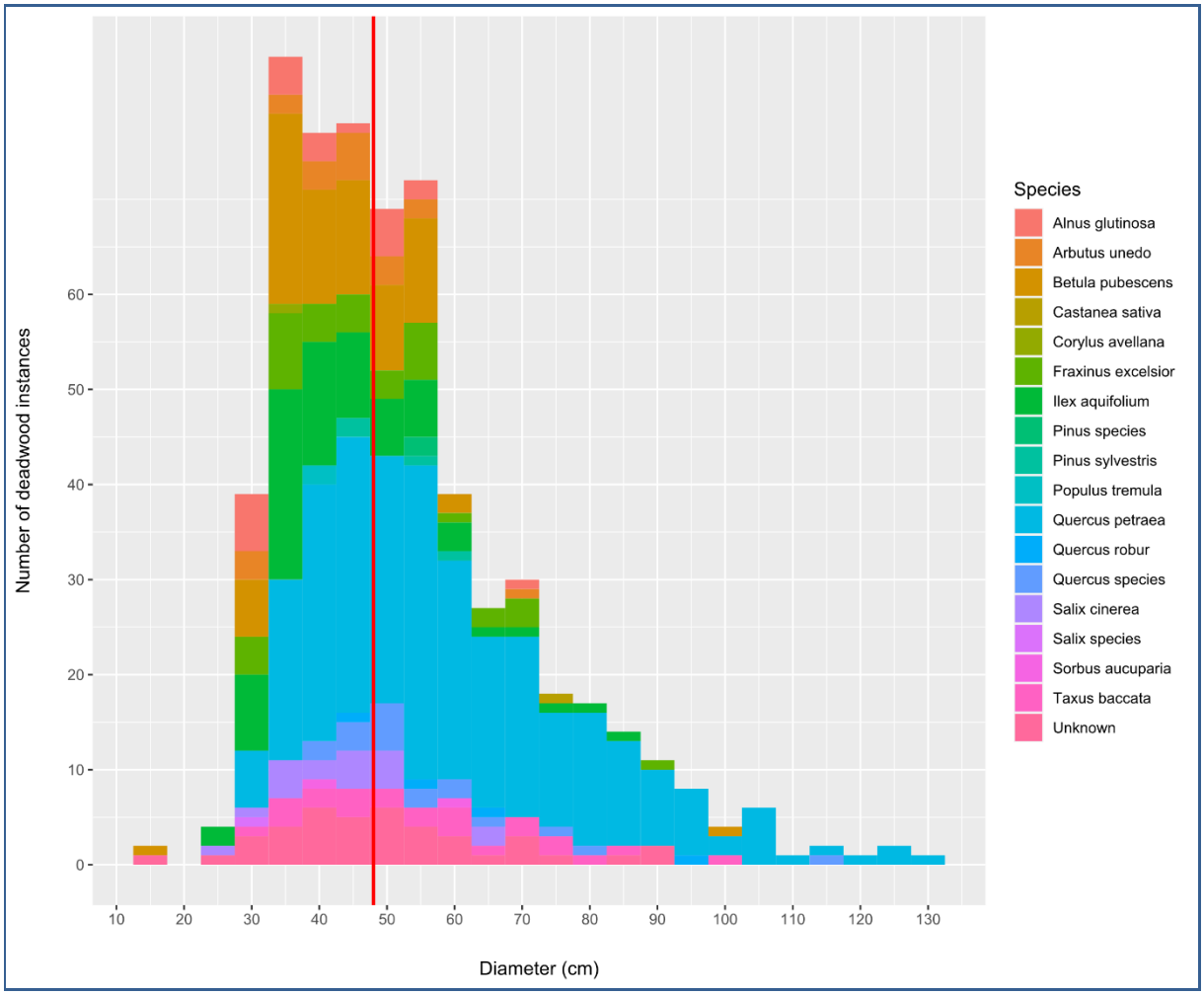

Figure 7 Histogram of deadwood diameter measurements (*n*=607) colour-coded by species. The vertical red line indicates the median value.

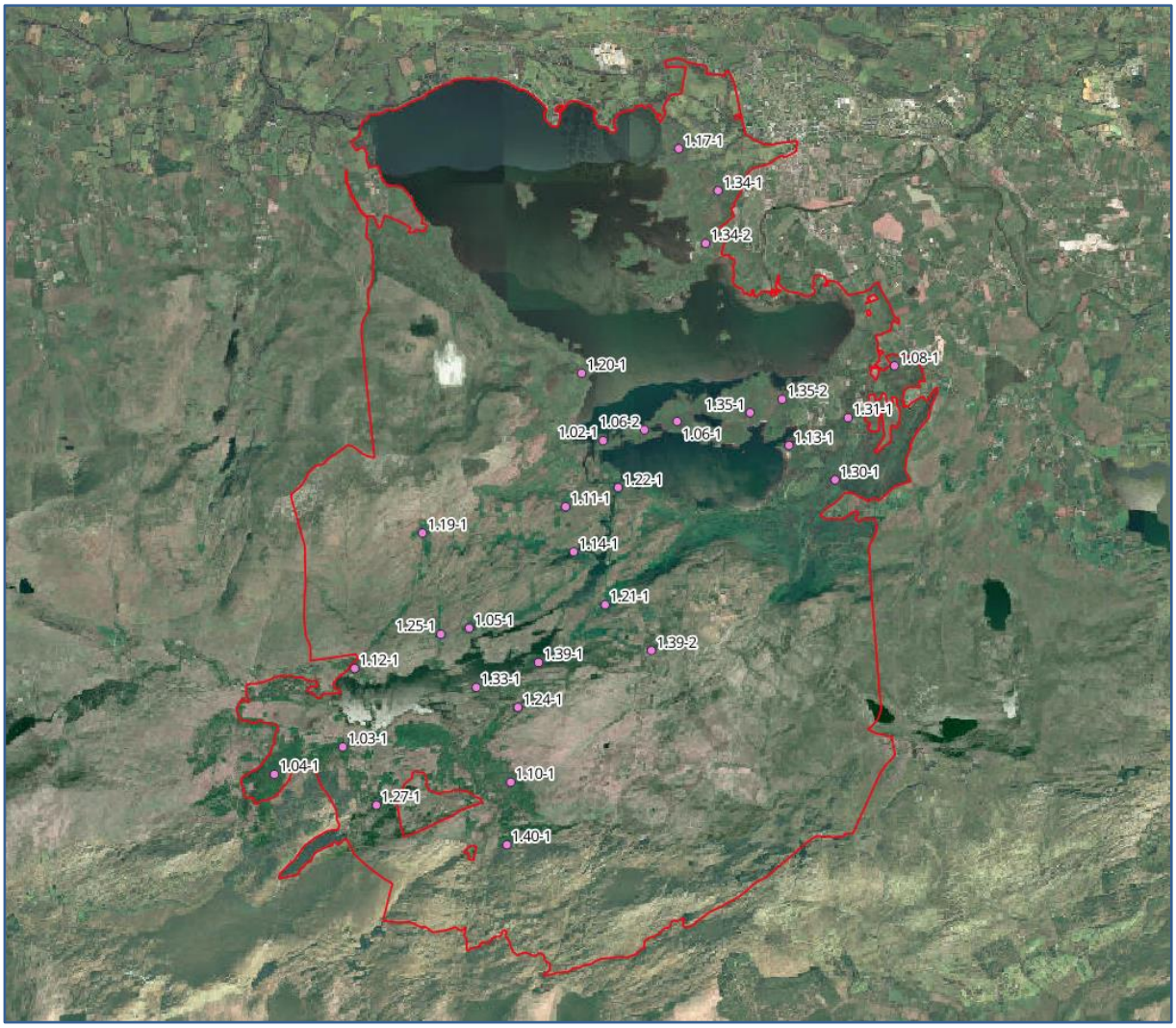

Figure 8 Distribution of relevés recorded during this project in the Killarney National Park. Labels are relevé codes, which consist of the site number and relevé number.

Table 11 Assignment of relevés to Fossitt (2000) categories and the Irish Vegetation Classification.

Relevé code	Fossitt habitat	IVC community	IVC match (%)
1.02-1	WN1	WL1B *Quercus petraea – Luzula sylvatica* woodland	85.5
1.03-1	WN1	WL1D *Quercus petraea – Vaccinium myrtillus* woodland	99.1
1.04-1	WD2	WL1D *Quercus petraea – Vaccinium myrtillus* woodland	93.8
1.05-1	WN1	WL1D *Quercus petraea – Vaccinium myrtillus* woodland	76.9
1.06-1	WN1	WL1B *Quercus petraea – Luzula sylvatica* woodland	59.4
1.06-2	WN1	WL1D *Quercus petraea – Vaccinium myrtillus* woodland	63.8
1.08-1	WN7	WL4E *Betula pubescens – Salix cinerea* woodland	37.2
1.10-1	WN1	WL4B *Betula pubescens – Agrostis capillaris* woodland	59.8
1.11-1	WD1	WL1D *Quercus petraea – Vaccinium myrtillus* woodland	64.5
1.12-1	WN1	WL1D *Quercus petraea – Vaccinium myrtillus* woodland	65.2
1.13-1	WN3	WL2F *Taxus baccata – Ilex aquifolium* woodland	100.0
1.14-1	WN1	WL1D *Quercus petraea – Vaccinium myrtillus* woodland	54.8
1.17-1	WN6	WL4E *Betula pubescens – Salix cinerea* woodland	91.5
1.19-1	WN1	WL1D *Quercus petraea – Vaccinium myrtillus* woodland	97.1
1.20-1	WD1	IN1A *Rhododendron ponticum* invasive community	99.1
1.21-1	WN1	WL1D *Quercus petraea - Vaccinium myrtillus* woodland	84.8
1.22-1	WN1	HE2B *Calluna vulgaris - Hypnum jutlandicum* heath	52.9
1.24-1	WN1	WL1D *Quercus petraea - Vaccinium myrtillus* woodland	98.8
1.25-1	WN1	WL1D *Quercus petraea - Vaccinium myrtillus* woodland	81.8
1.27-1	WN1	WL1D *Quercus petraea - Vaccinium myrtillus* woodland	99.3
1.30-1	WD2	WL1A *Quercus robur - Luzula sylvatica* woodland	45.4
1.31-1	WD1	WL2C *Fraxinus excelsior - Acer pseudoplatanus* woodland	52.6
1.33-1	WN1	WL1D *Quercus petraea - Vaccinium myrtillus* woodland	75.0
1.34-1	WN7	WL4A *Betula pubescens - Vaccinium myrtillus* woodland	43.1
1.34-2	WN6	WL3F *Salix cinerea - Phalaris arundinacea* woodland	97.0
1.35-1	WN3	WL2F *Taxus baccata - Ilex aquifolium* woodland	95.0
1.35-2	WN6	WL3E *Salix cinerea - Galium palustre* woodland	93.4
1.39-1	WN1	WL1D *Quercus petraea - Vaccinium myrtillus* woodland	70.0
1.39-2	WN1	WL1D *Quercus petraea - Vaccinium myrtillus* woodland	48.6
1.40-1	WN1	WL1D *Quercus petraea - Vaccinium myrtillus* woodland	99.9
3-1	WN1	WL4B *Betula pubescens - Agrostis capillaris* woodland	45.1

3.2 Site assessments

3.2.1 Overview of conservation measures

The prescribed site-level conservation measures are summarised using generalised categories in Figure 9. Measures needed to address Rhododendron (*Rhododendron ponticum*) and overgrazing were by far the most frequent being each prescribed for over 90% of sites. Measures to reduce risks of wildfires are needed at over two-thirds of sites. Such measures include not piling Rhododendron brash within the woodlands. Conversion of non-native stands—these include conifer plantations and modified woodland—was recommended for over half of the sites reflecting the frequency of such stands. Measures to tackle other alien shrubs and herbs were also common. Such species included Cherry Laurel (*Prunus laurocerasus*), Portugal Laurel (*Prunus lusitanica*), Snowberry (*Symphoricarpos albus*), Traveller's-joy (*Clematis vitalba*), Winter Heliotrope (*Petasites pyrenaicus*), Michaelmas-daisy (*Symphyotrichum* sp.), Montbretia (*Crocosmia* × *crocosmiiflora*), Bamboo (*Sasa* spp.) and Cotoneaster (*Cotoneaster* spp.). Reduction of habitat fragmentation by increasing connectivity between stands is needed for over a third of sites, mostly those in the Killarney uplands. Measures to remove non-native broadleaves from native woodland stands chiefly relates to Beech (*Fagus sylvatica*) and Sycamore (*Acer pseudoplatanus*), whereas measures to similarly remove non-native conifers relates to a range of species. Dumping of domestic refuse and glyphosate containers needs to be addressed at a relatively small number of sites. Other measures included dealing with sewage leaks, retention of deadwood on site, ceasing wood pasturage and creating new woodland on adjacent properties.

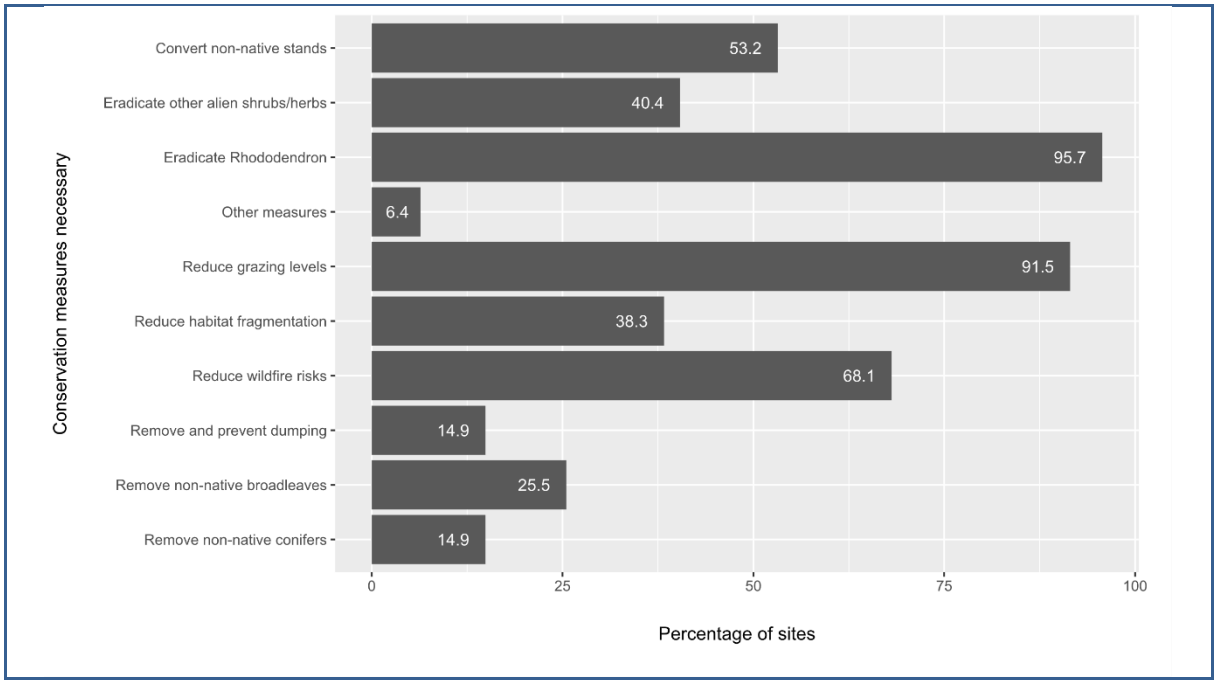

Figure 9 Frequency of prescribed site-level conservation measures summarised by generalised categories.

3.2.2 Annex I habitat assessments

Within the Killarney National Park, new monitoring plots were recorded in Cahernabane, Cahnicaun Wood, Tomies Wood, Tower Wood and Ullauns for 91A0, Reen Wood for 91E0 and Monk's Wood for 91J0. Monitoring plots were also recorded at Knockomagh Wood Nature Reserve and St Gobnet's Wood for 91A0. At the first of these two sites, the habitat does not currently conform to 91A0 but could do in the future with appropriate management. There was

insufficient habitat at Derrynafulla to establish any monitoring at those sites. No examples of 91D0 were monitored.

Six of these nine sites were assessed as 'red' or 'Unfavourable-Bad' (Table 12). Three sites were assessed as 'amber' or 'Unfavourable-Inadequate'. No sites were assessed as 'green' or 'Favourable'.

Table 12 Monitoring plot assessment results for Annex I habitat.

Site number	Site name	Annex I habitat	Number of plots with ≥X 'passes' for individual-plot criteria	Number of 'passes' at the four-plot level	Assessment
1.03	Cahernabane	91A0	3	2	Red
1.05	Cahnicaun Wood	91A0	4	2	Amber
1.09	Monks Wood	91J0	0	3	Red
1.34	Reen Wood	91E0	4	2	Amber
1.37	Tomies Wood	91A0	1	1	Red
1.39	Tower Wood	91A0	2	1	Red
1.40	Ullauns	91A0	3	2	Red
5	Knockomagh Woods Nature Reserve	91A0	0	3	Red
6	St Gobnet's Wood	91A0	3	3	Amber

In terms of individual criteria (Table 13), the highest pass rates were associated with canopy height, proportion of the canopy composed of target species, bryophyte cover, cover of Common Nettle (*Urtica dioica*) in 91E0, presence of deadwood. The lowest pass rates were associated with regeneration of non-native species, cover of the native shrub layer, regeneration of native trees (both target and non-target trees) and indications of high-grazing pressure.

3.2.3 Conservation and threat scores

Site-level data on the conservation scores are presented in Appendices 7 and 8. No sites were classified as Very Poor but three sites were classified as Poor. Carrigafreaghane (36.1%) is a species-poor site with low native status and low habitat diversity. Looscaunagh (38.9%) scored poorly on area, native basal area and horizontal diversity. Tower Bog (30.6%) is a collection of scrappy stands and treelines with a very small area and is deemed to be recent woodland. Five sites were classified as Excellent: Reenadinna (88.9%), Camillan (86.1%), Derrycunnihy (86.1%), Ross Island (80.6%) and Uragh Wood Nature Reserve (80.6%). These are all large, ancient woodland sites with high levels of species diversity. Derrycunnihy, Reenadinna and Ross Island all scored well for notable species. Camillan and Reenadinna scored maximum points for both Annex I and Fossitt habitats. The remaining sites were classified as Moderate or Very Good.

Site-level data on the threat scores are presented in Appendices 9 and 10. Three sites were classified as having a Low threat level. The Upper Lake Islands (15.4%), the Lower Lake Islands (7.7%) and St Gobnet's Wood (7.7%) only scored for alien shrub infestation. Fifteen sites—including most of those in the west and south of the Killarney National Park—were classified as having a Severe threat level. These sites all scored highly for alien shrub infestation, grazing levels and the risk of wildfire. The remaining sites were classified as having a Moderate or High threat level.

Thirteen sites were classified as Excellent or Very Good in terms of conservation value but also classified as having a Severe or High threat level. These sites could be regarded as management priorities.

Table 13 Pass rates for individual assessment criteria.

Criterion	*n*	% pass
1P.1 Presence of positive indicator species	36	83.3
1P.2 Cover of negative indicator species	36	75.0
1P.3 Regeneration of negative indicator species of trees or shrubs	36	47.2
1P.4. Median canopy height	36	100.0
1P.5 Total canopy cover	36	97.2
1P.6 Proportion of canopy composed of target species	36	86.1
1P.7 Cover of native shrub layer	36	55.6
1P.8 (91A0, 91E0) Cover and median height of native dwarf shrub/field layer	32	81.3
1P.8 (91J0) Cover of native dwarf shrub/field layer	4	75.0
1P.9 (91J0) Median height of native dwarf shrub/field layer	4	75.0
1P.9 (91A0, 91E0) 1P.10 (91J0) Cover of bryophyte layer	36	100.0
1P.10 (91A0, 91E0) 1P.11 (91J0) Indications of high grazing pressure	36	25.0
1P.11 (91E0) Cover of Common Nettle (*Urtica dioica*)	4	100.0
4P.1 Variation in target species size classes	9	66.7
4P.2. Regeneration of target species	9	0.0
4P.3. Regeneration of other native tree species	9	44.4
4P.4 Presence of deadwood	9	100.0

3.3 Site descriptions and prescriptions

3.3.1 Ash Valley (Site 1.01)

Description:

This small site of only 3.6 ha is dispersed across the uplands along the Old Kenmare Road in the east of the Killarney National Park, Co. Kerry (Figure 10). It consists of several narrow fragments of remnant woodland. The first group occurs in Esknamucky Glen on the south-eastern side of Cromaglan Mountain while the second group occurs on the eastern slopes of the same peak overlooking the Crinnagh River. There is a third group on the lower slopes of Mangerton Mountain to the east of the Crinnagh River towards Cores and a final group in a steep ravine on the Owengarriff River towards Ferta.

The character of the first three groups is that of acidophilous oak woodland (WN1/91A0). The canopy is fairly low and composed mainly of Sessile Oak (*Quercus petraea*) and Downy Birch (*Betula pubescens*) with Holly (*Ilex aquifolium*) forming the understorey. The field layer includes Bracken (*Pteridium aquilinum*), Wood-sorrel (*Oxalis acetosella*), Irish Spurge (*Euphorbia hyberna*), Bilberry (*Vaccinium myrtillus*), Great Wood-rush (*Luzula sylvatica*), Purple Moor-grass (*Molinia caerulea*), Common Bent (*Agrostis capillaris*), Brown Bent (*Agrostis vinealis*), Sweet Vernal-grass (*Anthoxanthum odoratum*) and Hard Fern (*Blechnum spicant*). The bryophyte layer includes Little Shaggy-moss (*Rhytidiadelphus loreus*), Slender Mouse-tail Moss (*Isothecium myosuroides*), Common Tamarisk-Moss (*Thuidium tamariscinum*) and Heath Plait-moss (*Hypnum jutlandicum*). On rocks can be St Patrick's-cabbage (*Saxifraga spathularis*), Wilson's Filmy-fern (*Hymenophyllum wilsonii*) and various

types of Fringe-moss (*Racomitrium* spp.). Natural regeneration of tree species is absent due to severe deer grazing.

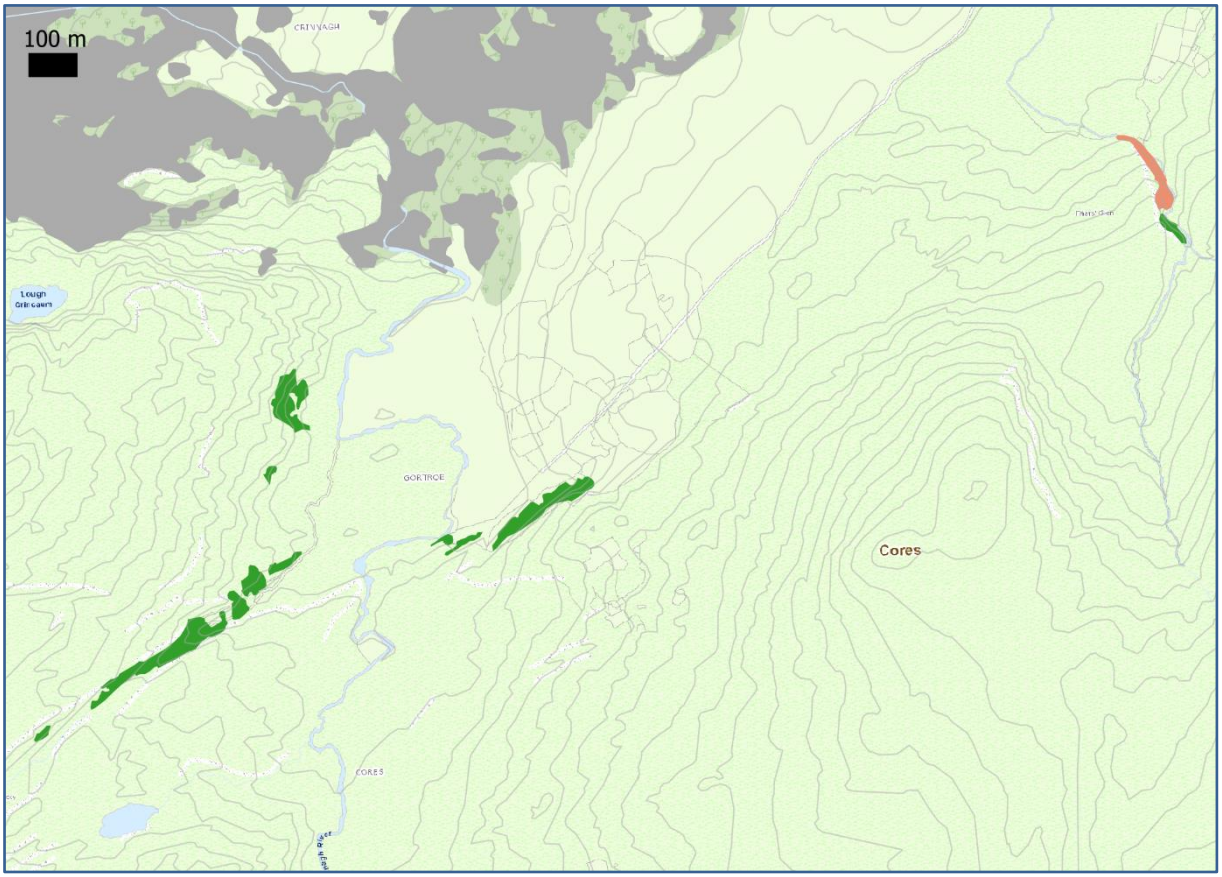

Figure 10 Site map for Ash Valley. ■ = WN1, ■ = WD2, ■ = other sites.

At the western end of Esknamucky Glen, Ash (*Fraxinus excelsior*) is frequent and Hazel (*Corylus avellana*) can be found in the understorey. Toothwort (*Lathraea squamaria*) grows beneath a Hazel on the edge of the footpath here. In the main stand on the eastern side of Cromaglan, there is some mineral flushing of the rock faces which support some calcicole species like Crisped Neckera (*Neckera crispa*), Maidenhair Spleenwort (*Asplenium trichomanes*) and Comb-moss (*Ctenidium molluscum*). In both of these stands, there has been a loss of woodland cover as older trees have fallen but have not been replaced. Isolated mature Oaks that occur between the first two groups provide evidence that these stands were linked by woodland in the past.

The stand at Ferta is very small and due to the steep nature of the ravine barely forms a proper canopy. Native trees here include Rowan (*Sorbus aucuparia*) and Grey Willow (*Salix cinerea*) but due to the presence of several European Larch (*Larix decidua*), it can be regarded as a mixed conifer/broadleaved woodland (WD2). There are some dense clumps of Rhododendron (*Rhododendron ponticum*) here on the side of the ravine which would be difficult to access. This species is present throughout the rest of the site but at much lower levels.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Convert the areas of modified woodland to native broadleaved woodland by removing European Larch.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

5. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers. Most of the stands are currently too small to support the environmental conditions of a woodland interior.

Old-growth forest status:

The WN areas of this site are highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=9) had a DBH range of 37-92 cm with a median of 76 cm, Ash had DBH measurements of 96 and 67 cm and Downy Birch had a single DBH measurement of 56 cm. Half of these trees were from the edge of the woodland—this is not surprising given the narrowness of the stands. Three trees were classified as 'old/gnarly', with one being 'multi-stemmed' and the rest 'straight'. There is also an abundance and high diversity of deadwood within the site including large-scale instances. A subjective sample (*n*=4) of these instances, all Sessile Oak, had a diameter range of 35-72 cm with a median of 52 cm. Of these instances, one was 'fallen dead' and three were 'old/senescent'. Two of these trees appeared to have died due to old age while two were toppled by storms. There are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=12) supported 14 different TReMs, the most frequent being breakage (10 trees), branch holes (8), cracks/scars (8), epiphytic bryophytes and lichens (8) and bark loss (7). In terms of structural complexity, the site occasionally has a multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures, there are occasional root plates and frequent hollows in the rocky terrain. Lastly, the abundance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN areas within Ash Valley fulfil the requirements for old-growth forest status.

3.3.2 Brickeen Island (Site 1.02)

This site of 8.1 ha is located at the western end of the Muckross Peninsula and is bounded by Lough Leane on its northern edge and Muckross Lake on its southern and eastern edges (Figure 11). The Muckross Lake loop walk runs through the woodland.

The character of most of the broadleaved woodland is acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) and Downy Birch (*Betula pubescens*) with Holly (*Ilex aquifolium*) and Rowan (*Sorbus aucuparia*) occurring in the understorey. Strawberry Tree (*Arbutus unedo*) and Yew (*Taxus baccata*) are also present throughout the woodland, but only on an occasional basis. Some smaller Birch-dominated areas occur and exclosures were erected in the centre of the site some 10-15 years ago to encourage natural regeneration; these now contain dense Holly and Birch poles.

The field layer varies slightly but is generally comprised of carpets of Great Wood-rush (*Luzula sylvatica),* along other typical component such as Hard Fern *(Blechnum spicant),* Honeysuckle (*Lonicera periclymenum*) and Bramble (*Rubus fruticosus* agg.). Bilberry (*Vaccinium myrtillus*) is present but has a very scant cover for the most part. The bryophyte flora is diverse and frequently encountered species include Large White-moss (*Leucobryum glaucum),* Common Tamarisk-moss (*Thuidium tamariscinum*), Common Feather-moss (*Kindbergia praelonga*), Shining Hookeria (*Hookeria lucens*) and Swan's-neck Thyme-moss (*Mnium hornum*). To the north of the main block of woodland is the small wooded island of Brickeen Beag. This area contains a similar suite of species to the main block. Sessile Oak is the main canopy species, along with Downy Birch and Strawberry Tree. A handful of Scots Pine (*Pinus sylvestris*) also

occur but they are not plentiful. The field layer is dominated by Heather (Calluna vulgaris) but Rhododendron (*Rhododendron ponticum*) is frequent throughout.

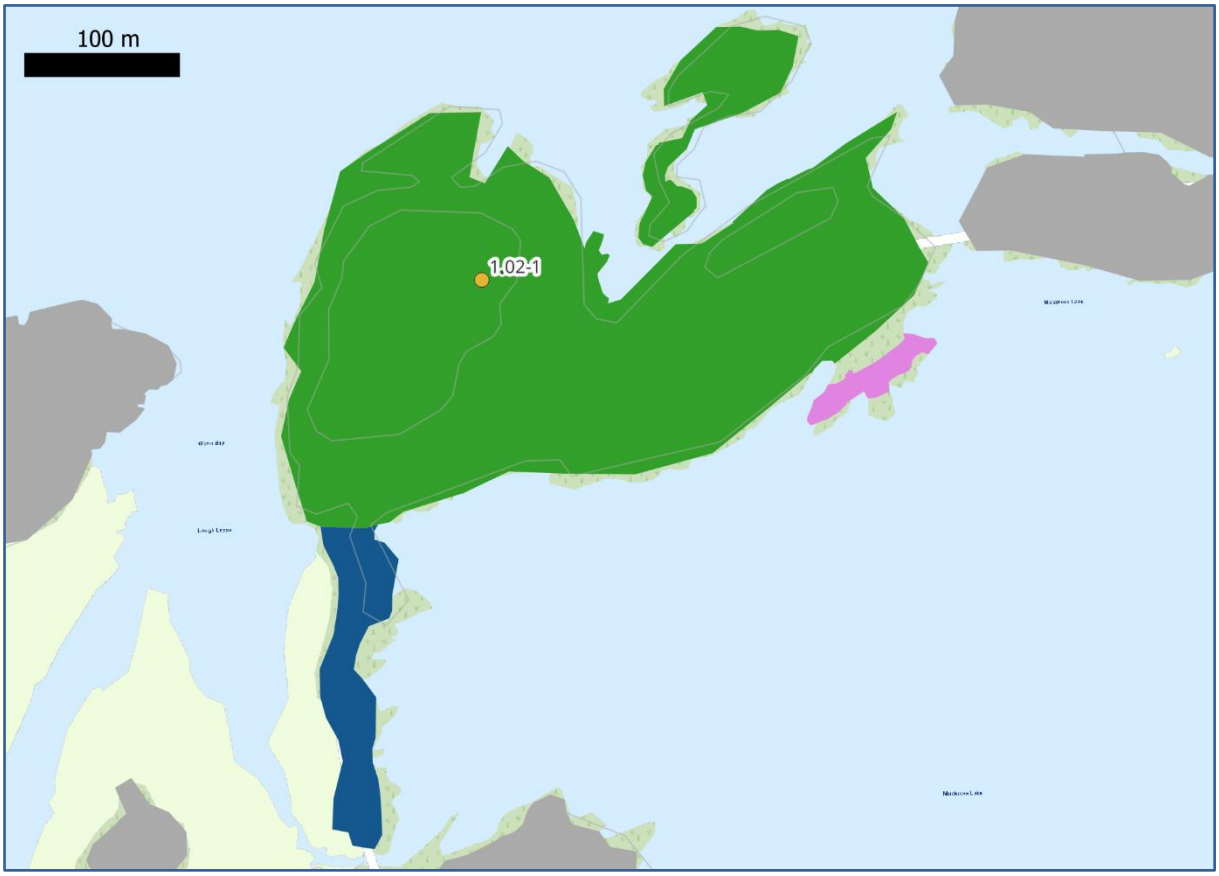

Figure 11 Site map for Brickeen Island. ■ = WN1, ■ = WN6, ■ = WS3, ■ = other sites, ● = relevé.

At the south end of the woodland, there is a narrow expanse of wet woodland (WN6/91E0). The woodland is dominated by Grey Willow (*Salix cinerea*) with Downy Birch occurring occasionally along with Blackthorn (*Prunus spinosa*) and Guelder-rose (*Viburnum opulus*). The field layer is grassy in nature and contains species such as Reed Canary-grass (*Phalaris arundinacea*), Common Reed (*Phragmites australis*), Purple Moor-grass (*Molinia caerulea*) and Creeping Bent (*Agrostis stolonifera*) along with Meadowsweet (*Filipendula ulmaria*) and Marsh Bedstraw (*Galium palustre*). A promontory in the east of the site is dominated by Rhododendron scrub (WS3).

Clearance of Rhododendron has taken place within the last 10 years, however, there is significant regrowth, especially in the western half of the site.

<u>Conservation measures:</u>

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

Old-growth forest status:

The WN areas of this site are highly native with large old trees present and a medium standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=12) had a DBH range of 52-83 cm with a median of 63 cm, Strawberry Tree (*n*=4) had a DBH range of 38-87 cm with a median of 51 cm and single DBH measurements were taken for Alder (*Alnus glutinosa*) (29 cm), Ash (*Fraxinus excelsior*) (68 cm), Downy Birch (45 cm) and Yew (83 cm). Just under half of these trees were from the edge of the woodland, near paths or close to the lakeshore. Nine of the trees were classified as 'straight' with a further eight being classified as 'old/gnarly'. The rest were 'multi-stemmed' except for the Alder, which was sampled was classified as 'coppice'. There is a low diversity of deadwood within the site, and deadwood is occasional rather than abundant. Subjective samples of large-scale deadwood instances by different species were as follows: Sessile Oak (*n*=9) had a diameter range of 49-81 cm with a median of 62 cm, Strawberry Tree had diameter measurements of 41, 45 and 52 cm, Holly had diameter measurements of 37, 38 and 49 cm, and Oak (*Quercus* sp.) had a single diameter measurement of 61 cm. An unidentified instance had a diameter measurement of 26 cm. Excluding the conservation actions of Rhododendron clearance, there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=20) supported 15 different TReMs, the most frequent being epiphytic bryophytes and lichens (19 trees), epiphytic climbers (19), breakage (16 trees), microsoils (15) and other cavities (11). In terms of structural complexity, the site occasionally has a multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures, there are occasional root plates and frequent hollows in the rocky terrain. Lastly, the abundance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN areas within Brickeen Island fulfil the requirements for old-growth forest status.

3.3.3 Cahernabane (Site 1.03)

Description:

This site of 69.0 ha occupies much of the north and eastern slopes of Looscaunagh Hill in the south-west of the Killarney National Park, Co. Kerry (Figure 12). There are two large blocks of broadleaved woodland with multiple smaller stands to the north and east. Some of these fragmentary stands occur along the shore of the Upper Lake. In the west of the site is a large conifer plantation that is bordered to the west by a Coillte property. The N71 runs along the southern border of the site and the trail known as the Mass Path passes through the area in the north.

The character of most of the broadleaved woodland is acidophilous oak woodland (WN1/91A0). The canopy is dominated by a mixture of Sessile Oak (*Quercus petraea*) and Downy Birch (*Betula pubescens*), with an understorey of old Holly (*Ilex aquifolium*). Rowan (*Sorbus aucuparia*) and Strawberry Tree (*Arbutus unedo*) are present but rather rare. The canopy is rather gappy in many places. Partly this is because there are numerous acidic flushes dominated by Purple Moor-grass (*Molinia caerulea*) within the woodland and partly this is because fallen trees are not being replaced as a severe level of deer grazing has led to a long-term absence of natural regeneration. The field layer includes Bracken (*Pteridium aquilinum*), Wood-sorrel (*Oxalis acetosella*), Hard Fern (*Blechnum spicant*), Bilberry (*Vaccinium myrtillus*), Honeysuckle (*Lonicera periclymenum*), Great Wood-rush (*Luzula sylvatica*) and Irish Spurge (*Euphorbia hyberna*). The bryophyte flora is diverse and contains oceanic species such as Western Earwort (*Scapania gracilis*), Prickly Featherwort (*Plagiochila spinulosa*), Greater Whipwort (*Bazzania trilobata*) and Juniper Prongwort (*Herbertus hutchinsiae*).

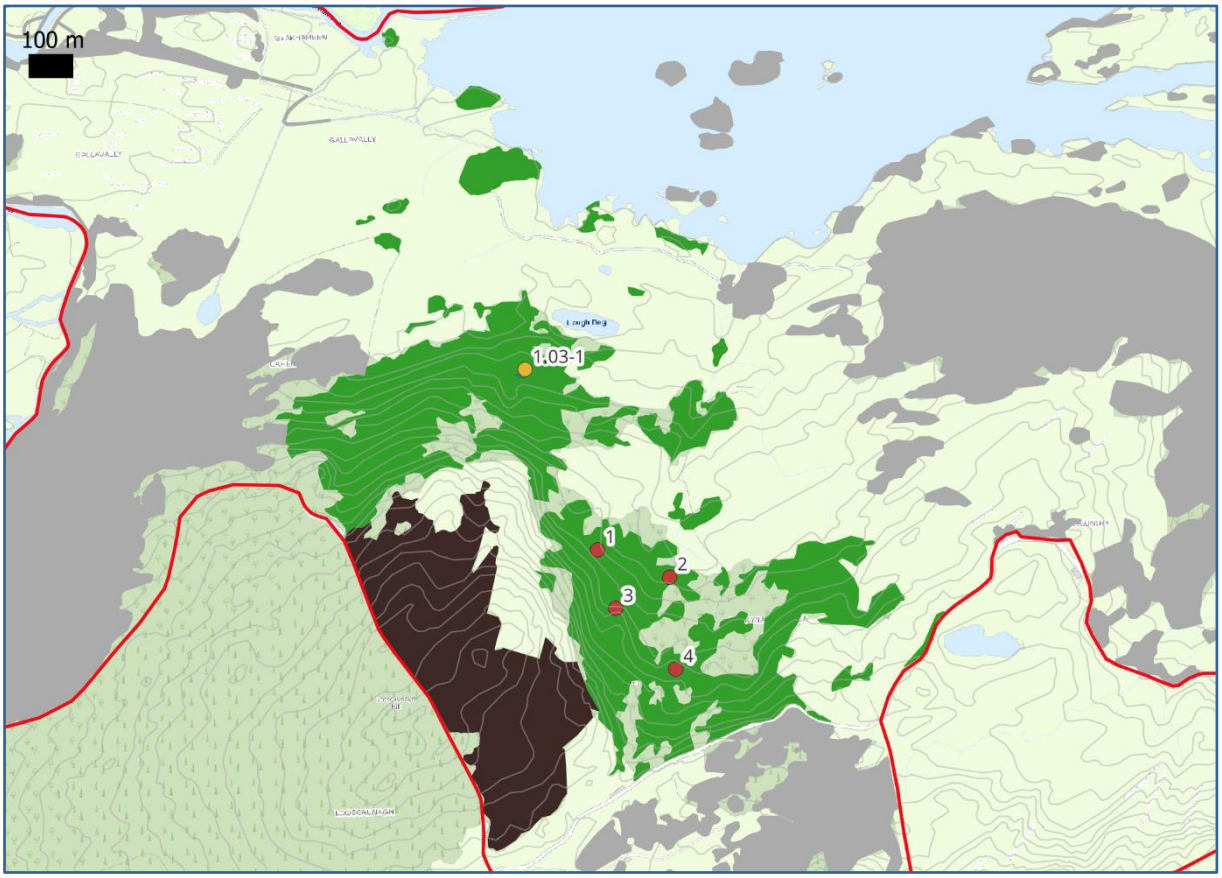

Figure 12 Site map for Cahernabane. ■ = WN1, ■ = WD4, ■ = other sites, ● = stops, ● = relevé, / = property boundary.

Mineral flushing of rocks and slopes is fairly frequent, particularly in the area immediately below the road. In such locations, species that typically favour more basic conditions can be found such as Primrose (*Primula vulgaris*), Wood Anemone (*Anemone nemorosa*), Ramsons (*Allium ursinum*), Maidenhair Spleenwort (*Asplenium trichomanes*), Comb-moss (*Ctenidium molluscum*) and Crisped Neckera (*Neckera crispa*). There are also some small patches of boggy woodland (WN7) that are dominated by Downy Birch and Grey Willow (*Salix cinerea*) and where Bog-moss (*Sphagnum* spp.) is plentiful. Some of these occur on the terraced slope on the northern side of the hill.

The conifer plantation (WD4) largely consists of Spruce (*Picea* sp.) with Rhododendron (*Rhododendron ponticum*) abundant in the understorey. Rhododendron is also present in the main broadleaved blocks but not frequent there. However, it is more prevalent in some of the northern fragments despite evidence of previous efforts to clear it. Strewn across the steep slope below the N71 is a considerable amount of refuse that has been dumped from the roadside.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

4. Convert the areas of conifer plantation to native broadleaved woodland. This should entail the felling of the conifers and allowing the area to naturally regenerate. The area should be temporarily fenced to protect natural regeneration from deer and trespassing sheep. Follow-up actions will be required to remove regenerating conifers.

5. Remove dumped refuse and dissuade reoccurrence.

Old-growth forest status:

The WN areas of this site are highly native with large old trees abundant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=21) had a DBH range of 49-106 cm with a median of 67 cm, Holly (*n*=10) had a DBH range of 33-60 cm with a median of 46 cm, Downy Birch (*n*=5) had a DBH range of 36-53 cm with a median of 48 cm and Strawberry Tree had DBH measurements of 37, 46 and 63 cm. The majority of these trees were recorded from the interior of the woodland and were classified as 'old/gnarly', with a few being 'straight' and a couple 'multi-stemmed'. There is also an abundance and high diversity of deadwood within the site including large-scale instances. Subjective samples by different species were as follows: Sessile Oak (*n*=26) had a diameter range of 30-88 cm with a median of 43 cm, Downy Birch (*n*=9) had a diameter range of 34-47 cm with a median of 38 cm, Holly had diameter measurements of 38 and 42 cm and Strawberry Tree had diameter measurements of 34 and 34 cm. Of these instances, 20 were fallen dead, 11 were old/senescent—included here are trees that have fallen but are still alive—and 8 were standing dead. Most dead trees appeared to have died due to old age, although at least two may have toppled due to shallow root plates. Excluding the conservation actions of Rhododendron clearance and fencing, there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=39) supported 15 different TReMs, the most frequent being breakage (35 trees), bark loss (30), branch holes (26), cracks/scars (21) and epiphytic bryophytes and lichens (25). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are occasional root plates and abundant hollows in the rocky terrain. Lastly, the abundance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN areas within Cahernabane fulfil the requirements for old-growth forest status.

3.3.4 Cahernaduv (Site 1.04)

Description:

This site of 62.8 ha lies mainly on the rocky western and northern slopes of Looscaunagh Hill in the Killarney National Park, Co. Kerry (Figure 13). Its western boundary is marked by the Owenreagh River and a narrow band of woodland follows the riverbank north towards Lord Brandon's Cottage.

The character of most of the site is broadly that of acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) and there is an understorey of Holly (*Ilex aquifolium*). Downy Birch (*Betula pubescens*) and Rowan (*Sorbus aucuparia*) are also present. The field layer is sparse due to severe grazing by deer but contains Bracken (*Pteridium aquilinum*), Bilberry (*Vaccinium myrtillus*), Hard Fern (*Blechnum spicant*), Wood-sorrel (*Oxalis acetosella*), Great Wood-rush (*Luzula sylvatica*), Honeysuckle (*Lonicera periclymenum*), Hay-scented Buckler-fern (*Dryopteris aemula*), Brown Bent (*Agrostis vinealis*) and Common Bent (*Agrostis capillaris*). On mossy rocks can be found St Patrick's-cabbage (*Saxifraga spathularis*), Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*) and Wilson's Filmy-fern (*Hymenophyllum wilsonii)*. The diverse bryophyte flora includes typical species such as Little Shaggy-moss (*Rhytidiadelphus loreus*), Heath Plait-moss (*Hypnum jutlandicum*), Common Tamarisk-Moss (*Thuidium tamariscinum*) and Short-beaked Wood-moss

(*Loeskeobryum brevirostre*) and oceanic species including Prickly Featherwort (*Plagiochila spinulosa*), Greater Whipwort (*Bazzania trilobata*), Juniper Prongwort (*Herbertus hutchinsiae*) and Rock Fingerwort (*Lepidozia cupressina*). A substantial part of the centre of the site is a mixed conifer/broadleaved stand (WD2) where Scots Pine (*Pinus sylvestris*) has been planted abundantly through the oakwood in the distant past. These Pines are now some 30 m tall and overtop any Oaks in the vicinity. Bracken is often abundant in the field layer in this section

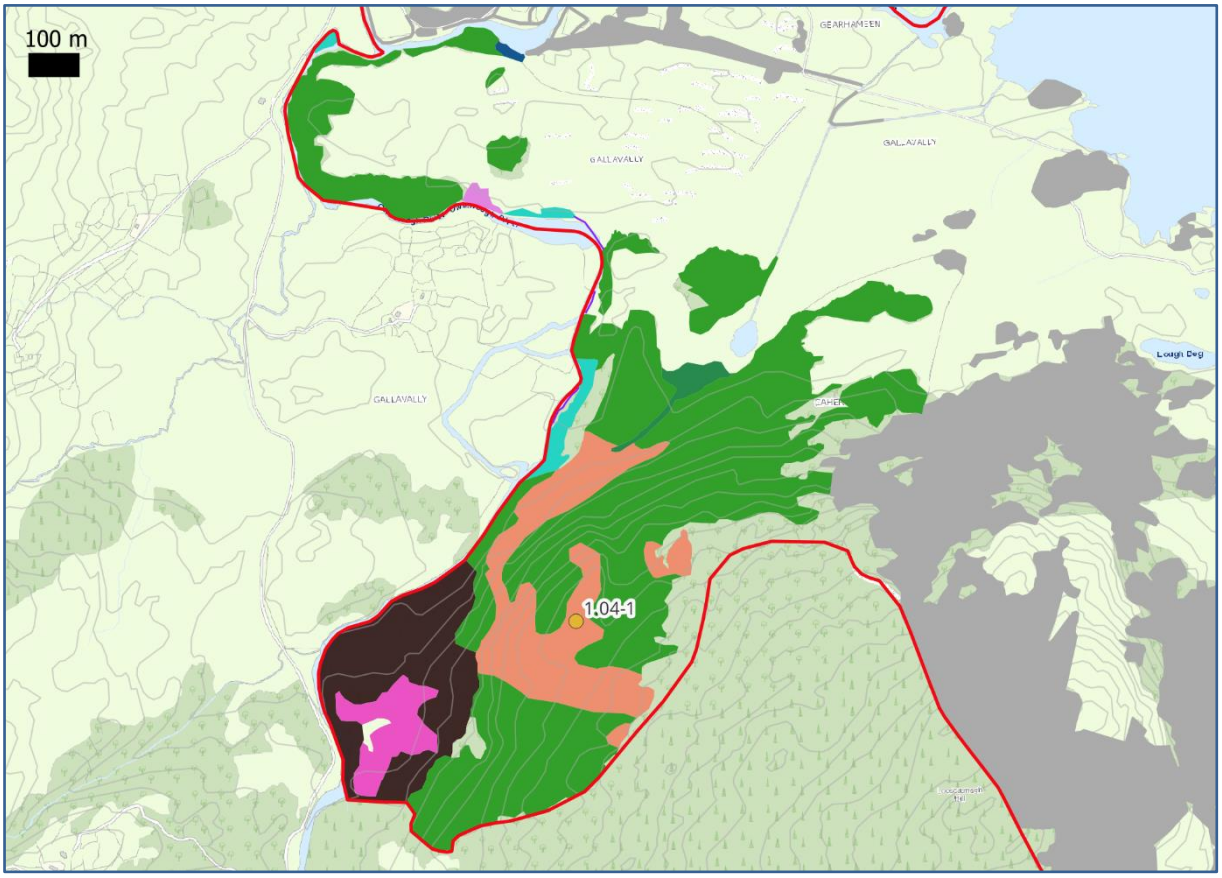

Figure 13 Site map for Cahernaduv. ■ = WN1, ■ = WN4, ■ = WD2, ■ = WD4, ■ = WS1, ■ = WS3, ■ = other sites, ● = relevé, / = WL2, / = property boundary.

In the north of the site is a narrow strip of boggy woodland (WN7) with Downy Birch, Grey Willow (*Salix cinerea*), Soft Rush (*Juncus effusus*) and Bog-moss (*Sphagnum* spp.) which spreads out as it approaches the edge of the wood. Along the river are some small periodically flooded stands (WN4). Some of these have a canopy with Ash (*Fraxinus excelsior*) and Alder (*Alnus glutinosa*) and a ground flora containing Pignut (*Conopodium majus*), Lesser Celandine (*Ficaria verna*) and Ramsons (*Allium ursinum*). The most southerly area, however, is a marginal example with a very sparse canopy over Soft Rush. In the far north of the site is a small wet woodland stand (WN6) with Grey Willow.

In the west of the site adjacent to the river is a substantial conifer plantation (WD4) dominated by Spruce (*Picea* sp.). Rhododendron (*Rhododendron ponticum*) is abundant here and a central clearing in the plantation is dominated by Rhododendron scrub (WS3). In the south of the site are a small number of mature Beech (*Fagus sylvatica*). A hose pipe crosses the river in the west and traverses the site for several hundred metres, presumably to a water source in the east.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Convert the areas of mixed broadleaved/conifer woodland to native broadleaved woodland by reducing the cover of Scots Pine.

4. Convert the areas of conifer plantation to native broadleaved woodland. This should entail the felling of the conifers and allowing the area to naturally regenerate. The area should be temporarily fenced to protect natural regeneration from deer and trespassing sheep. Follow-up actions will be required to remove regenerating conifers.

5. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

6. Improve the native status of the oak woodland by removing the Beech in the south of the site.

Old-growth forest status:

The WN areas of this site are highly native with large old trees abundant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=12) had a DBH range of 49-123 cm with a median of 66 cm, Holly had DBH measurements of 31, 34 and 44 cm, Downy Birch had DBH measurements of 47, 49 and 69 cm, Scots Pine had DBH measurements of 82 and 88 cm, and Beech has a single DBH measurement of 118 cm. The majority of these trees were recorded from the interior of the woodland. Five of these trees were classified as 'old/gnarly', eleven were classified as 'straight', five as 'multi-stemmed' (all of them Sessile Oaks) and one as a 'pollard'. There is also an abundance and high diversity of deadwood within the site including large-scale instances. Subjective samples by different species were as follows: Sessile Oak (*n*=18) had a diameter range of 36-77 cm with a median of 46 cm, Downy Birch (*n*=8) had a diameter range of 33-62 cm with a median of 42 cm and Scots Pine had a single diameter measurement of 46 cm. Of these instances, 14 were fallen dead, 8 were old/senescent—included here are trees that have fallen but are still alive—and 5 were standing dead. Most dead trees appeared to have died due to old age. Excluding the conservation actions of Rhododendron clearance there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=21) supported 14 different TReMs, the most frequent being breakage (17 trees), branch holes (13), root buttresses (12) and epiphytic bryophytes and lichens (12). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are occasional root plates and abundant hollows in the rocky terrain. Lastly, the abundance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN areas within Cahernaduv fulfil the requirements for old-growth forest status. The majority of the above measurements are from the large WN1 area. The native areas are largely contiguous and with a shared history of management it therefore seems reasonable for the status to apply across the site.

3.3.5 Cahnicaun Wood (Site 1.05)

Description:

This site of 19.6 ha consists primarily of a long, linear block of woodland on the lower slopes of Shehy Mountain, north of The Long Range river in Killarney National Park, Co. Kerry (Figure 14). Along with the main block of woodland, there are several other smaller fragments slightly upslope to the north.

The character of the woodland is that of acidophilous oak woodland (WN1/91A0). The woodland canopy is dominated by Sessile Oak (*Quercus petraea*) with some Downy Birch

(*Betula pubescens*) and Rowan (*Sorbus aucuparia*). The understorey comprises Holly (*Ilex aquifolium*), Strawberry Tree (*Arbutus unedo*) and the occasional Hazel (*Corylus avellana*).

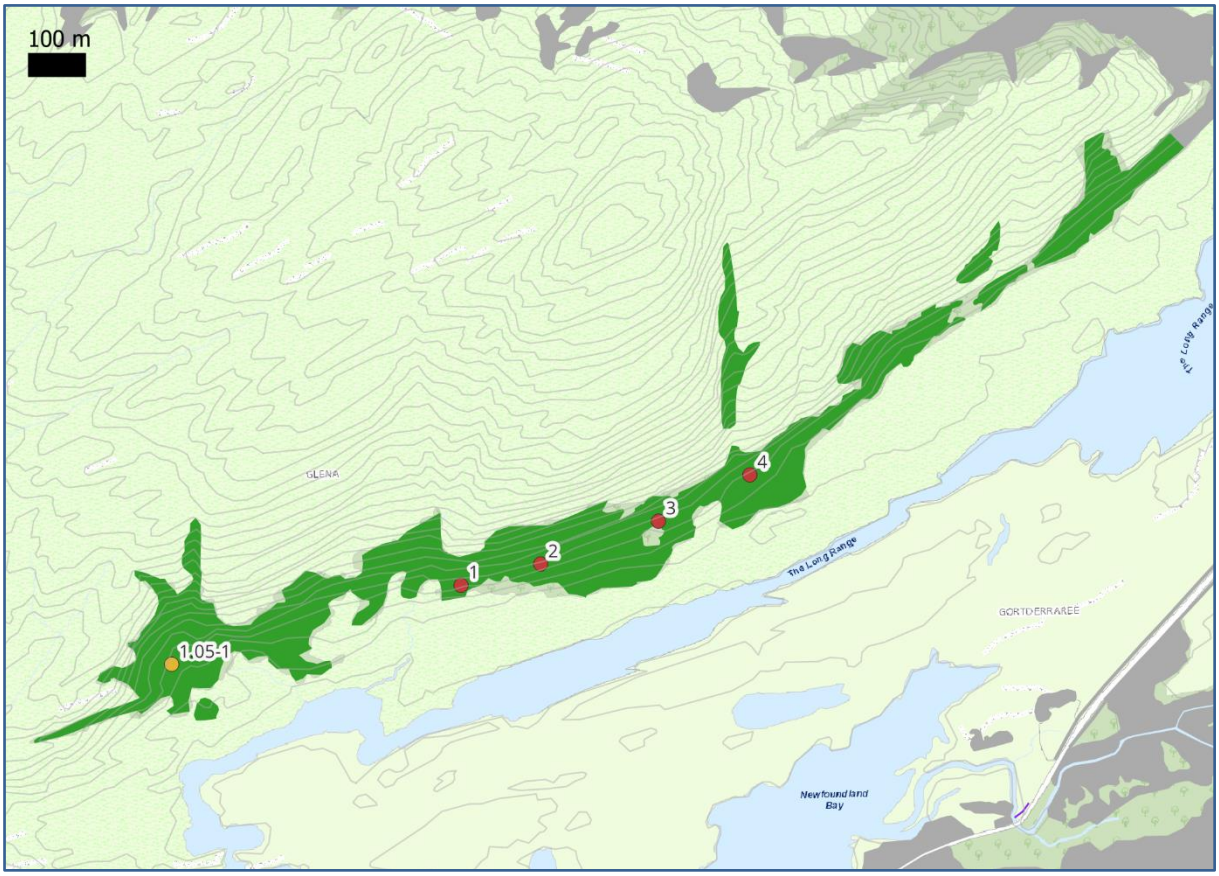

Figure 14 Site map for Cahnicaun Wood. ■ = WN1, ■ = other sites, ● = stops, ● = relevé.

The interior of the woodland is rocky in nature with a high bryophyte cover but severe grazing levels have resulted in a sparse field layer and an absence of natural regeneration. Typical components of the field layer include Great Wood-rush (*Luzula sylvatica*), Irish Ivy (*Hedera hibernica*), Hard Fern (*Blechnum spicant*), Bramble (*Rubus fruticosus* agg.), Purple Moor-grass (*Molinia caerulea*) and the dwarf shrubs Bilberry (*Vaccinium myrtillus*) and Heather (*Calluna vulgaris*).

Damp rock faces provide niche habitat for St Patrick's-cabbage (*Saxifraga spathularis*), abundant swathes of Filmy-ferns (*Hymenophyllum* spp.) and one or two instances of Lemon-scented Fern (*Oreopteris limbosperma*). The gametophyte of Killarney Fern (*Trichomanes speciosum*) also occurs in several places where there are suitable habitat conditions. A number of flushy areas and streams run through the woodland providing niches for species such as Remote Sedge (*Carex remota*), Star Sedge (*Carex echinata*), Soft Rush (*Juncus effusus*) and Bulbous Rush (*Juncus bulbosus*), along with herbs such as Lesser Skullcap (*Scutellaria minor*), Lesser Spearwort (*Ranunculus flammula*), Marsh Bedstraw (*Galium palustre*) and bryophytes such as Common Haircap (*Polytrichum commune*) and Bog-mosses (*Sphagnum* spp.)

There is a fairly diverse bryophyte flora including typical species such as Little Shaggy-moss (*Rhytidiadelphus loreus*), Slender Mouse-tail Moss (*Isothecium myosuroides*), White Earwort (*Diplophyllum albicans*), Elegant Silk-moss (*Pseudotaxiphyllum elegans*), Common Tamarisk-Moss (*Thuidium tamariscinum*) and Short-beaked Wood-moss (*Loeskeobryum brevirostre*) along with oceanic species such as Western Earwort (*Scapania gracilis*), Greater Whipwort (*Bazzania trilobata*), Straggling Pouchwort (*Saccogyna viticulosa*) and Rock Fingerwort (*Lepidozia cupressina*).

Rhododendron (*Rhododendron ponticum*) treatment has taken place at this site and large areas of the woodland are clear. However, regeneration of this alien is occurring, most notably along the western edge of the woodland with a few scattered plants occurring elsewhere within the site. Another alien species, Cotoneaster (*Cotoneaster* sp.), was also recorded a handful of times within the woodland.

Especially along the margins of the wood, trees and shrubs exhibit recent wildfire damage and deadwood habitat has also been lost. This damage is more pronounced in Cahnicaun Wood than in some other sites due to the linear and relatively narrow shape of the woodland. In a small number of areas along the southern boundary, the wildfire damage has infiltrated slightly deeper into the woodland resulting in pockets of standing dead trees that appeared to have been alive and growing before the damage occurred.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Remove Cotoneaster from the site.

4. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers.

5. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

Old-growth forest status:

This site is highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=11) had a DBH range of 46-124 cm with a median of 93 cm, Strawberry Tree (*n* =4) had a DBH range of 49-67 cm with a median of 62 cm, Holly had DBH measurements of 41 cm and 70 cm, Yew (*Taxus baccata*) had DBH measurements of 38 and 66 cm, and Downy Birch had a single DBH measurement of 59 cm. Despite the woodland being relatively narrow, only seven of the seventeen trees sampled were from the edge of the woods. Fifteen of the trees were classified as ‘straight’, the majority of which were Sessile Oak and there was one instance where a Sessile Oak was classified as ‘multi-stemmed’. There is a medium diversity of deadwood within the site including large-scale instances, and deadwood is abundant. Subjective samples of the large-scale instances by different species were as follows: Sessile Oak (*n*=13) had a diameter range of 50-107 cm with a median of 79 cm, Yew had diameter measurements of 34 and 64 cm, and Holly and Strawberry Tree had single diameter measurements of 39 cm and 47 cm, respectively. Excluding the conservation actions of Rhododendron clearance, there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=20) supported 17 different TReMs, the most frequent being epiphytic bryophytes and lichens (19 trees), breakage (17), deformities (12), microsoils (12) and root buttresses (11). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are occasional root plates and frequent hollows in the rocky terrain. Lastly, the abundance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Cahnicaun Wood fulfils the requirements for old-growth forest status.

3.3.6 Camillan Wood (Site 1.06)

Camillan Wood is a site of 54.5 ha situated on the Muckross Peninsula in the Killarney National Park, Country Kerry, sandwiched between Muckross Lake to the south and Lough Leane to the north (Figure 15). It is bordered to the east by Doo Lough. The Muckross Lake loop walk runs through the woodland.

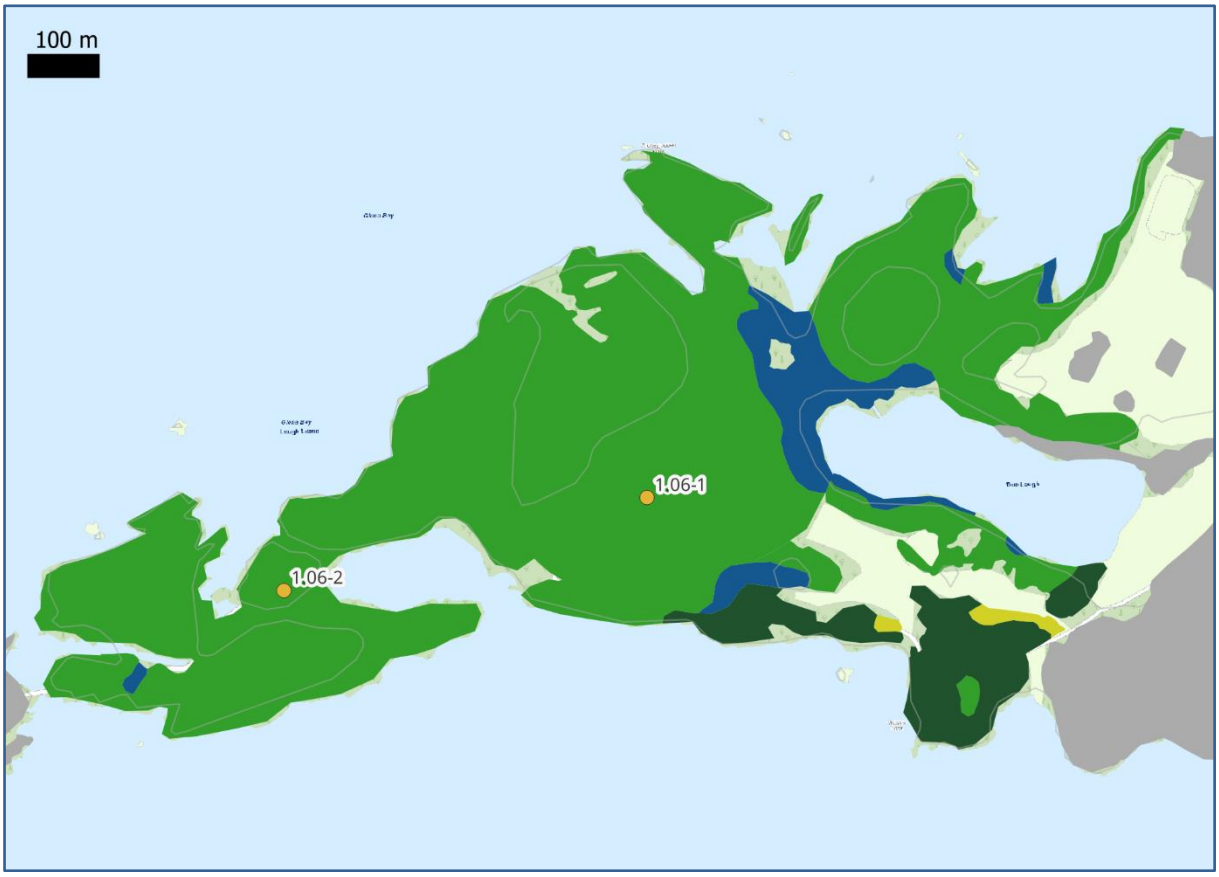

Figure 15 Site map for Camillan Wood. ■ = WN1, ■ = WN6, ■ = WN3, ■ = WN2, ■ = other sites, ● = relevés.

The majority of the area consists of acidophilous oak woodland (WN1/91A0). It is dominated by a dense canopy of Sessile Oak (*Quercus petraea*) with Holly (*Ilex aquifolium*) the main species in the understorey. Also present in the canopy are frequent Strawberry Tree (*Arbutus unedo*), occasional Downy Birch (*Betula pubescens*) and Rowan (*Sorbus aucuparia*), and rare, scattered Yew *(Taxus baccata*). In the east of the site, there are a small number of mature Beech (*Fagus sylvatica*) and Sycamore (*Acer pseudoplatanus*). The field layer is tall in places with high Heather (*Calluna vulgaris*), dense Bracken (*Pteridium aquilinum*) and occasional patches of Bilberry (*Vaccinium myrtillus*). Also frequent in the field layer are Great Wood-Rush (*Luzula sylvatica*), Hard Fern (*Blechnum spicant*), Ivy (*Hedera helix*), Wood False-brome (*Brachypodium sylvaticum*) and Honeysuckle (*Lonicera periclymenum*). Wet depressions are frequent and support species such as Purple Moor-grass (*Molinia caerulea*), Soft Rush (*Juncus effusus*), Water Mint (*Mentha aquatica*), Common Bent (*Agrostis stolonifera*) and Bog-mosses (*Sphagnum* spp.). The bryophyte layer is diverse and features species such as Common Tamarisk-moss (*Thuidium tamariscinum*), Little Shaggy-moss (*Rhytidiadelphus loreus*), White Earwort (*Diplophyllum albicans*), Common Striated Feather-moss (*Eurhynchium striatum*) and Greater Whipwort (*Bazzania trilobata*).

A fringe of wet woodland (WN6/91E0) occurs along some of the lake shores. Here the canopy consists of Alder (*Alnus glutinosa*), Grey Willow (*Salix cinerea*) and Ash (*Fraxinus excelsior*) with a field layer which includes species such as Soft Rush, Compact Rush (*Juncus*

conglomeratus), Water Mint, Marsh Bedstraw (*Galium palustre*), Remote Sedge (*Carex remota*) and Hemp-agrimony (*Eupatorium cannabinum*).

Areas of outcropping limestone in the south-east support small pockets of Yew woodland (WN3/91J0). In these areas Yew dominates, with Hazel (*Corylus avellana*) frequent and Holly, Hawthorn (*Crataegus monogyna*) and Ash also present. The field layer supports species that favour more basic conditions such as Dog Violets (*Viola riviniana/reichenbachiana*), Hart's-tongue Fern (*Asplenium scolopendrium*), Sanicle (*Sanicula europaea*) and Scaly Male-fern (*Dryopteris affinis*). The bryophyte layer is dominated by Fox-tail Feather-moss (*Thamnobryum alopecurum*), Common Tamarisk-moss and Common Striated Feather-moss. Some small areas on the limestone lack Yew (WN2).

A population of Betony (*Betonica officinalis*)—a species listed on the Flora (Protection) Order, 2022—occurs along the edge of the woodland to the east. Rhododendron (*Rhododendron ponticum*) treatment has taken place in Camillan Wood but some regeneration is present. A patch of Wall Cotoneaster (*Cotoneaster horizontalis*) also occurs. Dumping of old glyphosate containers is present in the centre of the site.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Remove Cotoneaster from the site.

4. Improve the native status of the oak woodland by removing Beech and Sycamore

5. Remove dumped refuse and dissuade reoccurrence.

Old-growth forest status:

This site is highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=16) had a DBH range of 71-126 cm with a median of 101 cm, Yew had DBH measurements of 67, 92 and 97 cm, Holly had DBH measurements of 38 and 43 cm, and Strawberry Tree, Wild Cherry (*Prunus avium*) and Grey Willow had single DBH measurements of 42 cm, 91 cm and 53 cm, respectively. The majority of these trees were recorded from the woodland interior with five noted as being near a path and two from the edge of the woodland. Six trees were classified as 'old/gnarly', one being 'multi-stemmed' and the rest 'straight'. There is also an abundance and high diversity of deadwood within the site including large-scale instances. Subjective samples of these large-scale instances by different species were as follows: Sessile Oak (*n*=12) had a diameter range of 46-119 cm with a median of 77 cm, Strawberry Tree had diameter measurements of 52 and 68 cm, and Alder, Downy Birch, Ash and Holly had single diameter measurements of 43 cm, 56 cm, 37 cm and 46 cm respectively. Of these instances, eleven were 'fallen dead', four were 'old/senescent' and the remainder were 'standing dead'. Eight of these trees appeared to have fallen due to shallow soils, six died due to old age or disease and two appeared to have been impacted by storms. There is an old stone building but it has been ruined for decades. Excluding, the conservation actions of Rhododendron clearance, there are no other significant signs of former human intervention.

Between them, the sample of large trees (*n*=24) supported 17 different TReMs, the most frequent being epiphytic bryophytes and lichens (24 trees), breakage (22), epiphytic climbers (20), microsoils (17) and branch holes (16). In terms of structural complexity, the site frequently has a multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures, there are frequent root plates and rare hollows in the rocky terrain.

Lastly, the abundance of Sessile Oak and Yew are indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN areas within Camillan fulfil the requirements for old-growth forest status. The majority of the above measurements are from the large WN1 area. The native areas are largely contiguous and with a shared history of management it therefore seems reasonable for the status to apply across the site.

3.3.7 Carrigafreaghane (Site 1.7)

This site of 11.4 ha occurs just off the N71 in the lowlands of the east of the Killarney National Park, Co. Kerry and is surrounded by improved farmland (Figure 16). Most of the woodland is gently sloping westwards towards the road being almost flat in the west.

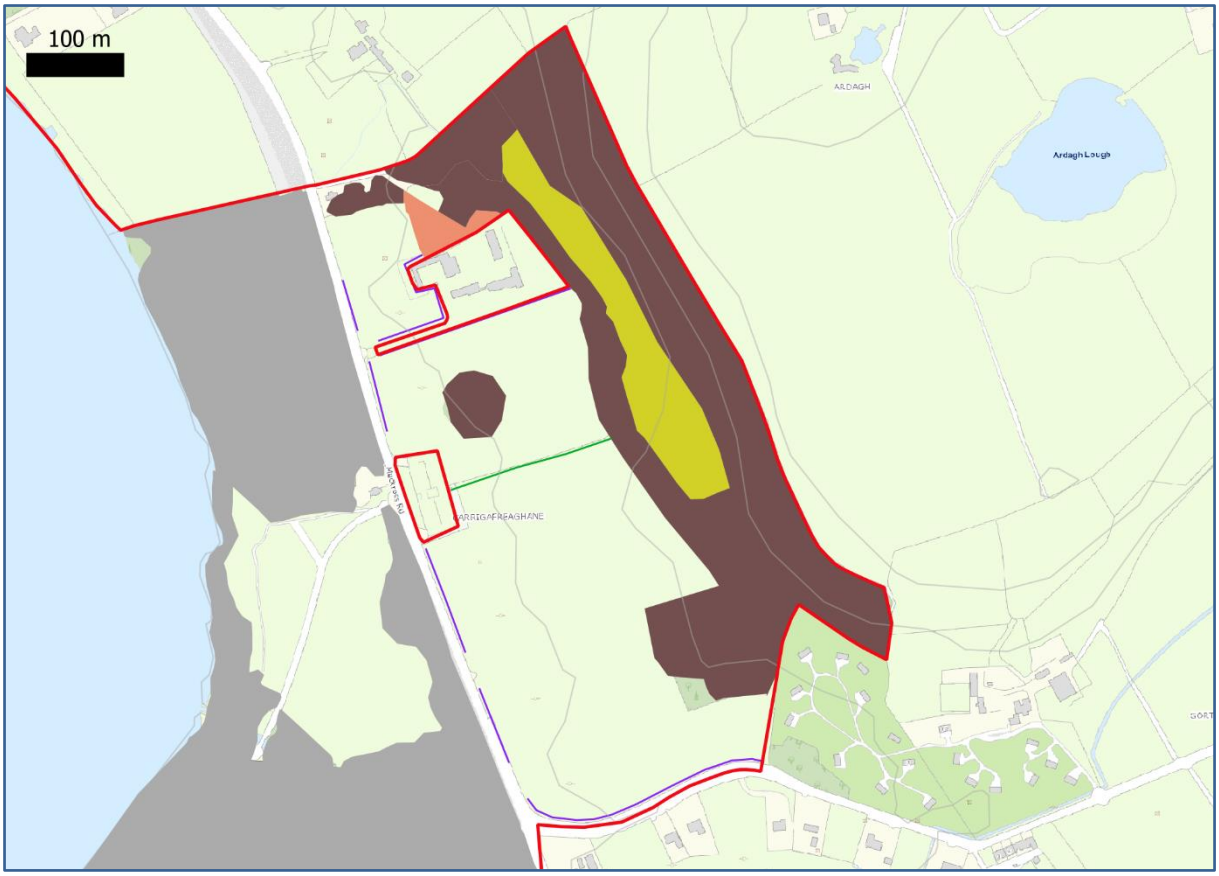

Figure 16 Site map for Carrigafreaghane. ■ = WD1, ■ = WD2, ■ = WN2, ■ = other sites, / = WL1, / = WL2, / = property boundary.

The majority of the site is composed of modified broadleaved woodland (WD1) dominated by a mixture of mature Beech (*Fagus sylvatica*), Sycamore (*Acer pseudoplatanus*) and Pedunculate Oak (*Quercus robur*). Due to the heavy shade cast by Beech, the field layer is fairly poor containing a few typical species including Great Wood-rush (Luzula sylvatica), Bramble (*Rubus fruticosus* agg.), Honeysuckle (*Lonicera periclymenum*) and Irish Ivy (*Hedera hibernica*). In the centre of the site lies a flat area of woodland that broadly corresponds to oak-ash-hazel woodland (WN2). Here the canopy is dominated by a mix of Ash (*Fraxinus excelsior*) and Alder (*Alnus glutinosa*) with Hawthorn (*Crataegus monogyna*), Elder (*Sambucus nigra*) and Holly (*Ilex aquifolium*) all occurring occasionally in the understorey. Ash dieback is frequently throughout this area and vigorous Bramble growth has developed at the expense of the field layer in some areas. However, where good herb cover occurs, it includes species such as Herb-robert (*Geranium robertianum*), Sanicle (*Sanicula europaea*) and Dog-violets (*Viola* spp.).

Bryophyte diversity is relatively low and include species such as Common Tamarisk-moss (*Thuidium tamariscinum*), Fox-tail Feather-moss (*Thamnobryum alopecurum*) and Common Striated Feather-moss (*Eurhynchium striatum*). In the north-western corner of the site is a small pocket of mixed conifer/broadleaved woodland (WD2) with the ruins of an old house and dumped domestic waste. Rhododendron (*Rhododendron ponticum*) was frequent, especially in the southern half of the site where it formed thickets.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Convert the areas of modified woodland to native broadleaved woodland. This should entail the gradual removal from the canopy of Beech and Sycamore. In their place, native species should be promoted through the planting of local provenance saplings or through natural regeneration. Extant regeneration of non-native species should also be removed.

4. Remove dumped refuse and dissuade reoccurrence.

Old-growth forest status:

The WN area of this site supports several large, old trees and has a medium standing volume. Subjective samples of these trees by different species were as follows: Ash had DBH measurements of 42, 52 and 87 cm, and Holly had a single DBH measurement of 46 cm. All these trees were recorded from the interior of the woodland. One tree was classified as ‘old/gnarly’, the remaining three as ‘straight’. Deadwood was deemed to be only rare and of low diversity. Only one large-scale instance was recorded from the native woodland area: a fallen dead tree of unknown species, with a diameter of 49 cm. There are some drains going through the site but it is not known how functional these are. Otherwise, there are no significant signs of former human intervention.

Based on these observations, the WN area within Carraigfrehane does not fulfil the mandatory requirements for old-growth forest status.

3.3.8 Cloghereen (Site 1.8)

This site of 40.7 ha—that is also known as ‘The Blue Pool’—is located on the eastern edge of the Killarney National Park, Co. Kerry, just east of the N71 and north of Muckross Forest (Figure 17). The site is a popular amenity woodland with numerous tracks and trails traversing the woodland and there are a number of streams winding through the site. The majority of the woodland is highly modified in nature with the exception of a few pockets of oak, bog and wet woodland.

The most abundant stand type within the site is conifer plantation (WD4) which is here dominated by a mix of conifers including Scots Pine (*Pinus sylvestris*), Spruce (*Picea* sp.) and Western Hemlock-spruce (*Tsuga heterophylla*). The field layer here is largely absent and the ground is typically covered in a dense layer of needles except for areas where light gets through and a scant cover of species such as Great Wood-rush (*Luzula sylvatica*), Wood-sorrel (Oxalis acetosella), Irish Ivy (*Hedera hibernica*) and Bramble (*Rubus fruticosus* agg.) occur. In the north and west of the main block are areas of modified broadleaved woodland (WD1) that contain stands of Beech (*Fagus sylvatica*) and Sycamore (*Acer pseudoplatanus)*, along with the occasional Sessile Oak (*Quercus petraea*). The field layer in these areas is characteristically scant containing a few species such as Great Wood-rush, Wood-sorrel. Bramble and Irish Ivy. A second variant of this woodland type occurs in the east of the site that

primarily contains a mix of Downy Birch and Grey Willow but which has recently been cleared of Rhododendron (*Rhododendron ponticum*) and is almost completely lacking any sort of field layer. Blocks of mixed conifer/broadleaved woodland (WD2) occur in the south-west of the site and in the east. The main trees species in these areas are Scots Pine, Sessile Oak, Beech and Holly (*Ilex aquifolium*).

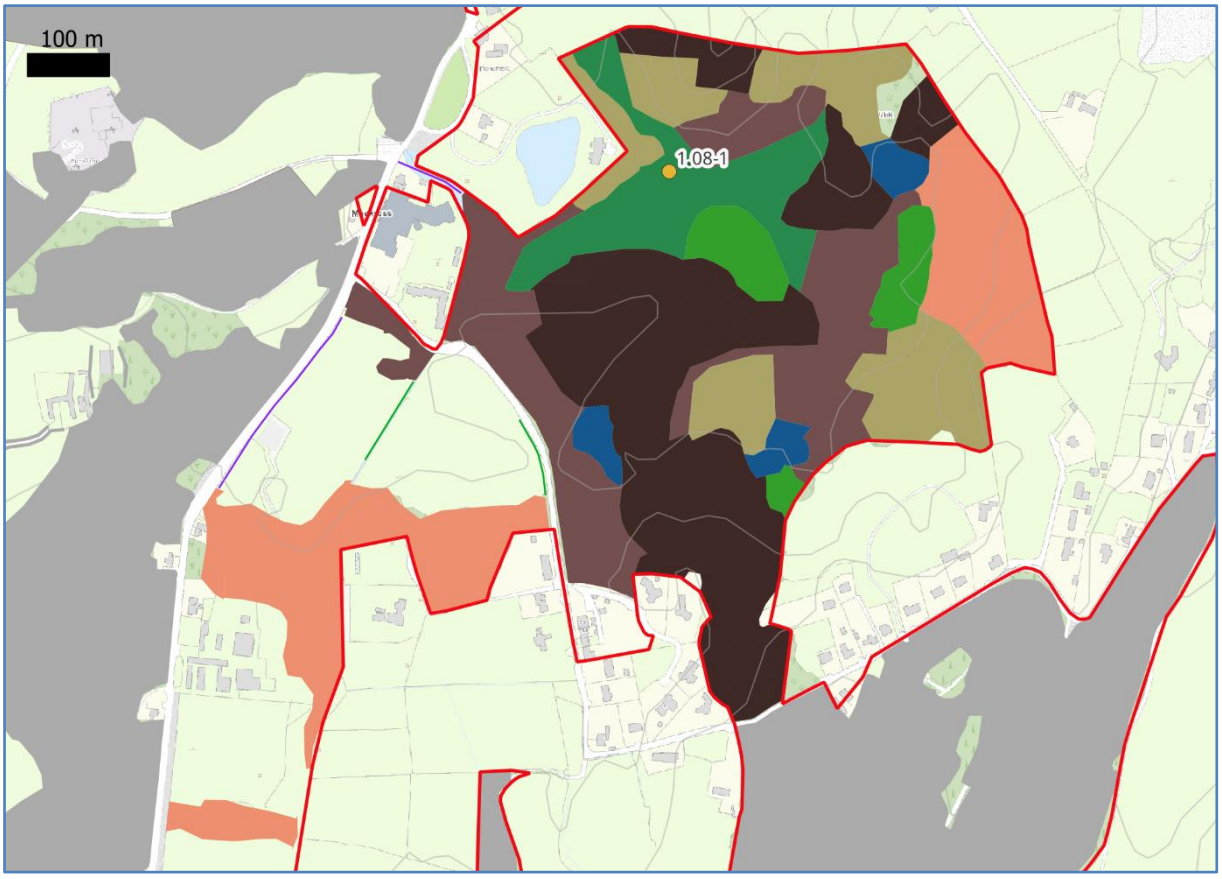

Figure 17 Site map for Cloghereen. ■ = WN1, ■ = WN6, ■ = WN7, ■ = WD1, ■ = WD2, ■ = WD4, ■ = WD3, ■ = other sites, ● = relevés, / = WL1, / = WL2, / = property boundary.

There are a few small pockets of wet woodland (WN6), some of which conform to the Annex I habitat 91E0. These areas are generally dominated by Grey Willow (*Salix cinerea*) with Downy Birch (*Betula pubescens*) present and Ash (*Fraxinus excelsior*) occasional. The field layer varies but typically contains species such as Remote Sedge (*Carex remota*), Creeping Bent (*Agrostis stolonifera*), Meadowsweet (*Filipendula ulmaria*), Creeping Buttercup (*Ranunculus repens*) and Water Mint (*Mentha aquatica*). Commonly found bryophytes in this habitat include Pointed Spear-moss (*Calliergonella cuspidata*), Heart-leaved Spear-moss (*Calliergon cordifolium*) and Fox-tail Feather-moss (*Thamnobryum alopecurum*). In the centre of the site, there are two small pockets of oak woodland (WN1/91A0) that are dominated by Sessile Oak with Holly in the understorey. A handful of Beech are also present. The field layer includes Great Wood-rush, Bilberry (*Vaccinium myrtillus*) and Hard Fern (*Blechnum spicant*), along with bryophytes such as Waved Silk-moss (*Plagiothecium undulatum*), Swan's-neck Thyme-moss (*Mnium hornum*) and Large White-moss (*Leucobryum glaucum*). In the north-west of the site is an area of bog woodland (WN7) that is dominated by Downy Birch with the occasional Grey Willow and Scots Pine, and with Holly in the understorey. There has been extensive Rhododendron (*Rhododendron ponticum*) treatment in this area and as a result the field layer is poor with only a scant cover of species such as Hard Fern (*Blechnum spicant*), Honeysuckle and the occasional tussock of Greater Tussock-sedge (*Carex paniculata*). Treelines (WL2) and hedgerows (WL1) occur along the road edges.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Convert the areas of modified woodland (WD1, WD2 and WD4) to native broadleaved woodland by removing mature and regenerating non-native species of conifers and broadleaves. In their place, native species should be promoted through the planting of local provenance saplings or through natural regeneration.

4. Remove piles of Rhododendron brash. These would be a liability in the event of a wildfire.

5. Improve the native status of the oak woodland by removing the Beech.

Old-growth forest status:

Within the WN areas of this site, large old trees are present and the areas have a medium standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=7) had a DBH range of 79-139 cm with a median of 90 cm, Grey Willow (*n*=5) had a DBH range of 37-76 cm with a median of 42 cm, Alder had DBH measurements of 30, 31 and 35 cm, Downy Birch had DBH measurements of 27, 41 and 46 cm, and Oak (*Quercus* sp.) had a single DBH measurement of 91 cm. All of these trees were recorded from the woodland interior. Six trees were classified as 'old/gnarly', two being 'multi-stemmed' and the rest 'straight'. There is occasional deadwood at the site and this is of medium diversity. Subjective samples of the large-scale instances of deadwood were as follows: Downy Birch (*n*=5) had a diameter range of 34-47 cm with a median of 37 cm, Sessile Oak had diameter measurements of 39, 62 and 67 cm, and Holly, Poplar, Grey Willow and Willow (*Salix* sp.) had single diameter measurements of 38 cm, 38 cm, 43 cm and 30 cm, respectively. Of these seven were 'fallen dead' and three were 'old/senescent' with the remainder being 'standing dead'. Seven of these trees appeared to have fallen due to shallow soils, one due to old age with the cause of the demise of the remainder being unknown. There are no significant signs of former human intervention beyond intensive work to remove heavy Rhododendron infestation.

Between them, the sample of large trees (*n*=19) supported 17 different TReMs, the most frequent being epiphytic bryophytes and lichens (19 trees), microsoils (13), epiphytic climbers (12), cankers/burrs (11), insect holes (10), breakage (10) and epiphytic ferns (10). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is low. In terms of natural soil microrelief structures, there are occasional root plates and frequent hollows. Wet woodland areas such as these would not be expected to support species typical of late-seral development phases as defined in section 1.3.2.

Based on these observations, the WN areas within Cloghereen fulfil the requirements for old-growth forest status. However, this is a marginal call and the precautionary principle has been applied.

3.3.9 Cuckoo Wood (Site 1.9)

This small site of 1.1 ha is located on the lower eastern slopes of Shehy Mountain in the Killarney National Park, Co. Kerry (Figure 18). It lies just above Dinis Bog and is surrounded on all sides by bog and heath.

The character of the woodland is that of rocky acidophilous oak woodland (WN1/91A0). The canopy is formed predominantly of Sessile Oak (*Quercus petraea*) with Holly (*Ilex aquifolium*) forming the understorey. Rowan (*Sorbus aucuparia*) and Ash (*Fraxinus excelsior*) are

occasional. The bryophyte layer includes Bank Haircap (*Polytrichum formosum*), Common Tamarisk-moss (*Thuidium tamariscinum*), Little Shaggy-moss (*Rhytidiadelphus loreus*), White Earwort (*Diplophyllum albicans*), Slender Mouse-tail moss (*Isothecium myosuroides*) and Straggling Pouchwort (*Saccogyna viticulosa*). The gametophyte of Killarney Fern (*Trichomanes speciosum*) occurs here. Natural regeneration of tree species is absent due to severe deer grazing.

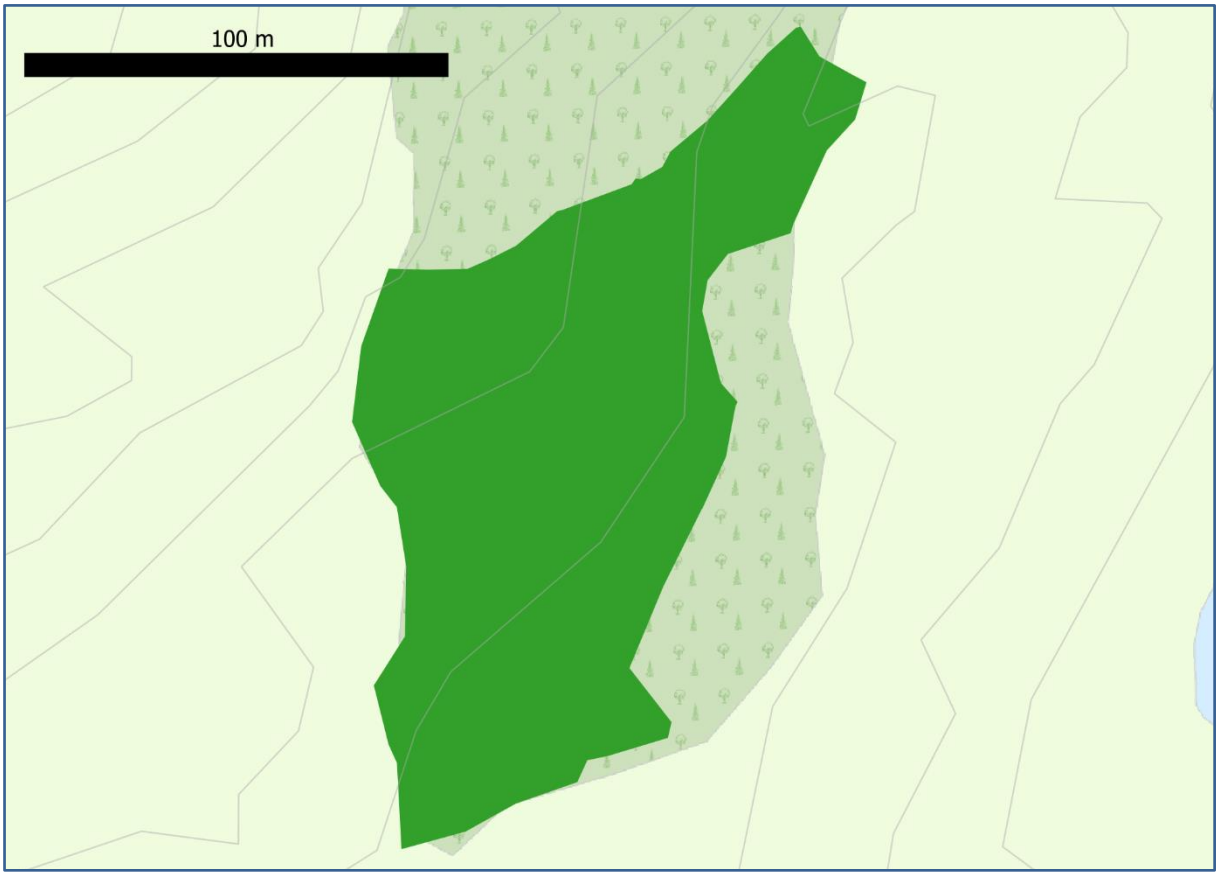

Figure 18 Site map for Cuckoo Wood. ■ = WN1.

There has been significant clearance of Rhododendron (*Rhododendron ponticum*) here with large stumps of this species remaining as well as abundant litter present on the forest floor. As a result, the field layer is still extremely depauperate, with just occasional Hard Fern (*Blechnum spicant*), Wood-sorrel (*Oxalis acetosella*) and low growing Bilberry (*Vaccinium myrtillus*). Regeneration of Rhododendron is present, although the plants remain small. Much of the site is difficult to access due to the high quantities of Rhododendron brash present.

Cuckoo Wood has been affected by wildfires and a small area of woodland to the east of the main stand has been completely lost. The eastern side of the main stand shows evidence of severe burning, with fire-scarred trunks and charred dead trees along the boundary. At the southern end of the site, a number of barrels and containers that originally contained glyphosate have been dumped.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires including removal of Rhododendron brash from the site.

4. Remove dumped refuse and dissuade reoccurrence.

Old-growth forest status:

This site is highly native with large old Sessile Oak trees dominant and a medium standing volume. A subjective sample of these large Oaks (*n*=9) had a DBH range of 43-97 cm with a median of 69 cm. Seven of these trees were recorded from the interior of the woodland while the remaining two were located near an edge. Two were classified as 'old/gnarly', six as 'straight' and one as 'multi-stemmed'. There is a medium diversity of deadwood within the site including large-scale instances, but it is frequent rather than abundant. A subjective sample of these large-scale instances, which were all Sessile Oak (*n*=7), had a diameter range of 33-81 cm with a median of 46 cm. Four of these instances were 'standing dead', two were 'fallen dead' and one was 'old/senescent'. All of these had been damaged by wildfires and one appeared to have fallen due to shallow soil. Excluding the conservation actions of Rhododendron clearance, there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=9) supported 12 different TReMs, the most frequent being epiphytic bryophytes and lichens (9 trees), breakage (8), microsoils (7), epiphytic ferns (5) and root buttresses (5). In terms of structural complexity, the site only rarely has a multi-layer structure and horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are frequent root plates and rare hollows. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Cuckoo Wood fulfils the requirements for old-growth forest status.

3.3.10 Derrycunnihy (Site 1.10)

A large site of 146.9 ha, Derrycunnihy is situated in the south-west of the Killarney National Park, Co. Kerry (Figure 19). It is directly south of the Upper Lake and is bisected by the N71 and Galway's River. It comprises one large, essentially contiguous area and several smaller isolated patches of woodland, mostly around the western side of the site. Several walking trails including part of the Kerry Way pass through the woodland.

The character of most of the woodland is acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) with some Downy Birch (*Betula pubescens*) present whilst Holly (*Ilex aquifolium*) dominates the understorey. Rowan (*Sorbus aucuparia*) and Strawberry Tree (*Arbutus unedo*) occur occasionally. The site is very severely grazed by deer resulting in a generally sparse field layer and an absence of natural regeneration. Typical components of the field layer include Great Wood-rush (*Luzula sylvatica*), Wood-sorrel (*Oxalis acetosella*), Hard Fern (*Blechnum spicant*), False Wood-brome (*Brachypodium sylvaticum*), Irish Spurge (*Euphorbia hyberna*), Honeysuckle (*Lonicera periclymenum*) and Bracken (*Pteridium aquilinum*). Dwarf shrubs such as Heather (*Calluna vulgaris*) and Bilberry (*Vaccinium myrtillus*) occur occasionally. Damp rock faces provide niche habitats for species such as St Patrick's-cabbage (*Saxifraga spathularis*), Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*) and Wilson's Filmy-fern (*Hymenophyllum wilsonii*). The diverse bryophyte flora includes typical species such as Bank Haircap (*Polytrichum formosum*), Common Tamarisk-moss (*Thuidium tamariscinum*), Little Shaggy-moss (*Rhytidiadelphus loreus*), Short-beaked Wood-moss (*Loeskeobryum brevirostre*) and Slender Mouse-tail Moss (*Isothecium myosuroides*) as well as oceanic species such as Western Earwort (*Scapania gracilis*), Greater Whipwort (*Bazzania trilobata*), Rock Fingerwort (*Lepidozia cupressina*) and Straggling Pouchwort (*Saccogyna viticulosa*). Streams and flushes are frequent, particularly on the eastern side of the site and support species including Purple Moor-grass (*Molinia caerulea*), Soft Rush (*Juncus effusus*), Common Haircap (*Polytrichum commune*) and Bog-mosses (*Sphagnum* spp.).

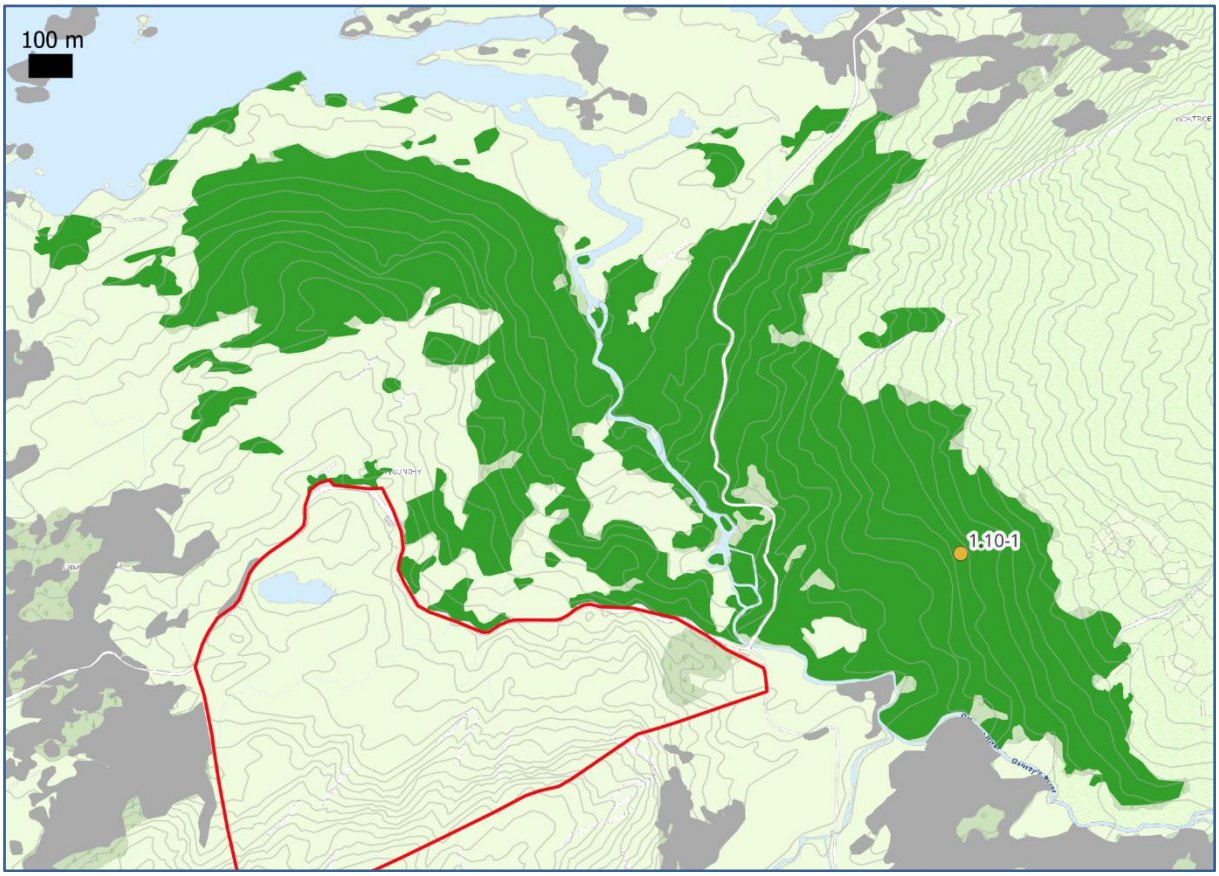

Figure 19 Site map for Derrycunnihy. ■ = WN1, ■ = other sites, ● = relevé, / = property boundary.

Deer exclosures are occasional in Derrycunnihy, but the majority of these have breaches. They contain saplings of Birch, Rowan and Holly but no regeneration of Oak occurs. Small, isolated patches of woodland are present outside of the main block, particularly to the west of the site. A number of these have been subject to Rhododendron (*Rhododendron ponticum*) treatment and have an associated depauperate field layer. Regeneration of Rhododendron is occasional in these areas. Piles of brash associated with Rhododendron clearance are present, presenting a fire risk. Patches of mature, flowering Rhododendron occur in the eastern half of the site and should be removed as a matter of priority given that the site as a whole has mostly avoided heavy infestation. Himalayan Cotoneaster (*Cotoneaster simonsii*) and mature Beech (*Fagus sylvatica*) also occur.

Also found at this site are the rare species Lemon-scented Fern (*Oreopteris limbosperma*) and Ivy-leaved Bellflower (*Wahlenbergia hederacea*) and also the gametophyte of Killarney Fern (*Trichomanes speciosum*), a species on the Flora (Protection) Order, 2022.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Remove Cotoneaster from the site.

4. Improve the native status of the oak woodland by removing Beech.

5. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires including removal of Rhododendron brash from the site.

6. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers.

Old-growth forest status:

This site is highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=22) had a DBH range of 63-139 cm with a median of 103 cm, Alder (*Alnus glutinosa*) had diameter measurements of 49 and 79 cm, and Hybrid Oak (*Quercus* × *rosacea*) had a single DBH measurement of 131 cm. The majority of these trees were recorded from the woodland interior with five from the edge of the woodland and three beside the river. Eight trees were classified as 'old/gnarly', one being 'multi-stemmed' and the rest 'straight'. Deadwood is frequent and with a medium diversity including large-scale instances. Subjective samples of these large-scale instances by different species were as follows: Sessile Oak (*n*=19) had a diameter range of 42-104 cm with a median of 71 cm, two Oaks (*Quercus* sp.) had diameters of 44 and 48 cm, Holly had single diameter measurement of 48 cm and an unidentified instance had a diameter of 70 cm. Of these six were 'fallen dead', eight were 'old/senescent' with the remainder 'standing dead'. Fourteen of these trees appeared to have died due to old age, four appear to have fallen due to shallow soils, while two appear to have been impacted by burning. Excluding the conservation actions of Rhododendron clearance and fencing there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=25) supported 17 different TReMs, the most frequent being epiphytic bryophytes and lichens (25 trees), microsoils (24), breakage (23), epiphytic ferns (23), branch holes (17) and insect holes (17). In terms of structural complexity, the site frequently has a multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures, there are frequent root plates and hollows in the rocky terrain. Lastly, the abundance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Derrycunnihy fulfils the requirements for old-growth forest status.

3.3.11 Dinis (Site 1.11)

This site of 14.5 ha lies in the centre of the Killarney National Park, Co. Kerry (Figure 20). and is bounded by Muckross Lake to the east. There are two main blocks of woodland. The first is on Dinis Island and is dissected by the Muckross Lake loop walk. The second occurs on the lower mountain slopes on the western side of Dinis Bog. There are additionally several small outlying stands. Throughout the site, natural regeneration of tree species is very low due to severe deer grazing.

The character of most of the woodland located on Dinis Island is that of acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) and Downy Birch (*Betula pubescens*) with Holly (*Ilex aquifolium*) in the understory along with the occasional Strawberry Tree (*Arbutus unedo*). Rowan (*Sorbus aucuparia*) and Yew (*Taxus baccata*) are also present, but neither are abundant. The field layer includes Great Wood-rush (*Luzula sylvatica*), Honeysuckle (*Lonicera periclymenum*), Hard Fern (*Blechnum spicant*), Bramble (*Rubus fruticosus* agg.) and Wood-sorrel (*Oxalis acetosella*), along with Bilberry (*Vaccinium myrtillus*) and Heather (*Calluna vulgaris*). In a flat-lying area in the north of the island is an area bog woodland (WN7). The canopy is relatively low and is dominated by Downy Birch with the occasional Rowan, along with Holly occurring abundantly in the understory. The field layer is fairly poor and contains species such as Hard Fern and Bramble with the occasional tussock of Purple-moor Grass (*Molinia caerulea*). Bryophyte cover for the most part is poor and contains scant cover of Common Tamarisk-moss (*Thuidium tamariscinum*) and

Common Feather-moss (*Kindbergia praelonga*). This area appears to have been planted or may have formerly been fenced from grazers as the stand is very dense and of mostly the same age. In the south of the island, surrounding Dinis Cottage, a small block of highly modified broadleaved woodland (WD1) occurs that contains natives and a handful of exotic species, including Bamboo (*Sasa* sp.), Cotoneaster (*Cotoneaster* sp.) and Portugal Laurel (*Prunus lusitanica*). Also on the island is a small stand of conifer plantation (WD3) with Scots Pine (*Pinus sylvestris*).

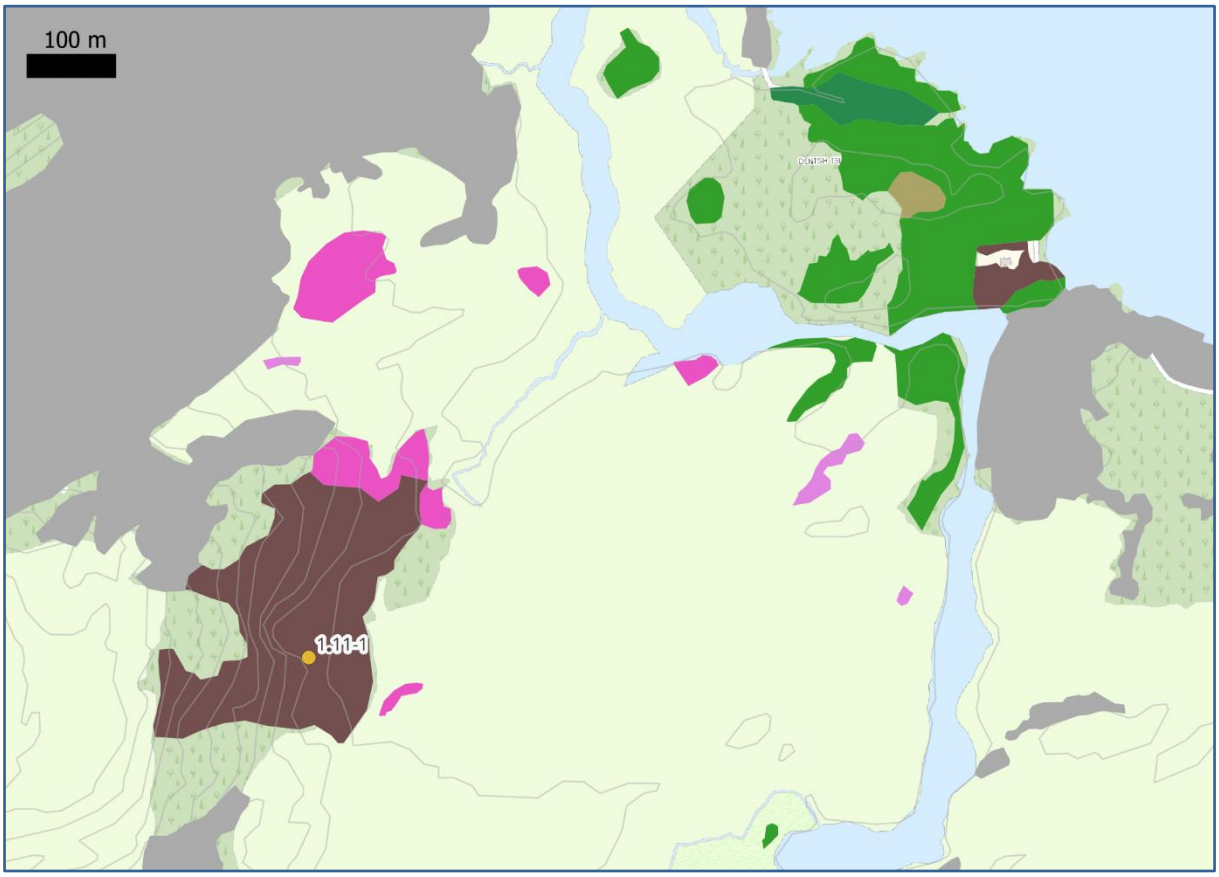

Figure 20 Site map for Dinis. ■ = WN1, ■ = WN7, ■ = WD1, ■ = WD4, ■ = WS1, ■ = WS3, ■ = other sites, ● = relevés.

The large block on the western side of Dinis Bog is mainly modified woodland (WD1). Although the canopy is native—it is dominated by Sessile Oak—the stand is infested with thickets of dense Rhododendron (*Rhododendron ponticum*) and is now impacted to the extent that the entire woodland lacks the typical understorey and field layer for acidophilous oak woodland. The rest of this block is Rhododendron scrub (WS3) and there are some additional patches of this habitat to the north and east. On the eastern edge of Dinis Bog are some fragments of oak woodland and Gorse (*Ulex europaeus*) scrub (WS1).

Trees and shrubs around the edges of the woods exhibit recent wildfire damage and deadwood habitat has been lost. Adjacent to the main block on Dinis Island, there are pockets of standing dead trees that appear to have been alive before the wildfires and where vigorous regrowth of Rhododendron is occurring. These areas can no longer be classified as woodland. Further west on Dinis Island, two stands of developing oakwood have also been impacted with burning damage visible and some loss of canopy.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Remove other non-native species including Bamboo, Cotoneaster and Portugal Laurel.

4. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers.

5. Convert the areas of modified woodland (WD1) on Dinis Island to native broadleaved woodland by removing non-native tree species. In their place, native species should be promoted through the planting of local provenance saplings or through natural regeneration. The Scots Pine stand (WD3) should be thinned and diversified.

6. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

Old-growth forest status:

The WN1 areas at this site are contain large old trees and have a medium standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=8) had a DBH range of 63-153 cm with a median of 109 cm, and Holly, Crab Apple (*Malus sylvestris*), Hybrid Oak (*Quercus* × *rosacea*) and Yew had single DBH measurements of 51 cm, 46 cm, 53 cm and 47 cm, respectively. The majority of these trees were recorded from the woodland edge and five from the interior. Eight trees were classified as 'old/gnarly', and the rest 'straight'. Deadwood is occasional and with a low diversity. Subjective samples of these large-scale instances by different species were as follows: Sessile Oak (*n*=5) had a diameter range of 43-85 cm with a median of 65 cm, Holly had diameter measurements of 34 and 37 cm, and Grey Willow and Yew had single diameter measurement of 43 cm and 65 cm, respectively. Of these four were 'fallen dead', two were 'old/senescent' with the remainder 'standing dead'. The majority of these were noted as being damaged due to burning while four appear to have toppled due to shallow soils. There are no significant signs of former human intervention apart from recent burning and previous rhododendron management.

Between them, the sample of large trees (*n*=12) supported 14 different TReMs, the most frequent being epiphytic bryophytes and lichens (11), micro soils (10), breakage (10 trees) and epiphytic climbers (9). In terms of structural complexity, the site frequently has a multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures, bare rock is frequent, burrows occasional and both root plates and slumping are rare. Lastly, the frequency of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations the WN1 areas of Dinis fulfil the requirements for old-growth forest status. The WN7 area appears to be recent and no measurements were taken there, therefore it is not included within this consideration.

3.3.12 Doogary Wood (Site 1.12)

This site lies of 12.8 ha occurs in the west of the Killarney National Park, Co. Kerry (Figure 21). The largest extent of the woodland occurs on the lower slopes of Purple Mountain on the northern shores of the Upper Lake. Higher up the slopes, the woodland continues up a gully in a linear fashion. Within the site there are several old stone walls within the interior of the woods and around the edges there are several ruined stone buildings, along with evidence of old farming systems in the form of old lazy beds.

The character of the woodland is that of rocky acidophilous oak woodland (WN1/91A0) with Sessile Oak (*Quercus petraea*) dominating the canopy. Abundant gnarly trees of Holly (*Ilex aquifolium*) forming the understory along with the occasional Hazel (*Corylus avellana*). Downy Birch (*Betula pubescens*) is frequent whilst Rowan (*Sorbus aucuparia*) and Ash (*Fraxinus excelsior*) are both occasionally present. Yew (*Taxus baccata*), Alder (*Alnus glutinosa*), Grey

Willow (*Salix cinerea*) and Aspen (*Populus tremula*) also occur but are rare. Severe grazing from deer and trespassing cattle have resulted in a generally sparse field layer and a complete absence of natural regeneration. The field layer in rockier areas includes Bracken (*Pteridium aquilinum*), Wood-sorrel (*Oxalis acetosella*), Purple Moor-grass (*Molinia caerulea*) and Hard Fern (*Blechnum spicant*). Common Bent (*Agrostis capillaris*) is locally frequent giving the field layer a grassy appearance in those patches. Bryophyte cover is high and here includes a number of oceanic species such as Western Earwort (*Scapania gracilis),* Straggling Pouchwort (*Saccogyna viticulosa)* and Greater Whipwort (*Bazzania trilobata*). Often growing luxuriantly alongside these is Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*).

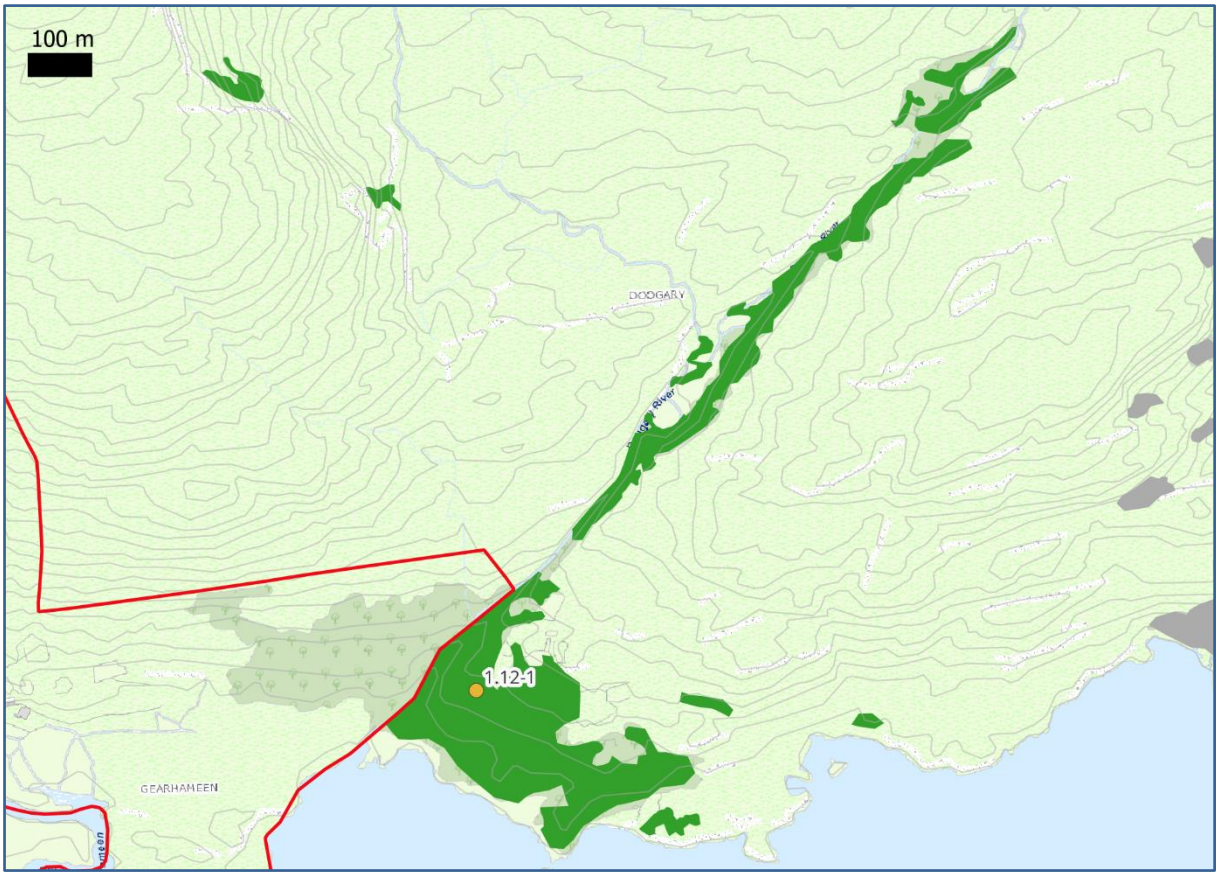

Figure 21 Site map for Doogary Wood. ■ = WN1, ■ = other sites, ● = relevé, / = property boundary.

A number of flushes run through the woodland which provide niches for species such as Remote Sedge (*Carex remota*), Star Sedge (*Carex echinata*), Soft Rush (*Juncus effusus*) and Bulbous Rush (*Juncus bulbosus*), along with herbs such as Marsh St-John's-wort (*Hypericum elodes*), Lesser Skullcap (*Scutellaria minor*) and Marsh Bedstraw (*Galium palustre*). Bryophytes such as Common Haircap (*Polytrichum commune*), Bog-mosses (*Sphagnum* spp.) and, occasionally, Handsome Woollywort (*Trichocolea tomentella*) also occur in these flushes.

The canopy is rather gappy in many places and this is partly because old fallen trees are not being replaced. Rhododendron (*Rhododendron ponticum*) is present but is overall rare across the site. Around the margins of the woods, trees and shrubs exhibit damage caused by wildfires and deadwood habitat has been lost.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers. Many of the stands are currently too small to support the environmental conditions of a woodland interior.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

Old-growth forest status:

This site is highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=14) had a DBH range of 49-129 cm with a median of 96 cm and Downy Birch (*n* =4) had a DBH range if 43-78 cm with a median of 63 cm. The majority of these trees were sampled from the interior of the woodland. Ten of the trees were classified as 'straight', the majority of which were Sessile Oak, and seven were classified as 'old/gnarly'. There was one instance where a Sessile Oak was classified as "multi-stemmed" suggesting it may have been felled or coppiced in the past. There is a high diversity of deadwood within the site including large-scale instances, but the majority of the various deadwood types were frequent rather than abundant. Subjective samples of these large-scale instances by different species were as follows: Sessile Oak had diameter measurements of 51, 53 and 87 cm, Downy Birch had diameter measurements of 37, 54 and 57 cm, Holly had diameter measurements of 23 and 44 cm, and Ash had a single diameter measurement of 56 cm. There are the remains of stone walls and old stone houses within the woodland but given the size of the trees, this was many decades ago. Excluding the conservation actions of Rhododendron clearance, there are no other significant signs of former human intervention.

Between them, the sample of large trees (*n*=18) supported 16 different TReMs, the most frequent being epiphytic bryophytes and lichens (18 trees), epiphytic ferns (16), breakage (16) and branch holes (12). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are frequent root plates and occasional hollows in the rocky terrain. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Doogary fulfils the requirements for old-growth forest status.

3.3.13 Drumrougher (Site 1.13)

This site of 36.9 ha lies in the east of the Killarney National Park, Co. Kerry, on the eastern shores of Muckross Lake (Figure 22). The vast majority of the site is comprised of modified broadleaved woodland with a few pockets of woodland that are semi-natural in nature.

The most abundant type of woodland within the site is highly-modified broadleaf woodland (WD1). There are two main variants. The first is woodland that is dominated by Beech (*Fagus sylvatica*) and Oak (*Quercus* spp.) which are accompanied by a mix of other broadleaves including Sycamore (*Acer pseudoplatanus*), Sweet Chestnut (*Castanea sativa*) and Horse Chestnut (*Aesculus hippocastanum*). The second type, which occurs at the south-western edge of the site, is dominated by Downy Birch (*Betula pubescens*) but the woodland is infested with Rhododendron (*Rhododendron ponticum*) which dominates the shrub layer and in some places the understorey; as a result, the field layer is negligible.

In the south of the site there are a few slithers of wet woodland (WN6/91E0). The woodland here is dominated by a relatively low canopy of Grey Willow (*Salix cinerea*) along with occasional Ash (*Fraxinus excelsior*) and Downy Birch. The field layer is grassy and includes tussocks of Purple Moor-grass (*Molinia caerulea*) and Remote Sedge (*Carex remota*), along with herbs such as Water Mint (*Mentha aquatica*), Meadowsweet (*Filipendula ulmaria*), Marsh

Bedstraw (*Galium palustre*) and Common Valerian (*Valeriana officinalis*). The most commonly occurring bryophytes include Pointed Spear-moss (*Calliergonella cuspidata*) and Fox-tail Feather-moss (*Thamnobryum alopecurum*).

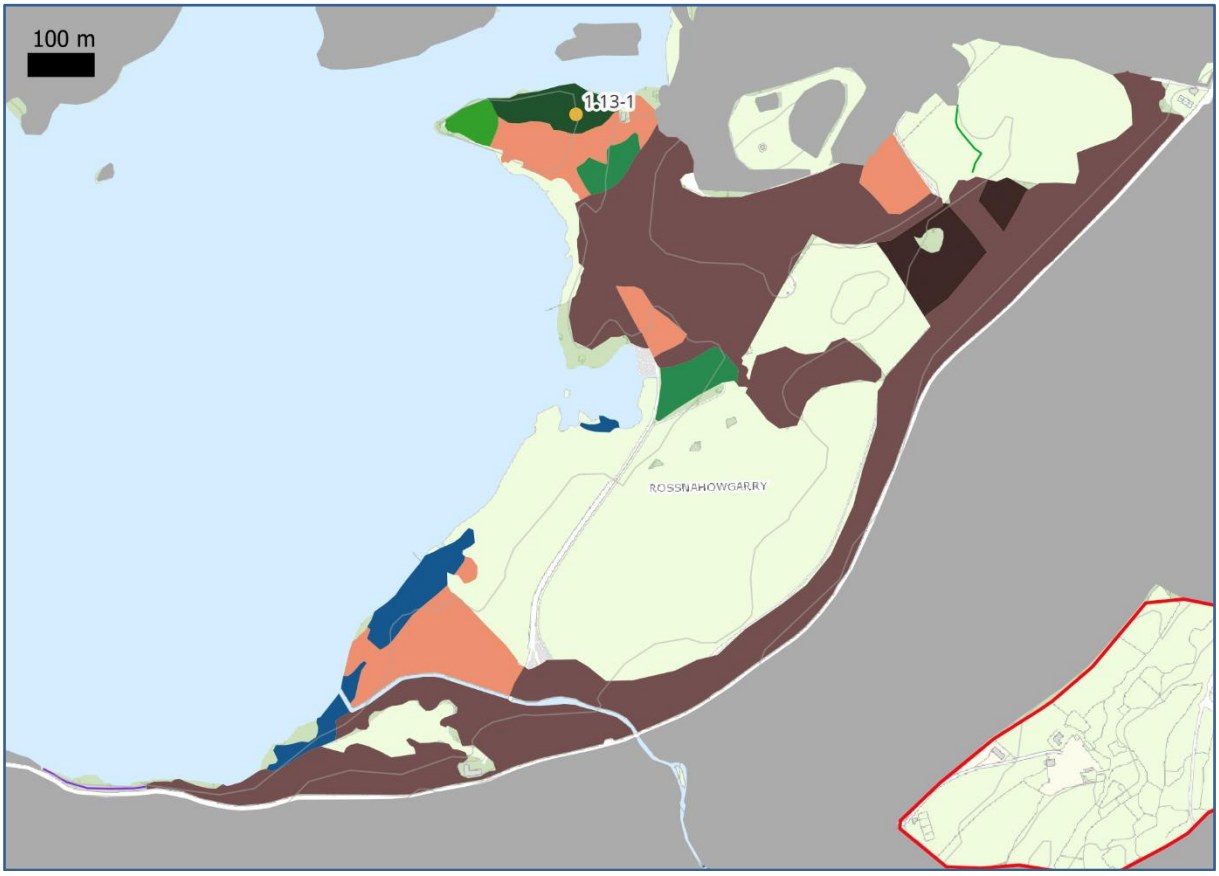

Figure 22 Site map for Drumrougher. ■ = WN1, ■ = WN3, ■ = WN6, ■ = WN7, ■ = WD1, ■ = WD2, ■ = WD4, ■ = other sites, ● = relevés, / = WL1.

An area of Yew woodland (WN3/91J0) occurs on outcropping limestone in the north-west of the site. The canopy here is dominated by Yew (*Taxus baccata*) with the occasional Ash whilst with Holly (*Ilex aquifolium*) and Hazel (*Corylus avellana*) occur in the understory. The field layer includes False Brome (*Brachypodium sylvaticum*), Sanicle (*Sanicula europaea*), Bramble (*Rubus fruticosus* agg.) and Dog-violets (*Viola* spp.). Bryophyte cover is high and includes Fox-tail Feather-moss and Crisped Neckera (*Neckera crispa*). West of this stand is a small patch of oak woodland (WN1/91A0). Here the canopy is dominated by Sessile Oak (*Quercus petraea*) with Holly in the understory. The field layer includes Great Wood-rush (*Luzula sylvatica*), Hard Fern (*Blechnum spicant*) and bryophyte flora includes Little Shaggy-moss (*Rhytidiadelphus loreus*) Short-beaked Wood-moss (*Loeskeobryum brevirostre*) and Broom Fork-moss (*Dicranum scoparium*).

There are also two small areas of Bog woodland (WN7), one at the back of Goleen Bay, the other further north towards Dundag Point. They are dominated by Downy Birch with the occasional Scots Pine (*Pinus sylvestris*) also in the canopy. Other tree species present include Holly, Grey Willow and Rowan (*Sorbus aucuparia*), but these are not frequent. The field layer contains species such as Purple Moor-grass, Bramble (*Rubus fruticosus* agg.), Honeysuckle (*Lonicera periclymenum)*, Remote Sedge and occasional ferns including Hard Fern and Hay-scented Buckler-fern (*Dryopteris aemula*). The main bryophytes present include Bank Haircap (*Polytrichum formosum*) and Pointed Spear-moss. Several pockets of mixed conifer woodland (WD2) occur throughout the site. These areas contain a mix of conifers along with native and non-native broadleaves. The ground layer typically includes Bramble along with False-brome. Also occurring on site are a few small blocks of conifer plantation (WD4).

Some clearance of Rhododendron has taken place but it is still frequent throughout the site and has infested large areas. Other alien species occurring on site include Cherry Laurel (*Prunus laurocerasus*) and Montbretia (*Crocosmia* sp.).

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Remove other non-natives including Cherry Laurel and Montbretia.

4. Convert the areas of modified woodland (WD1, WD2 and WD4) to native broadleaved woodland by removing mature and regenerating non-native species of conifers and broadleaves, particularly Beech. In their place, native species should be promoted through the planting of local provenance saplings or through natural regeneration.

Old-growth forest status:

The WN areas at this site are generally representative of their respective habitats with large old trees being abundant and there being a high standing volume. Subjective samples of these trees by different species were as follows: Grey Willow (*n*=6) had a DBH range of 28-87 cm with a median of 46 cm, Downy Birch (*n*=4) had a DBH range of 33-41 cm with a median of 37 cm, Sessile Oak had DBH measurements of 59, 76 and 109 cm, Yew had DBH measurements of 62, 77 and 90 cm, and Strawberry Tree (*Arbutus unedo),* Ash and Crab Apple (*Malus sylvestris*) had single DBH measurements of 43 cm, 87 cm and 41 cm, respectively. Nine of these trees were recorded from the woodland interior with ten from the edge of the woodland. Seven trees were classified as ‘old/gnarly’, four being ‘multi-stemmed’ and the rest ‘straight’. Deadwood was noted as frequent but with a low diversity. Subjective samples of the large-scale instances of deadwood by different species were as follows: Downy Birch (*n*=4) had a diameter range of 31-48 cm with a median of 38 cm, Grey Willow had diameter measurements of 35 and 49 cm, Yew had diameter measurements of 68 and 98 cm, Strawberry Tree, Rowan and Oak (*Quercus* sp.) had single diameter measurements of 32 cm, 58 cm and 81 cm, respectively. Of these, five were ‘fallen dead’ four were ‘old/senescent’ with the remainder ‘standing dead’. Fiver of these trees appeared to have fallen due to shallow or waterlogged soils, three died due to old age and one due to storm damage. There are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=19) supported 14 different TReMs, the most frequent being epiphytic bryophytes and lichens (19 trees), epiphytic climbers (15), breakage (14), microsoils (13) and cracks/scars (7). In terms of structural complexity, the site occasionally has a multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures, there are frequent root plates and frequent occasional slumping and bare rocks. Lastly, the abundance of Sessile Oak and Yew is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN areas within Drumrougher that lie near Dundag Point fulfil the requirements for old-growth forest status. The WN7 area east of Goleen Bay lacks sufficient large trees and deadwood. The WN6 areas are lacking in large trees and deadwood.

3.3.14 Eagles Nest (Site 1.14)

This site of 7.2 ha is wrapped around the steep eastern slopes of Eagles Nest, a craggy peak at the foot of Shehy Mountain in the centre of the Killarney National Park, Co. Kerry (Figure 23). It overlooks a large meander in The Long Range river.

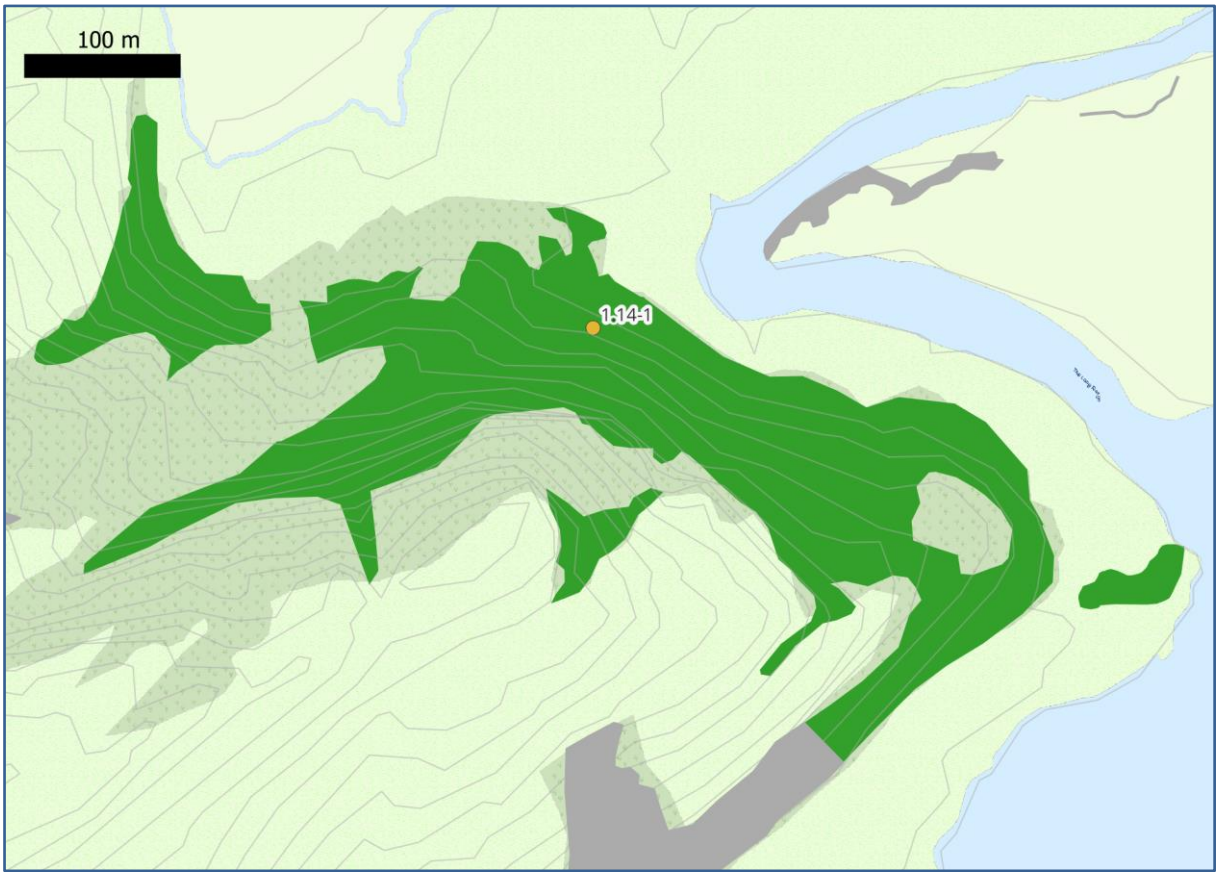

Figure 23 Site map for Eagles Nest. ■ = WN1, ■ = other sites, ● = relevé.

The character of the woodland is that of rocky acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) with Holly (*Ilex aquifolium*) occurring abundantly in the understorey alongside the occasional Hazel (*Corylus avellana*). Downy Birch (*Betula pubescens*), Strawberry Tree (*Arbutus unedo*), Ash (*Fraxinus excelsior*), Rowan (*Sorbus aucuparia*) and Yew (*Taxus baccata*) also occur in the woodland but none of these species are more than occasional. The field layer is scant due to the severe grazing levels but includes Great Wood-rush (*Luzula sylvatica*) and Heather (*Calluna vulgaris*) and ferns such as Bracken (*Pteridium aquilinum*), Hard Fern (*Blechnum spicant*) and Hay-scented Buckler-fern (*Dryopteris aemula*). Damp, rocky outcrops provide niches for species such as St Patrick's-cabbage (*Saxifraga spathularis*), Navelwort (*Umbilicus rupestris*) and Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*) to occur. Bryophyte cover is high and includes Little Shaggy-moss (*Rhytidiadelphus loreus*), Short-beaked Wood-moss (*Loeskeobryum brevirostre*), Straggling Pouchwort (*Saccogyna viticulosa*), Slender Mouse-tail Moss (*Isothecium myosuroides*), Broom Fork-moss (*Dicranum scoparium*) and Greater Fork-moss (*Dicranum majus*), along with oceanic species such as Western Earwort (*Scapania gracilis*), Rock Fingerwort (*Lepidozia cupressina*) and Greater Whipwort (*Bazzania trilobata*).

Recent wildfire damage is evident and deadwood habitat has been lost. This is most pronounced in the north and south-east of the site where the burning has resulted in the loss of trees that appeared to have been alive before the wildfires. In other areas, charring is evident on the bark or roots of trees but they have not been lost.

The woodland has been cleared of Rhododendron (*Rhododendron ponticum*) in the last 5-10 years with brash piles occurring frequently within the woodland interior. However, vigorous regeneration is occurring, especially in areas that have been burnt.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural

regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires including removal of Rhododendron brash from the site.

Old-growth forest status:

This site is highly native with large old trees present and a medium standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=9) had a DBH range of 65-158 cm with a median of 83 cm, Holly had DBH measurements of 37 and 51 cm, and Yew had a single DBH measurement of 83 cm. The majority of these trees were sampled from the edge of the woodland. Seven of the trees were classified as 'straight' and five were classified as 'old/gnarly'. Deadwood was frequent within the site including large-scale instances with a low diversity. Subjective samples of the large-scale instances by different species were as follows: Sessile Oak (*n*=6) had a diameter range of 42-128 cm with a median of 63.5 cm, Yew had diameter measurements of 31 and 56 cm, and Downy Birch had a single diameter measurement of 37 cm. Excluding the conservation actions of Rhododendron clearance, there are no other significant signs of former human intervention.

Between them, the sample of large trees (*n*=12) supported 14 different TReMs, the most frequent being epiphytic bryophytes and lichens (12 trees), root buttresses (9), microsoils (8) and breakage (7). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, root plates are occasional across the rocky terrain. Lastly, the abundance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Eagles Nest fulfils the requirements for old-growth forest status.

3.3.15 Eamonn's Wood (Site 1.15)

This site of 23.6 ha is situated on the northern side of Eagles Nest in the Killarney National Park, Country Kerry (Figure 24). The terrain is steep and rocky and features deep gullies, abrupt edges and large boulders. Along with the main block of woodland, there are several other smaller fragments to the north, south and west.

The character of the woodland is that of acidophilous oak woodland (WN1/91A0). The woodland is dominated by Sessile Oak (*Quercus petraea*) with Holly (*Ilex aquifolium*) occurring in the understorey. Downy Birch (*Betula pubescens*) occurs occasionally, particularly in the northern portion of the site, while Ash (*Fraxinus excelsior*) and Rowan (*Sorbus aucuparia*) can be found scattered throughout the site

The interior of the woodland is rocky in nature with a high bryophyte cover but severe grazing levels have resulted in a sparse field layer and an absence of natural regeneration. Typical components of the field layer include Great Wood-Rush (*Luzula sylvatica*), Hard Fern (*Blechnum spicant*) and Wood-sorrel (*Oxalis acetosella*). The dwarf shrubs Bilberry (*Vaccinium myrtillus*) and Heather (*Calluna vulgaris*) occur occasionally. Some open grassy areas occur which support species such as Sweet Vernal-grass (*Anthoxanthum odoratum*), Common Bent (*Agrostis capillaris*), Tormentil (*Potentilla erecta*), Self-Heal (*Prunella vulgaris*), Primrose (*Primula vulgaris*) and Cat's-ear (*Hypochaeris radicata*).

Damp rock faces provide niches for species such as St Patrick's-cabbage (*Saxifraga spathularis*), Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*) and Wilson's Filmy-fern (*Hymenophyllum wilsonii*). The diverse bryophyte flora includes typical species such as Bank Haircap (*Polytrichum formosum*), Common Tamarisk-moss (*Thuidium tamariscinum*), Little

Shaggy-moss (*Rhytidiadelphus loreus*), Short-beaked Wood-moss (*Loeskeobryum brevirostre*) and Slender Mouse-tail moss (*Isothecium myosuroides*) as well as oceanic species such as Western Earwort (*Scapania gracilis*), Greater Whipwort (*Bazzania trilobata*), Rock Fingerwort (*Lepidozia cupressina*) and Straggling Pouchwort (*Saccogyna viticulosa*).

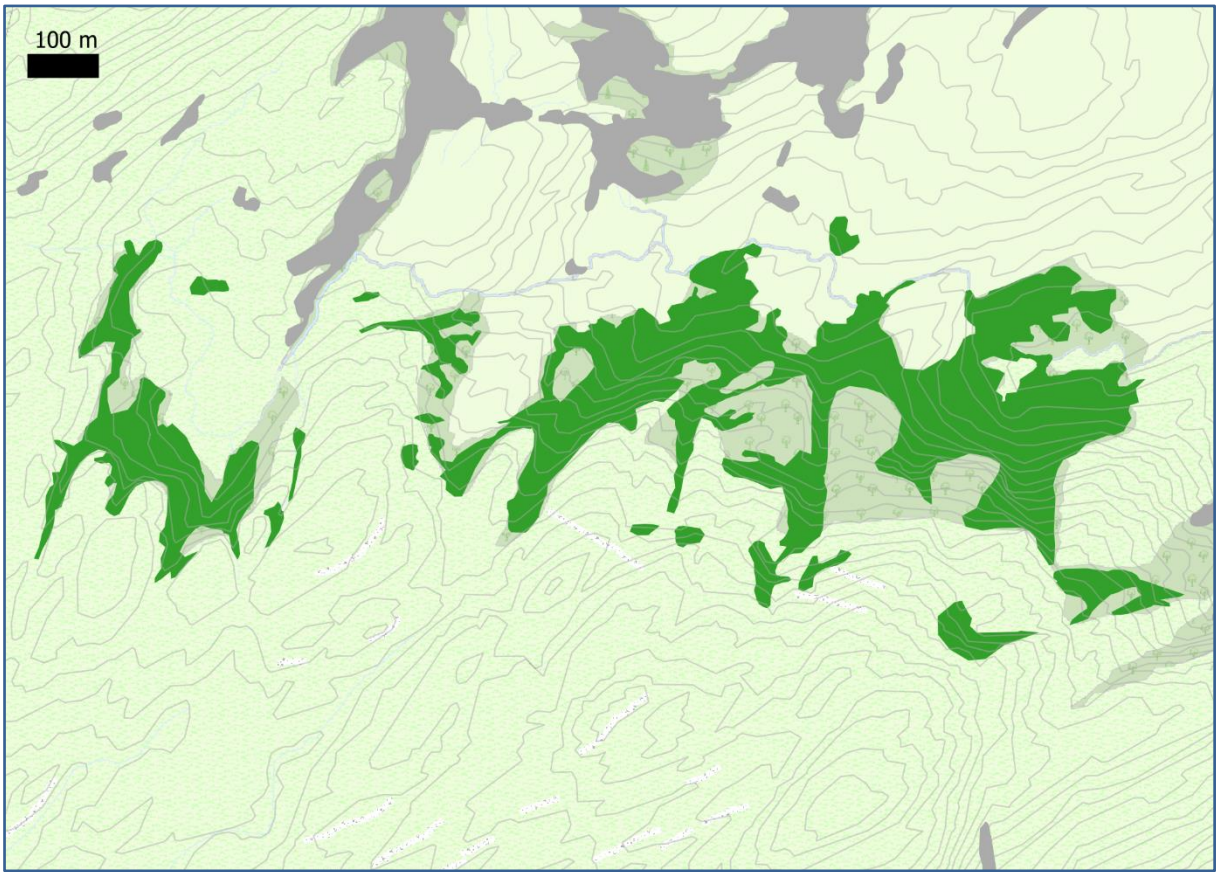

Figure 24 Site map for Eagles Nest. ■ = WN1, ■ = other sites.

Small streams, flushes and wet depressions are frequent throughout which provide habitat for species such as Soft Rush (*Juncus effusus*), Bulbous Rush (*Juncus bulbosus*), Marsh Bedstraw (*Galium palustre*), Lesser Spearwort (*Ranunculus flammula*), Remote Sedge (*Carex remota*) and bryophytes such as Common Haircap (*Polytrichum commune*) and Bog-mosses (*Sphagnum* spp.).

Rhododendron (*Rhododendron ponticum*) treatment has taken place here with scattered regeneration occurring in parts of the site. The site has suffered burning damage along much of the north-eastern edge with some small isolated stands suffering severe damage.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

4. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers.

Old-growth forest status:

This site is highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=14) had a DBH range of 39-109 cm with a median of 67 cm, Holly had a DBH measurements of 44, 57 and 72 cm, and Downy Birch and Yew (*Taxus baccata*) had single DBH measurements of 59 cm and 83 cm, respectively. The majority of these trees were recorded from the woodland interior with four from the edge of the woodland. Four trees were classified as 'old/gnarly', one being 'multi-stemmed' and the rest 'straight'. There is also an abundance and high diversity of deadwood within the site including large-scale instances. Subjective samples of these large-scale instances by different species were as follows: Sessile Oak (*n*=9) had a diameter range of 39-127 cm with a median of 58 cm, Holly had diameter measurements of 36, 47 and 53 cm, Downy Birch had diameter measurements of 35, 37 and 99 cm, and Ash had a single diameter measurement of 57 cm. Of these, ten were 'fallen dead', four were 'old/senescent' and the remainder were 'standing dead'. Nine of these trees appeared to have fallen due to shallow soils, three died due to old age, whilst three appear to have been impacted by burning. There are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=19) supported 15 different TReMs, the most frequent being breakage (18 trees), epiphytic bryophytes and lichens (17), epiphytic ferns (14), microsoils (13) and branch holes (10). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is low. In terms of natural soil microrelief structures, there are frequent root plates and rare hollows in the rocky terrain. Lastly, the abundance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Eamonn's Wood fulfils the requirements for old-growth forest status.

3.3.16 Gallavally (Site 1.16)

Description:

This site of 10.4 ha lies at the western end of the Upper Lake in the south-west of the Killarney National Park, Co. Kerry, close to Lord Brandon's Cottage (Figure 25). It is a predominantly low-lying area with some rocky knolls and the site consists of a remnant network of narrow wooded areas and treelines (WL2) on either side of the Gearhameen River. The site is further divided by the road to the Cottage.

The character of most of the site is broadly that of remnant acidophilous oak woodland (WN1). The canopy is composed largely of Sessile Oak (*Quercus petraea*) and Downy Birch (*Betula pubescens*), with the latter dominant in some areas. Holly (*Ilex aquifolium*) is abundant in the understorey. Significant northern parts of the site (not 91A0) are used as wood pasture for sheep and so have a grassy field layer of pasture species. Fallen trees are being removed from this area. In other areas, severe grazing by deer and sheep prevents the natural regeneration of tree species and makes the field layer exceedingly sparse. Species include Irish Ivy (*Hedera helix*), Bracken (*Pteridium aquilinum*), St Patrick's-cabbage (*Saxifraga spathularis*), Honeysuckle (*Lonicera periclymenum*), Hay-scented Buckler-fern (*Dryopteris aemula*), Common Bent (*Agrostis capillaris*) and Brown Bent (*Agrostis vinealis*). The bryophyte layer contains typical species such as Short-beaked Wood-moss (*Loeskeobryum brevirostre*) and Little Shaggy-moss (*Rhytidiadelphus loreus*), and also oceanic species such as Western Earwort (*Scapania gracilis*), Prickly Featherwort (*Plagiochila spinulosa*) and Straggling Pouchwort (*Saccogyna viticulosa*). Along the broad drain in the south of the site—an area lacking mature Oaks (not 91A0)—there has been recent work to remove Rhododendron (*Rhododendron ponticum*).

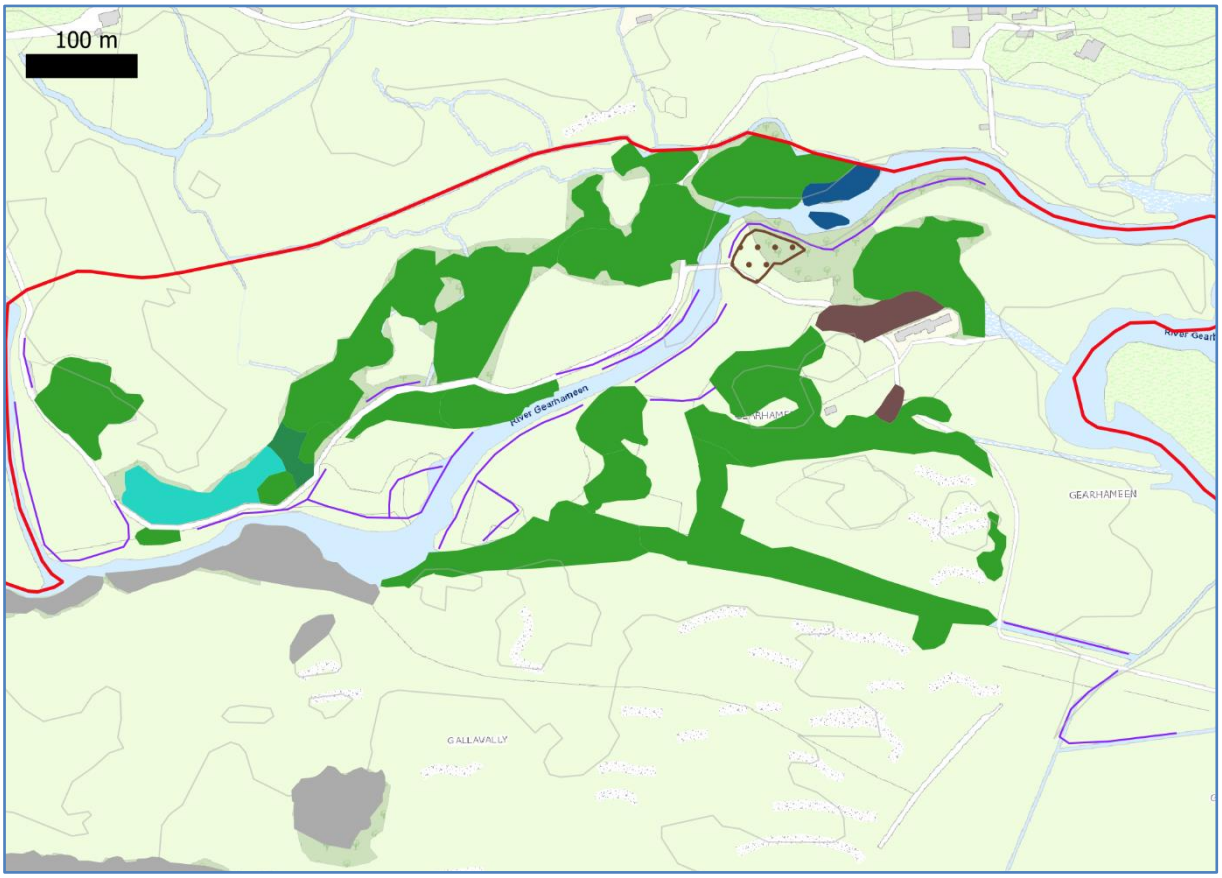

Figure 25 Site map for Gallavally. ■ = WN1, ■ = WN4, ■ = WN6, ■ = WN7, ■ = WD1, ⁘ = WD5, ■ = other sites, / = WL2, / = property boundary.

Beech (*Fagus sylvatica*) is frequent in heavily modified stands (WD1) close to the Cottage. In the west, there is a stand with Alder (*Alnus glutinosa*) along the road that is seasonally flooded by the river. Adjacent to this is a small area of boggy Birch woodland (WN7) with some cover of Blunt-leaved Bog-moss (*Sphagnum palustre*) and Soft Rush (*Juncus effusus*). In the east, on the banks of the river and on a small island is an area of wet woodland with Grey Willow (*Salix cinerea*). Field layer species in the wetter stands include Tufted Hair-grass (*Deschampsia cespitosa*), Remote Sedge (*Carex remota*), Hemlock Water-dropwort (*Oenanthe crocata*) and Yellow Iris (*Iris pseudacorus*).

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Remove other non-natives including Cherry Laurel and Portugal Laurel.

4. Convert the areas of modified woodland to native broadleaved woodland by removing non-native species such as Beech. In their place, native species should be promoted through the planting of local provenance saplings or through natural regeneration. Extant regeneration of non-native species should also be removed.

5. Retain deadwood where it falls within the woodlands.

6. Cease management of northern parts of the site as wood pasture and allow a natural woodland understorey and field layer to develop.

Old-growth forest status:

The WN areas of this site are highly native with several large, old trees and in a high standing volume, although the volume is lower in the south of the site where large Sessile Oak are absent. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=6) had a DBH range of 86-164 cm with a median of 112 cm, Downy Birch had DBH measurements of 65, 70 and 80 cm, and Holly had a single DBH measurement of 47. The majority of these trees were recorded from the interior of the woodland. Six trees were classified as 'old/gnarly', three as 'straight' and one as a 'pollard'. Deadwood was, however, deemed to be only frequent and of medium diversity. Only two large-scale instances were recorded: a standing dead Sessile Oak with a diameter of 56 cm and an old/senescent Holly with a diameter of 61 cm. The removal of deadwood and the use of a significant area of the site as wood pasture constitute significant human interventions.

Based on these observations, the WN areas within Gallavally do not fulfil the mandatory requirements for old-growth forest status.

3.3.17 Game Wood (Site 1.17)

This site of 33.9 ha lies in the north of Killarney National Park, Co. Kerry, on the north-eastern shores of Lough Leane (Figure 26). Numerous walking trails and bridle paths traverse the site and the woods are subjected to seasonal inundation by the nearby lake waters.

The majority of the site comprises low-lying wet woodland (WN6/91EO) occurring over alluvial gley soils. The canopy is dominated by Alder (*Alnus glutinosa*) and Grey Willow (*Salix cinerea*), with occasional Ash (*Fraxinus excelsior*) and Downy Birch (*Betula pubescens*). Hawthorn (*Crataegus monogyna)* is occasional in the understorey along with Buckthorn (*Rhamnus cathartica*). The latter species primarily occurs close to the lakeshore. The field layer is diverse containing a typical range of wet woodland species including Yellow Iris (*Iris pseudacorus*), Meadowsweet (*Filipendula ulmaria*), Water-pepper (*Persicaria hydropiper*), Water Mint (*Mentha aquatica*), Marsh Bedstraw (*Galium palustre*), Purple Moor-grass (*Molinia caerulea*), Remote Sedge (*Carex remota*), Soft Rush (*Juncus effusus*) and Lesser Skullcap (*Scutellaria minor*). Other species that occur less commonly include Common Skullcap (*Scutellaria galericulata*), Nodding Bur-marigold (*Bidens cernua*) Marsh Ragwort (*Jacobaea aquatica*) and Royal Fern (*Osmunda regalis*). Commonly occurring bryophytes include Pointed Spear-moss (*Calliergonella cuspidata*), Fox-tail Feather-moss (*Thamnobryum alopecurum*), Tree-moss (*Climacium dendroides*), Hart's-tongue Thyme-moss (*Plagiomnium undulatum)* and Dotted Thyme-moss *(Rhizomnium punctatum)* with Bog-mosses (*Sphagnum* spp.) occurring occasionally.

In the south of the site, modified broadleaf woodland occurs (WD1) that is dominated by a mix of Beech (*Fagus sylvatica*) and Sycamore (*Acer pseudoplatanus*) with a small proportion of native broadleaf species such as Ash or Holly (*Ilex aquifolium*). Further, smaller pockets of modified broadleaf woodland exist in the centre and north of the site, primarily in close proximity to the paths. These areas are typically also dominated by Beech or Sycamore, but in addition contain other non-native tree species such as Sweet Chestnut (*Castanea sativa*) or Hornbeam (*Carpinus betulus*) also. The field layer in these areas contains species such as Bracken (*Pteridium aquilinum*) and Wood-sorrel (*Oxalis acetosella*).

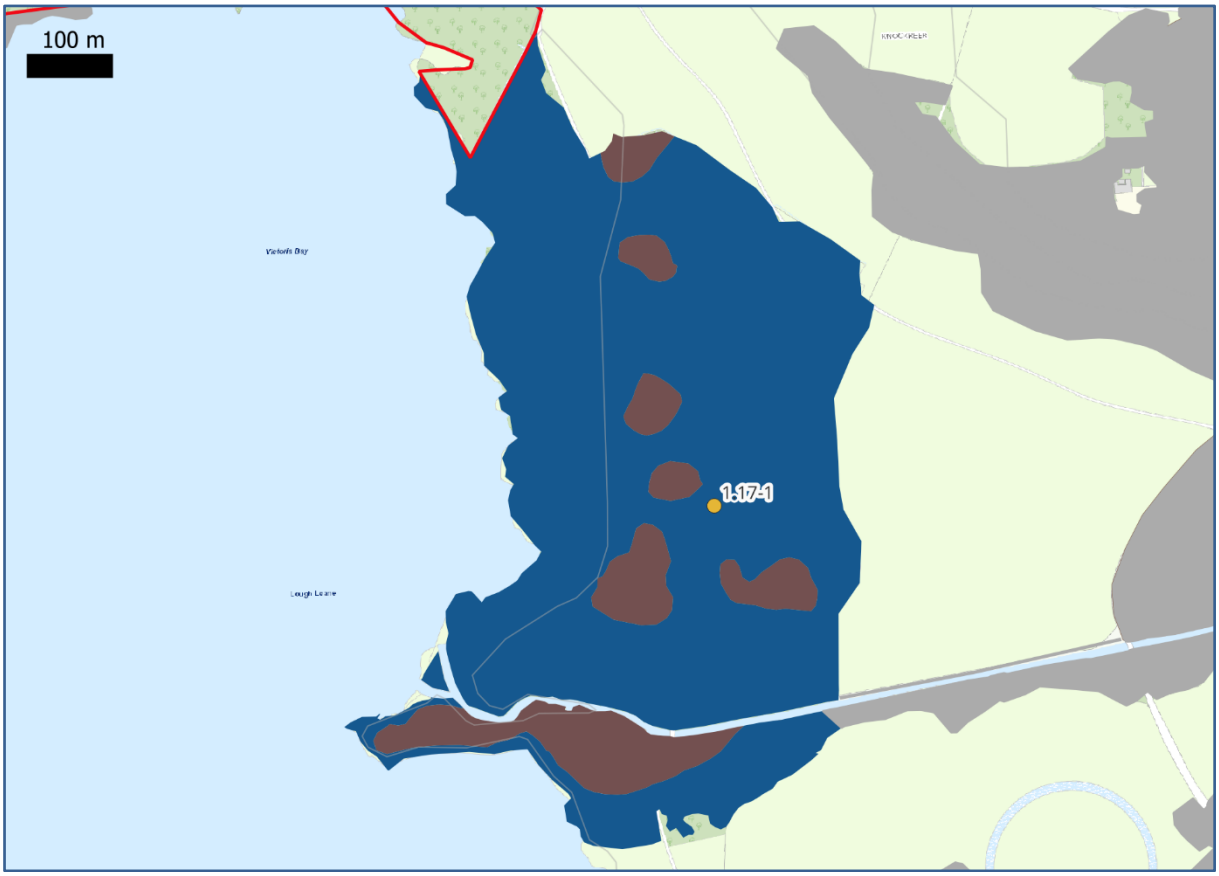

Figure 26 Site map for Game Wood. ■ = WN6, ■ = WD1, ■ = other sites, ● = relevé, / = property boundary.

Rhododendron (*Rhododendron ponticum*) is present in the site but its abundance is somewhat restricted by the wetness of the site and so is only present on an occasional basis within the woodland. Other alien species that occur are Snowberry (*Symphoricarpos albus*), Traveller's-joy (*Clematis vitalba*), Winter Heliotrope (*Petasites pyrenaicus*) and a species of Michaelmas-daisy (*Symphyotrichum* sp.) that appears to be beginning to outcompete ground flora species in some areas.

Grazing levels are severe throughout the site and as a result natural regeneration of native species is virtually absent. During the present survey, a female Skullcap Leaf Beetle (*Phyllobrotica quadrimaculata*) was recorded in the east of the site. This is a rare species of leaf beetle that is associated with Skullcap species.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Remove other non-natives including Snowberry, Traveller's-joy, Winter Heliotrope and Michaelmas-daisy.

4. Convert the areas of modified woodland (WD1) to native broadleaved woodland. This should entail the gradual removal from the canopy of Beech, Sycamore, Hornbeam and Sweet Chestnut. In their place, native species should be promoted through the planting of local

provenance saplings or through natural regeneration. Extant regeneration of non-native species should also be removed.

Old-growth forest status:

The WN areas within this site are of moderate native status due to the occasional presence of non-native trees. However, the majority of these areas have abundant large native species and a high standing volume. Subjective samples of these trees by different species were as follows: Alder (*n*=4) had a DBH range of 34-77 cm with a median of 60 cm, Grey Willow had a DBH measurements of 42, 48 and 67 cm, Downy Birch had DBH measurements of 31, 45 and 56 cm, Pedunculate Oak (*Quercus robur*) had DBH measurements of 61, 103 and 105 cm and Sessile Oak (*Quercus petraea*) had DBH measurements of 76 and 95 cm. The majority of these trees were sampled from the interior of the woodland with three sampled from the woodland edge. Ten of the trees were classified as 'straight', two as 'old/gnarly' and two as 'multi-stemmed'. Deadwood was frequent within the site with a medium diversity, including large-scale instances. Subjective samples of these were as follows: Alder (*n*=6) had a diameter range of 31-68 cm with a median of 48.5 cm and Downy Birch had diameter measurements of 38, 44 and 49 cm. Excluding the conservation actions of Rhododendron clearance there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=12) supported 14 different TReMs, the most frequent being epiphytic bryophytes and lichens (14 trees), epiphytic climbers (11), breakage (9) and microsoils (8). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, root plates are occasional across the rocky terrain. Wet woodland areas such as these would not be expected to support species typical of late-seral development phases as defined in section 1.3.2.

Based on these observations, the WN areas within Game Wood fulfil the requirements for old-growth forest status.

3.3.18 Glaisín na Marbh (Site 1.18)

This site of 23.7 ha lies on the middle slopes of Shehy Mountain in the western part of the Killarney National Park, Co. Kerry (Figure 27). It comprises one large block of woodland at the top of the site which wraps around a fold in the slope and several smaller fragments both downhill and the west. Within the site there are several ruined stone buildings, along with evidence of old farming systems in the form of old lazy beds at the western edge of the woods. It is the highest area of woodland in the park.

The character of the woodland is that of rocky acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) with gnarly trees of Holly (*Ilex aquifolium*) forming the understorey with the occasional Hazel (*Corylus avellana*) and Strawberry Tree (*Arbutus unedo*). Downy Birch (*Betula pubescens*), Ash (Fraxinus excelsior), Yew (*Taxus baccata*) and Rowan (*Sorbus aucuparia*) are also present. The canopy is quite gappy and is breaking up in places and this is partly because old, fallen trees are not being replaced. Severe grazing from deer and trespassing sheep have resulted in a sparse, often grassy field layer along with a complete absence of natural regeneration. Field layer species include Bracken (*Pteridium aquilinum*), Common Bent (*Agrostis capillaris*), Irish Ivy (*Hedera hibernica*), Purple Moor-grass (*Molinia caerulea*), Bilberry (*Vaccinium myrtillus*), Hard Fern (*Blechnum spicant*), Wood-sorrel (*Oxalis acetosella*), and Great Wood-rush (*Luzula sylvatica*).

Flushed areas provide niches for species such as Soft Rush (*Juncus effusus*), Bulbous Rush (*Juncus bulbosus*), Star Sedge (*Carex echinata*), Opposite-leaved Golden-saxifrage (*Chrysosplenium oppositifolium*), Primrose (*Primula vulgaris*), Lesser Skullcap (*Scutellaria minor*) and, occasionally, Ivy-leaved Bellflower (*Wahlenbergia hederacea*), a species primarily confined to the south-west of Ireland. Damp rock faces support species such as St Patrick's-cabbage (*Saxifraga spathularis*) and Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*) the latter growing luxuriantly on the rock faces and amongst bryophytes. The gametophyte of

Killarney Fern (*Trichomanes speciosum*) also occurs in several places. Bryophytes are abundant throughout and included a fairly diverse range of typical species including Little Slender Mouse-tail Moss (*Isothecium myosuroides*), Little Shaggy-moss (*Rhytidiadelphus loreus*), Common Tamarisk-Moss (*Thuidium tamariscinum*) and Short-beaked Wood-moss (*Loeskeobryum brevirostre*) along with oceanic species such as Straggling Pouchwort (*Saccogyna viticulosa*), Greater Whipwort (*Bazzania trilobata),* Western Earwort (*Scapania gracilis*) and Rock Fingerwort (*Lepidozia cupressina*).

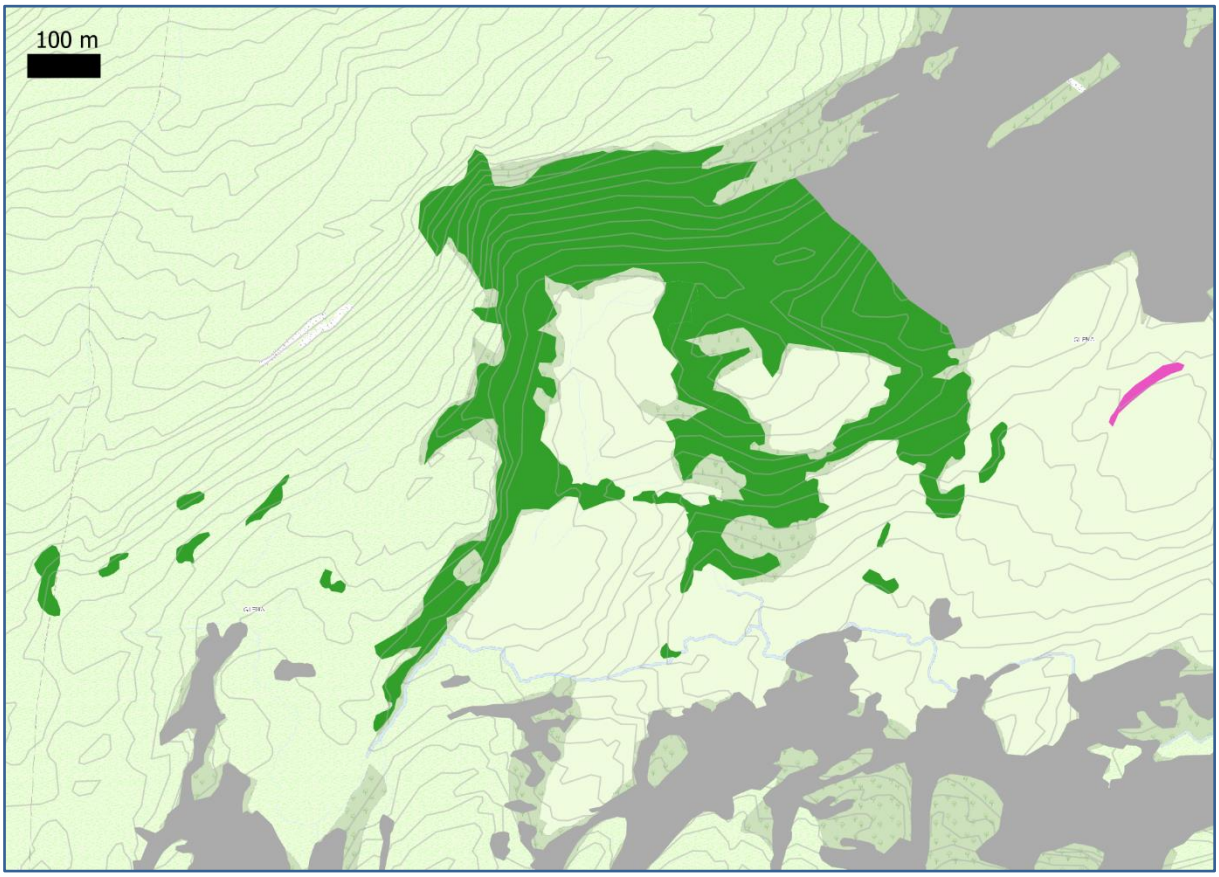

Figure 27 Site map for Glaisín na Marbh. ■ = WN1, ■ = WS3, ■ = other sites.

Rhododendron (*Rhododendron ponticum*) is present throughout but for the most part is not abundant except towards the north-eastern edge of the site which adjoins Glena where flowering plants are frequent. There is a small area of Rhododendron scrub (WS3) in the east. Some areas of the site have been treated and cleared in the last 5 years but they are showing vigorous regrowth. Around the margins of the woods, trees and shrubs exhibit damage caused by wildfires and deadwood habitat has been lost.

<u>Conservation measures:</u>

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

Old-growth forest status:

This WN areas of this site are highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=8) had a DBH range of 33-93 cm with a median of 69 cm, Holly (*n*=5) had a DBH range of 34-42 cm with a median of 36 cm, Ash had DBH measurements of 64 and 87 cm, and Alder (*Alnus glutinosa*) and Hazel had single DBH measurements of 175 cm and 54 cm, respectively. The majority of these trees were recorded from the woodland interior with six from the edge of the woodland. Five trees were classified as 'old/gnarly', ten were 'straight' and two were multi-stemmed, suggesting they may have been felled in the past. Deadwood is frequent at the site and there is high diversity of it including large-scale instances. Subjective samples of these large-scale instances by different species were as follows: Sessile Oak (*n*=8) had a diameter range of 37-113 cm with a median of 52 cm, Holly (*n*=5) had a diameter range of 30-47 cm, with a median of 36 cm, and Downy Birch had a single diameter measurement of 57 cm. Of these, four were 'fallen dead', four were 'old/senescent' and the remainder were 'standing dead'. Three of these trees appeared to have fallen due to shallow or water-logged soils, six died due to old age and two appear to have died due to burning. An additional two were dead before being damaged by fire. There are buildings and other signs of human habitation but this would have been many decades ago. Excluding the conservation actions of Rhododendron clearance there are no other significant signs of former human intervention.

Between them, the sample of large trees (*n*=17) supported 16 different TReMs, the most frequent being epiphytic bryophytes and lichens (17 trees), microsoils (12), breakage (9), cankers/burrs (9) and epiphytic ferns (8). In terms of structural complexity, the site frequently has a multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures, there are frequent root plates and occasional hollows in the rocky terrain. Lastly, the abundance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN areas of Glaisín na Marbh fulfil the requirements for old-growth forest status.

3.3.19 Glasha (Site 1.19)

Description:

This site of 10.9 ha—that is also known as Doogary Upper—lies in a gully about halfway up the southern slopes of Shehy Mountain in the west of the Killarney National Park, Co. Kerry (Figure 28). It comprises a large block of woodland at the top of the site and multiple smaller fragments both downslope and to the west.

The character of the woodland is that of rocky acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) with gnarly trees of Holly (*Ilex aquifolium*) forming the understorey. Downy Birch (*Betula pubescens*) and Rowan (*Sorbus aucuparia*) are also present. The site is very severely grazed by deer resulting in a typically sparse field layer and an absence of natural regeneration. Field layer species include Bracken (*Pteridium aquilinum*), Bilberry (*Vaccinium myrtillus*), Purple Moor-grass (*Molinia caerulea*), Tormentil (*Potentilla erecta*), Hard Fern (*Blechnum spicant*), Common Bent (*Agrostis capillaris*), Brown Bent (*Agrostis vinealis*), Hay-scented Buckler-fern (*Dryopteris aemula*), Great Wood-rush (*Luzula sylvatica*) and Wood-sorrel (*Oxalis acetosella*). Flushed areas and a stream add to the diversity by providing niches for species such as Soft Rush (*Juncus effusus*), Bulbous Rush (*Juncus bulbosus*), Star Sedge (*Carex echinata*), Opposite-leaved Golden-saxifrage (*Chrysosplenium oppositifolium*), Primrose (*Primula vulgaris*) and Lesser Skullcap (*Scutellaria minor*). There is a fairly diverse bryophyte flora including typical species such as Little Shaggy-moss (*Rhytidiadelphus loreus*), Slender Mouse-tail Moss (*Isothecium myosuroides*), Common Tamarisk-Moss (*Thuidium tamariscinum*) and Short-beaked Wood-moss (*Loeskeobryum brevirostre*) and oceanic species such as Western Earwort (*Scapania*

gracilis), Straggling Pouchwort (*Saccogyna cupressina*) and Rock Fingerwort (*Lepidozia cupressina*).

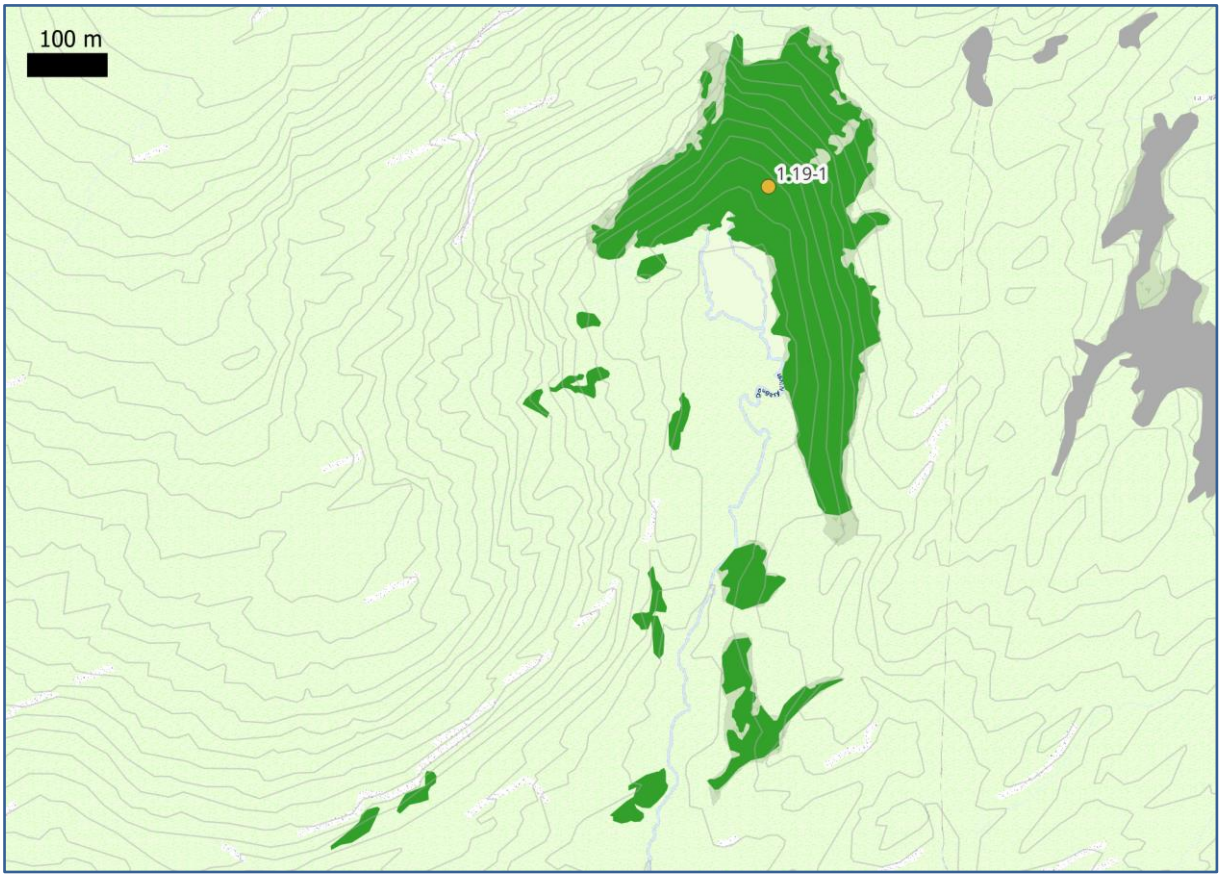

Figure 28 Site map for Glasha. ■ = WN1, ■ = other sites, ● = relevé.

Around the margins of the woods, trees exhibit damage caused by wildfires and deadwood habitat has been lost. Rhododendron (*Rhododendron ponticum*) is present but is not frequent. The canopy is breaking up in places as mature Oaks die and are not replaced. Some of the surviving Oaks are multi-stemmed suggesting that they were coppiced or at least felled in the past.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

Old-growth forest status:

This site is highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=7) had a DBH range of 54-86 cm with a median of 68 cm, Holly (*n*=6) had a DBH range of 31-45 cm with a median of 38 cm, Downy Birch (*n*=4) had a DBH range of 31-52 cm with a median of 38 cm.

Eleven of these trees were recorded from the interior of the woodland while the rest were located near an edge. Twelve of these trees were classified as 'old/gnarly' while the rest were 'straight'. There is also an abundance and high diversity of deadwood within the site including large-scale instances. Subjective samples of these instances by different species were as follows: Sessile Oak (*n*=6) had a diameter range of 34-63 cm with a median of 41 cm, Downy Birch had diameter measurements of 48 and 49 cm, Holly had diameter measurements of 33 and 43 cm and unidentified instances had diameter measurements of 40, 47 and 48 cm. Five of these instances were standing dead, seven were fallen dead and two were old/senescent. There are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=17) supported 13 different TReMs, the most frequent being breakage (16 trees), bark loss (15), branch holes (13), cracks/scars (12), epiphytic bryophytes and lichens (11), other cavities (11) and bark pockets (10). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are occasional root plates and abundant hollows in the rocky terrain. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Glasha fulfils the requirements for old-growth forest status.

3.3.20 Glena (Site 1.20)

This very large site of 191.5 ha is a tract of woodland located in the west of the Killarney National Park in Co. Kerry (Figure 29). The woodland lies on the north-eastern slopes of Shehy Mountain and runs from the middle slopes down to the western shores of Lough Leane. Within the site are the remains of old stonework including Glena Cottage, which is now derelict. The whole area has long been infested with Rhododendron (*Rhododendron ponticum*) making access to much of the site challenging. A path—referred to as 'the tunnel'—has been cut through the site to connect Dinis and Tomies.

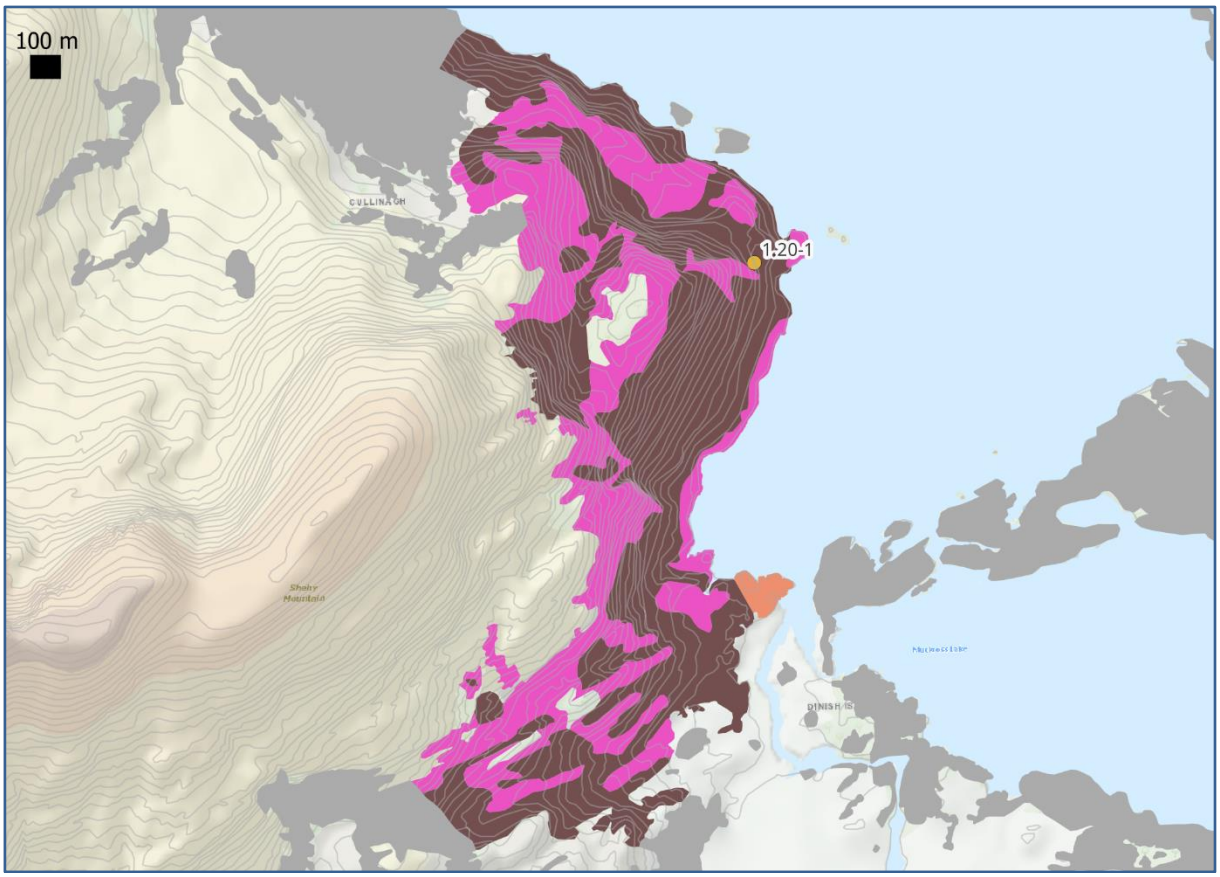

Figure 29 Site map for Glena. ■ = WD1, ■ = WD2, ■ = WS3, ■ = other sites, ● = relevé.

Most of the site is highly modified broadleaved woodland (WD1). The canopy is dominated by a mixture of Sessile Oak (*Quercus petraea*) and Downy Birch (*Betula pubescens*). Beneath, the understorey is dominated by dense Rhododendron with Holly (*Ilex aquifolium*) occurring occasionally. Other tree species present include Rowan (*Sorbus aucuparia*), Yew (*Taxus baccata*), Ash (*Fraxinus excelsior*), Aspen (*Populus tremula*), and Alder (*Alnus glutinosa*) but all are rare across the site. The field layer is mostly non-existent throughout the woodland, except along the path edges where scraps of typical species are growing, including Great Wood-rush (*Luzula sylvatica*), Hard Fern (*Blechnum spicant*) and Common Bent (*Agrostis capillaris*). The canopy is gappy in part and is breaking up in places. This is partly because old, fallen trees are not being replaced. Some regeneration of native species is evident but they do not progress beyond the seedling stage due to a combination of severe deer grazing and dense Rhododendron growth. Bryophyte cover is high along the path and the flora includes a fairly diverse range of species including Little Slender Mouse-tail Moss (*Isothecium myosuroides*), Shaggy-moss (*Rhytidiadelphus loreus*), Common Tamarisk-Moss (*Thuidium tamariscinum*) and Short-beaked Wood-moss (*Loeskeobryum brevirostre*) along with oceanic species such as Straggling Pouchwort (*Saccogyna viticulosa*), Greater Whipwort (*Bazzania trilobata),* Western Earwort (*Scapania gracilis*), Rock Fingerwort (*Lepidozia cupressina*) and, occasionally, Handsome Woollywort (*Trichocolea tomentella*). However, this diversity dwindles in the many areas where Rhododendron infestation severely impacts light availability. Large White-moss (*Leucobryum glaucum*) is frequent in areas that have been cleared of Rhododendron. Filmy-ferns (*Hymenophyllum* spp.) are also frequent, growing amongst bryophytes on rock faces. The gametophyte of Killarney Fern (*Trichomanes speciosum*) also occurs.

In the south-east of the site is a small pocket of mixed conifer/broadleaved woodland (WD2) which contains Scots Pine (*Pinus sylvestris*), along with Sessile Oak and Downy Birch. Here again the woodland is infested with Rhododendron and thus the field layer is mostly negligible. The remainder of the site comprises extensive thickets of Rhododendron scrub (WS3) that have either infested open heath or that represent area where the woodland canopy has disintegrated.

Some Rhododendron treatment and clearance has taken place, some of which is relatively recent. Close to the shoreline, south-west of the islet called Derby's Garden, an exclosure formed using Rhododendron brash is present and surrounds an area of woodland that has been cleared. However, regeneration of Rhododendron is frequent within this exclosed area. Some of the surviving Oaks are multi-stemmed suggesting that they were coppiced or at least felled in the past. Around the margins of the woods in the south, trees and shrubs exhibit damage caused by wildfires and deadwood habitat has been lost.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. This is a massive task and requires long-term planning and commitment of resources.

3. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires including the removal of piles of Rhododendron brash.

Old-growth forest status:

There are no areas of native woodland remaining at this site.

3.3.21 Gortderraree (Site 1.21)

This site of 21.9 ha lies on the western slopes of Torc Mountain in the Killarney National Park, Co. Kerry (Figure 30). Part of the woodland occurs on the lower slopes adjacent to the N71, with the remainder of the site stretching up and across the higher slopes to the north-east. A number of stone wall enclosures occur within the woodland.

The character of woodland in the lower part of the site is that of rocky acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) with Holly (*Ilex aquifolium*) in the understorey. Other tree species present include Downy Birch (*Betula pubescens*), Rowan (*Sorbus aucuparia*), Strawberry Tree (*Arbutus unedo*), Ash (*Fraxinus excelsior*), Grey Willow (*Salix cinerea*) and Alder (*Alnus glutinosa*). Severe grazing levels have resulted in a sparse field layer and an absence of natural regeneration, except in a few areas thar appear to have been previously exclosed and now contain dense poles Of Downy Birch. Species occurring within the field layer include Greater Wood-rush (*Luzula sylvatica*), Wood-sorrel (*Oxalis acetosella*), Common Bent (Agrostis *capillaris*), Purple Moor-grass (*Molinia caerulea*), along with ferns such as Bracken (*Pteridium aquilinum*), Hard Fern (*Blechum spicant*) and Hay-scented Buckler Fern (*Dryopteris aemula*). Bryophyte cover is high and includes species such as Little Shaggy-moss (*Rhytidiadelphus loreus*), Short-beaked Wood-moss (*Loeskeobryum brevirostre*), Waved Silk-moss (*Plagiothecium undulatum*), Straggling Pouchwort (Saccogyna viticulosa), Slender Mouse-tail Moss (*Isothecium myosuroides*), Broom Fork-moss (*Dicranum scoparium*), Greater Fork-moss (*Dicranum majus*), along with oceanic species such as Western Earwort (*Scapania gracilis*) and Rock Fingerwort (*Lepidozia cupressina*).

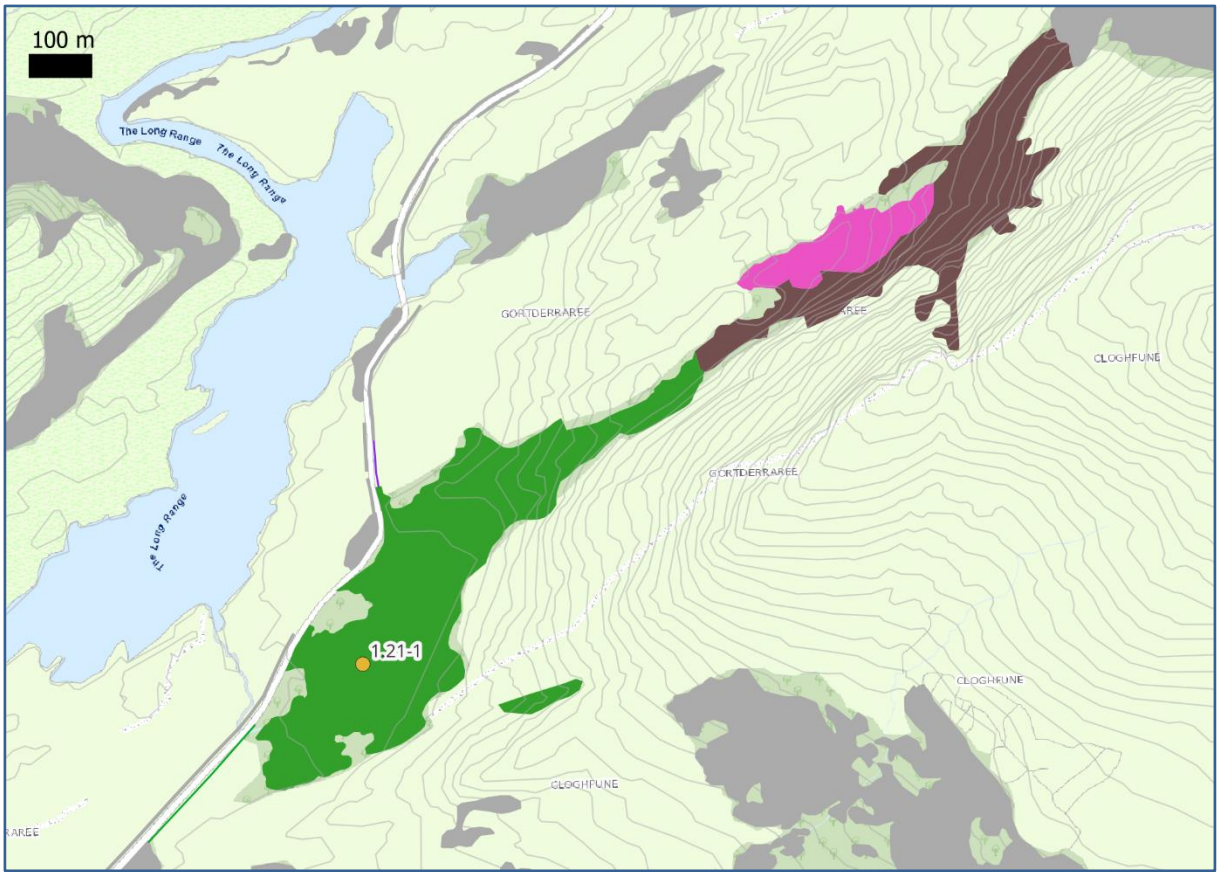

Figure 30 Site map for Gortderraree. ■ = WN1, ■ = WD1, ■ = WS3, ■ = other sites, ● = relevé, / = WL1, / = WL2.

A number of flushed areas in occur in the oak woodland which provide habitat for vascular species such as Star Sedge (*Carex echinata*), Soft Rush (*Juncus effusus*), Bulbous Rush (*Juncus bulbosus*) and Marsh Bedstraw (*Galium palustre*), together with bryophytes such as

Bog-mosses (S*phagnum* spp.), Dotted Thyme-moss (*Rhizomnium punctatum*) and Hart's-tongue Thyme-moss (*Plagiomnium undulatum*). Damp rock faces within the woodland interior provide habitat for species such as Kidney Saxifrage (*Saxifraga hirsuta*) and Tunbridge Filmy-fern (*Hymenophyllu*m *tunbrigense*). The gametophyte of Killarney Fern (*Trichomanes speciosum*) also occurs.

The majority of the lower section of the site has been cleared of mature Rhododendron (*Rhododendron ponticum*). However, from about the centre of the site upwards, the woodland becomes more infested with thickets of mature Rhododendron and can be regarded as highly modified broadleaved woodland (WD1). Although the canopy is still native, the woodland here is infested to such an extent that it lacks the typical understorey and field layer for acidophilous oak woodland. The canopy here is gappy and is breaking up in places. This is partly because old, fallen trees are not being replaced due to a combination of severe deer grazing and dense Rhododendron growth.

Adjacent to this modified woodland is an area of Rhododendron scrub (WS3). Treelines (WL2) and hedgerows (WL1) occur along the N71.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires including the removal of piles of Rhododendron brash.

Old-growth forest status:

The WN areas of this site are highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=13) had a DBH range of 66-163 cm with a median of 92 cm, Ash (*n*=4) had a DBH range of 64-90 cm with a median of 82 cm, Downy Birch had DBH measurements of 51 and 66 cm, and Holly had measurements of 54 and 89 cm. Fourteen of these trees were recorded from the interior of the woodland while five were located near an edge. Five of these trees were classified as 'old/gnarly', thirteen as 'straight' and three as 'multi-stemmed'. There is a medium diversity of deadwood within the site but it is frequent rather than abundant. Subjective samples of large-scale instances of deadwood by different species were as follows: Sessile Oak (*n*=5) had a diameter range of 56-126 cm with a median of 68 cm, Holly (*n*=4) had a diameter range of 32-87 cm with a median of 45 cm, Ash had diameter measurements of 44 and 63 cm, and unidentified instances measured 32, 41 and 72 cm. Five of these instances were 'standing dead', six were 'fallen dead' and three were 'old/senescent'. Excluding the conservation actions of Rhododendron clearance, there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=21) supported 16 different TReMs, the most frequent being epiphytic bryophytes and lichens (20 trees), breakage (18), microsoils (13), and epiphytic climbers (9). In terms of structural complexity, the site only occasionally has a multi-layer structure and horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are occasional root plates, mounds and hollows. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN sections of Gortderraree fulfil the requirements for old-growth forest status.

3.3.22 Gortracussane Lower (Site 1.22)

This site of 24.5 ha is spread across a large area in the centre of the Killarney National Park, Co. Kerry (Figure 31). The site consists of a large block of woodland in the north where it is bounded by the southern shores of Muckross Lake and several small fragments in the south as far as Five Mile Bridge. Along the N71 are number of treelines (WL2). The Muckross Lake loop walk passes through the north of the site and from this path a boardwalk runs to the Old Weir Bridge.

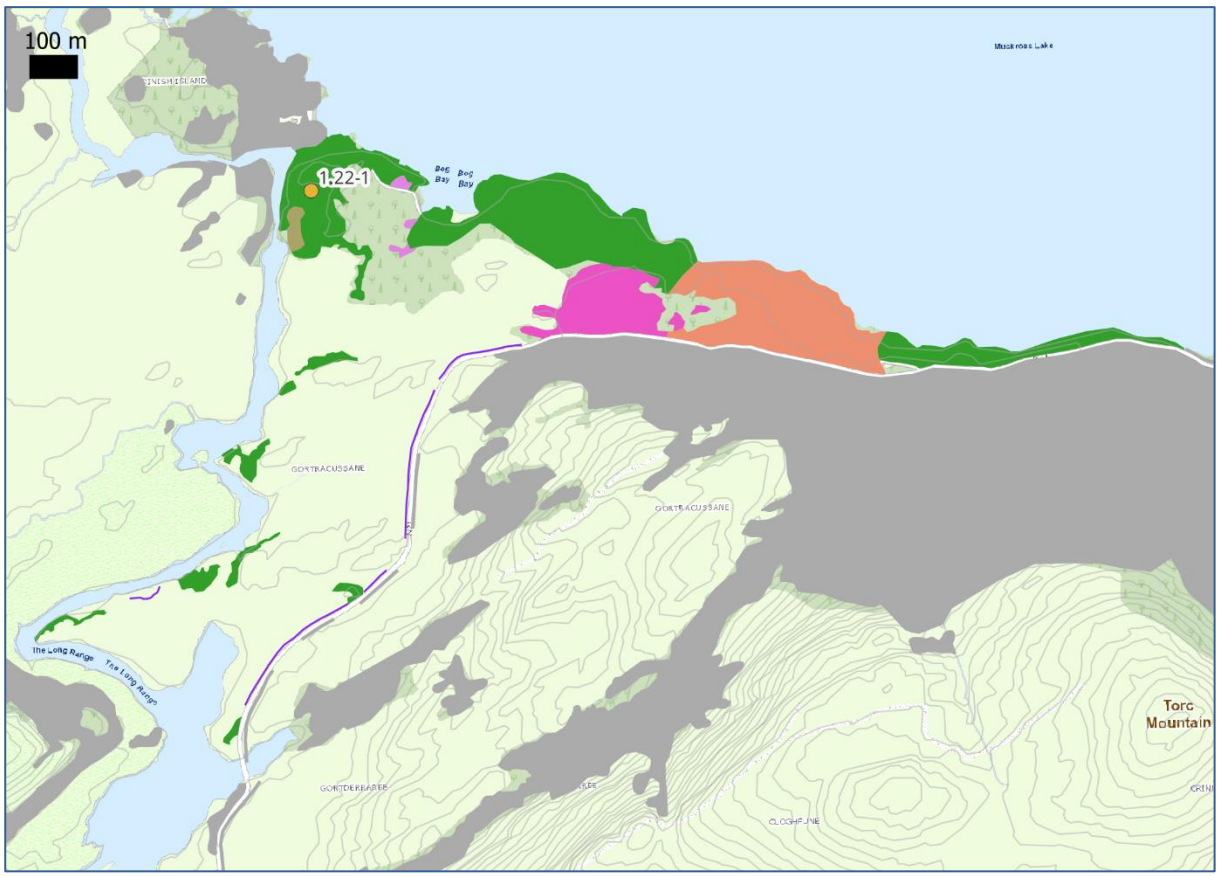

Figure 31 Site map for Gortracussane Lower. ■ = WN1, ■ = WD2, ■ = WD3, ■ = WS1, ■ = WS3, ■ = other sites, ● = relevé, / = WL2.

The character of the main block is mostly that of acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) with frequent Downy Birch (*Betula pubescens*) and the occasional Scots Pine (*Pinus sylvestris*). Holly occurs abundantly in the understorey., along with the occasional Strawberry Tree (*Arbutus unedo*). Other tree species present include Ash (*Fraxinus excelsior*), Alder (*Alnus glutinosa*), Yew (*Taxus baccata*), Aspen (*Populus tremula*), Crab Apple (*Malus sylvestris*), Grey Willow (*Salix cinerea*), Hawthorn (*Crataegus monogyna*) and Rowan (*Sorbus aucuparia*), but none of these are more than occasional. The field layer includes species such as Heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Purple Moor-grass (*Molinia caerulea*), Wood-sorrel (*Oxalis acetosella*), Common Cow-wheat (*Melampyrum pratense*), Great Wood-rush (*Luzula sylvatica*) along with ferns such as Bracken (*Pteridium aquilinum*) and Hard Fern (*Blechnum spicant*). Bryophyte cover is generally high and the flora includes typical species such as Little Slender Mouse-tail Moss (*Isothecium myosuroides*), Little Shaggy-moss (*Rhytidiadelphus loreus*), Common Tamarisk-Moss (*Thuidium tamariscinum*), Short-beaked Wood-moss (*Loeskeobryum brevirostre*), Common Feather-moss (*Kindbergia praelonga*), and Swan's-neck Thyme-moss (*Mnium hornum*) together with oceanic species such as Straggling Pouchwort (*Saccogyna viticulosa*), Greater Whipwort (*Bazzania trilobata)* and Western Earwort (*Scapania gracilis*). A number of damp hollows occur and support vascular species such Soft Rush (*Juncus effusus*)

and Lesser Spearwort (*Ranunculus flammula*), along with bryophyte species such as Common Haircap (*Polytrichum commune*) and Bog-mosses (*Sphagnum* spp.).

Within the main block of woodland is also a stand of mixed broadleaved/conifer woodland (WD2) that contains Scots Pine, Sessile Oak, Downy Birch, Sycamore (*Acer pseudoplatanus*) and Beech (*Fagus sylvatica*). Rhododendron (*Rhododendron ponticum*) infestation is severe in parts. Where it is absent, field layer species such as Ling, Bracken and Great Wood-rush occur. Another part of this main block is a significant area of Rhododendron scrub (WS3) and in the west there is a small stand of conifer woodland (WD3) that is dominated by Scots Pine together with some patches of scrub (WS1).

In the south of the site, across an area of bog, there are a number of smaller fragmented pieces of oak woodland (WN1/91A0) that run along a series of ridges. Some of these are very narrow and barely form a proper canopy. They contain a similar suite of species as the main block but are more severely grazed with topiary effect evident on Heather and stunted Holly saplings. Rhododendron treatment and clearance has been conducted in last 10 years and there are piles of brash within these patches. Nevertheless, vigorous regrowth is now occurring in places.

Recent wildfire damage is evident, especially around the edges of the woods. Wildfires have left pockets of standing dead trees in the oak woodland close to the Old Weir Bridge and in these areas vigorous regrowth of Rhododendron is conspicuous.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires including the removal of piles of Rhododendron brash.

4. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers. Many of the stands are currently too small to support the environmental conditions of a woodland interior.

Old-growth forest status:

The WN1 areas of this site are highly native with large, old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=11) had a DBH range of 47-153 cm with a median of 83 cm, Downy Birch had DBH measurements of 44, 59 and 59 cm, and Ash and Holly had single measurements of 62 cm and 44 cm, respectively. Half of the trees recorded were from the woodland edge which is unsurprising considering the fragmented nature of many of the native stands. The remainder were from the woodland interior. Five of these trees were classified as ‘old/gnarly’, ten as ‘straight’ and one as ‘multi-stemmed’. There is a medium diversity of deadwood within the site and it is frequent rather than abundant. Subjective samples of the large-scale instances of deadwood by different species were as follows: Sessile Oak (*n*=6) had a diameter range of 45-93 cm with a median of 55 cm, Holly (*n*=4) had a diameter range of 29-69 cm with a median of 40 cm, Strawberry Tree, Downy Birch and Grey Willow had single diameter measurements of 44 cm, 51 cm and 64 cm, respectively. Ten of the instances were noted as having fire damage, four had fallen, two of which apparently toppled due to shallow soils. A further two died of old age. Excluding the conservation actions of Rhododendron clearance, there are no other significant signs of former human intervention.

Between them, the sample of large trees (*n*=16) supported 14 different TReMs, the most frequent being epiphytic bryophytes and lichens (16 trees), breakage (13), root buttresses (12) and microsoils (10). In terms of structural complexity, the site only occasionally has a multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures, hollows, root plates and slumping are rare. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN areas within Gortracussane Lower fulfil the requirements for old-growth forest status.

3.3.23 Gortracussane Upper (Site 1.23)

This site of 6.3 ha consists of four stands of woodland on the lower western slopes of Torc Mountain, in the centre of the Killarney National Park, Co. Kerry and number of treelines (WL2). along the N71 (Figure 32).

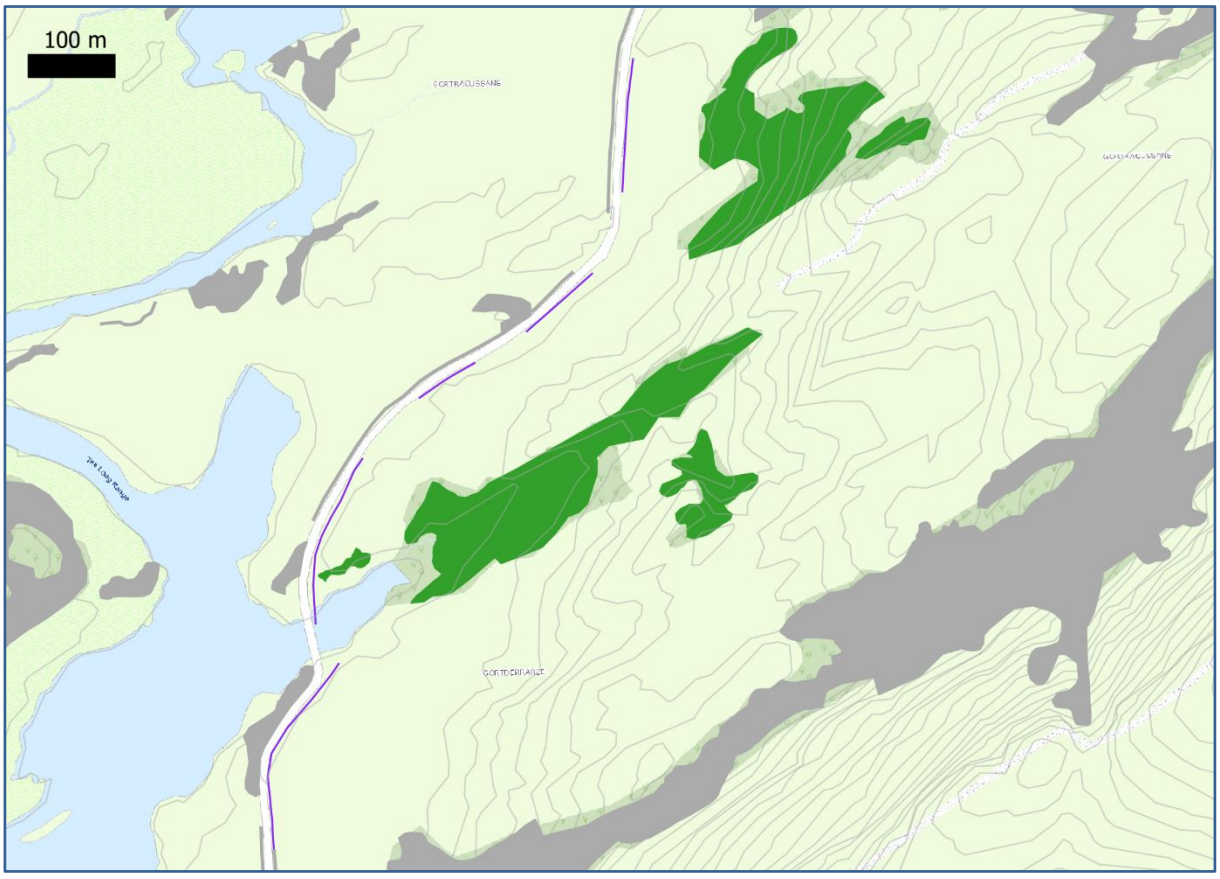

Figure 32 Site map for Gortracussane Upper. ■ = WN1, ■ = other sites, / = WL2.

The character of the woodland is that of rocky acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) with Holly (*Ilex aquifolium*) frequently occurring in the understorey. Other tree species present include Downy Birch (*Betula pubescens*), Strawberry Tree (*Arbutus unedo*), Rowan (*Sorbus aucuparia*), Ash (*Fraxinus excelsior*) and Yew (*Taxus baccata*). Grazing levels are severe throughout and have resulted in a sparse field layer and an absence of natural regeneration. The canopy is somewhat gappy in many places and this is partly because old, fallen trees are not being replaced. Field layer species include Purple Moor-grass (*Molinia caerulea*), Bilberry (*Vaccinium myrtillus*), Heather (*Calluna vulgaris*), Common Bent (*Agrostis capillaris*) and Wood-sorrel (*Oxalis acetosella*), along with ferns such as Bracken (*Pteridium aquilinum*), Hard Fern (*Blechnum spicant*) and Hay-scented Buckler-fern (*Dryopteris aemula*). Lesser Twayblade (*Neottia cordata*) occurs occasionally under deep shade growing amongst leaf litter. In a handful of mineral-flushed flushed areas in the south of the site can be found species such as Pignut (*Conopodium*

majus), Sanicle (*Sanicula europaea*) and Primrose (*Primula vulgaris*). Damp rock faces are frequent throughout the site and support species such as St Patrick's-cabbage (*Saxifraga spathularis*) and Tunbridge Filmy-fern (*Hymenophyllu*m *tunbrigense*). The gametophyte of Killarney Fern (*Trichomanes speciosum*) also occurs. Bryophytes cover is high and species include Little Shaggy-moss (*Rhytidiadelphus loreus*) Short-beaked Wood-moss (*Loeskeobryum brevirostre*), White Earwort (*Diplophyllum albicans*), Slender Mouse-tail Moss (*Isothecium myosuroides*), Broom Fork-moss (*Dicranum scoparium*) and Greater Fork-moss (*Dicranum majus*), plus a number of oceanic species such as Western Earwort (*Scapania gracilis*) and Rock Fingerwort (*Lepidozia cupressina*).

Rhododendron clearance has taken place throughout the woodland and large brash piles are frequent. In these areas, the field layer is even sparser but regeneration of native flora is occurring. However, simultaneously, so is regeneration of Rhododendron. In the north of the site, an exclosure has been created with this brash to exclude grazers. In the same area, but outside the exclosure, a number of Oaks have been underplanted in protective tree-tubes.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires including the removal of piles of Rhododendron brash.

4. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers. Many of the stands are currently too small to support the environmental conditions of a woodland interior.

Old-growth forest status:

This site is highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=13) had a DBH range of 43-138 cm with a median of 65 cm, and Strawberry Tree and Holly each had single DBH measurements of 43 cm and 32 cm, respectively. Nine of the trees recorded were from the woodland interior with five from the woodland edge. Seven of these trees were classified as 'old/gnarly', seven as 'straight' and one as 'multi-stemmed'. There an abundance and high diversity of deadwood within the site including large-scale instances. Subjective samples of these were as follows: Sessile Oak (*n*=4) had a diameter range of 35-79 cm with a median of 51 cm, Holly had diameter measurements of 23, 33 and 40 cm, Downy Birch had a single DBH measurement of 14 cm and there were four unidentified instances with a diameter range of 28-52 cm and a median of 42 cm. Two of these instances were 'standing dead', seven were 'fallen dead' and two were 'old/senescent'. Half of these appear to have died due to old age, with shallow soils causing the majority of the remainder to fall. Excluding the conservation actions of Rhododendron clearance, there are no other significant signs of former human intervention.

Between them, the sample of large trees (*n*=15) supported 12 different TReMs, the most frequent being breakage (15 trees), epiphytic bryophytes and lichens (14), epiphytic climbers (7) and branch holes (6). In terms of structural complexity, the site only occasionally has a multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures, root plates were frequent and bare rock occasional. The dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Some of the measurements for deadwood are rather small but these are limited to records from Holly and Downy Birch with those for Sessile Oak having a median of 51 cm. Therefore,

based on these observations, Gortracussane Upper is considered to fulfil the requirements for old-growth forest status.

3.3.24 Gortroe Woods (Site 1.24)

This site of 31.1 ha lies in the south-west of the Killarney National Park in Co. Kerry on the middle and lower slopes of the western flank of Torc Mountain, stretching down to the shores of the Upper Lake (Figure 33). The N71 passes through the lower sections of the site.

The character of the woodland is that of rocky acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) with Downy Birch (*Betula pubescens*) also frequent whilst abundant Holly (*Ilex aquifolium*) forms the understorey. Other tree species present on an occasional basis include Rowan (*Sorbus aucuparia*), Hazel (*Corylus avellana*), Ash (*Fraxinus excelsior*) and Strawberry Tree (*Arbutus unedo*). Yew (*Taxus baccata*), Grey Willow (*Salix cinerea*), Crab Apple (*Malus sylvestris*) and Aspen (*Populus tremula*) also occur but are rare. Grazing levels are severe throughout and have resulted in a sparse field layer and an absence of natural regeneration. The canopy is somewhat gappy in many places and this is partly because old, fallen trees are not being replaced. The field layer includes Bilberry (*Vaccinium myrtillus*), Heather (*Calluna vulgaris*), Great Wood-rush (*Luzula sylvatica*), Purple Moor-grass (*Molinia caerulea*) and Wood-sorrel (*Oxalis acetosella*), along with ferns such as Hard Fern (*Blechnum spicant*), Hay-scented Buckler-fern (*Dryopteris aemula*) and Bracken (*Pteridium aquilinum*). Bryophyte cover is high and typical species include Little Shaggy-moss (*Rhytidiadelphus loreus*) Short-beaked Wood-moss (*Loeskeobryum brevirostre*), White Earwort (Diplophyllum albicans), Slender Mouse-tail Moss (*Isothecium myosuroides*), Broom Fork-moss (*Dicranum scoparium*) and Greater Fork-moss (*Dicranum majus*). Oceanic species include Western Earwort (*Scapania gracilis),* Rock Fingerwort (*Lepidozia cupressina*), Straggling Pouchwort (*Saccogyna viticulosa*) and Greater Whipwort (*Bazzania trilobata*).

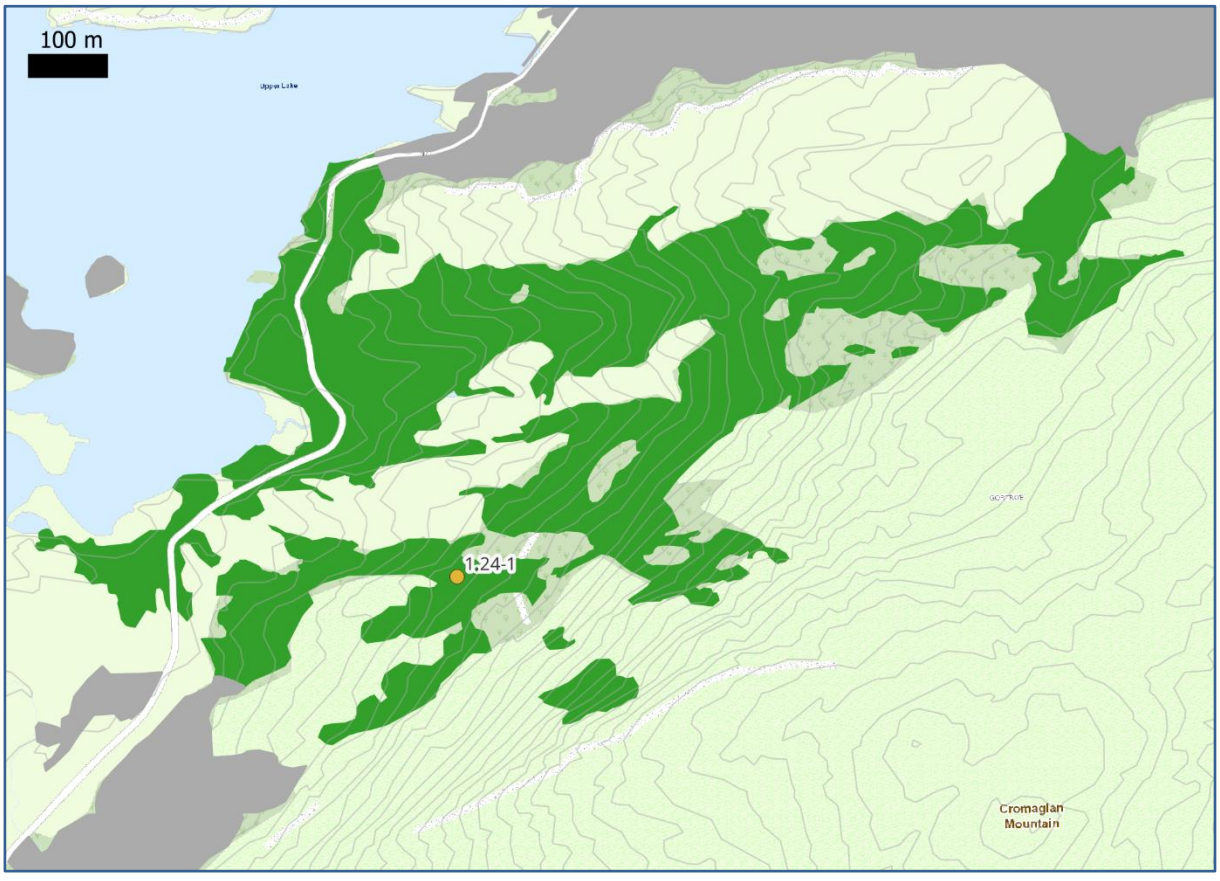

Figure 33 Site map for Gortroe Woods. ■ = WN1, ■ = other sites, ● = relevé.

A number of streamlets cascade throughout the woodland and damp rock faces are frequent. These provide habitat for species such as St Patrick's-cabbage (*Saxifraga spathularis*) and Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*). The gametophyte of Killarney Fern (*Trichomanes speciosum*) occurs in several places and the sporophyte was also recorded in a damp, shaded crevice; this appears to be a previously unrecorded station. Numerous flushy areas provide niches for species such as Remote Sedge (*Carex remota*), Star Sedge (*Carex echinata*), Bulbous Rush (*Juncus bulbosus*), Lesser Spearwort, Lesser Skullcap (*Scutellaria minor*) and Lesser Spearwort (*Ranunculus flammula*). Within these same areas, bryophytes include species such as Bog-mosses (*Sphagnum* spp.), Hart's-tongue Thyme-moss (*Plagiomnium undulatum*) and Dotted Thyme-moss (*Rhizomnium punctatum*).

Rhododendron (*Rhododendron ponticum*) treatment has taken place and large areas of the woodland are clear of both mature plants and regrowth but there is a scattered regeneration across the site. Some burning was evident around the edges in a few instances; this was old damage and not a consequence of the large fire in 2021. A female Skullcap Leaf Beetle (*Phyllobrotica quadrimaculata*) was recorded in the north-east of the site. This is a rare species of leaf beetle that is associated with Skullcap.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires, including removing the piles of Rhododendron brash.

Old-growth forest status:

This site is highly native and with large old trees abundant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=12) had a DBH range of 49-137 cm with a median of 90 cm, Holly (*n*=4) had a DBH range of 41-70 cm with a median of 43 cm, Strawberry Tree had DBH measurements of 58, 59 and 70 cm, and Downy Birch had a single DBH measurement of 57 cm. The majority of these trees were recorded from the interior of the woodland with six being from the edge. Twelve were classified as 'straight' with the remainder being 'old/gnarly'. Deadwood is frequent and it has medium diversity. Subjective samples of large-scale instances by different species were as follows: Sessile Oak (*n*=8) had a diameter range of 37-87 cm with a median of 66 cm, Holly (*n*=4) had a diameter range of 31-54 cm with a median of 36 cm, Strawberry Tree had diameter measurements of 46, 49 and 53 cm, Yew had diameter measurements of 44 and 86 cm, and an unidentified fallen tree measured 56 cm. Of these instances, 11 were 'fallen dead' with shallow soil being noted. Some had experienced damage due to fire. Excluding the conservation actions of Rhododendron clearance, there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=21) supported 15 different TReMs, the most frequent being epiphytic bryophytes and lichens (21 trees), root buttresses (17), breakage (14 trees), microsoils (11) and other cavities (9). In terms of structural complexity, multi-layer structure is abundant and horizontal structural diversity was noted as medium. In terms of natural soil microrelief structures, there are occasional hollows. Lastly, the abundance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Gortroe Woods fulfil the requirements for old-growth forest status.

3.3.25 Kingsboro Wood (Site 1.25)

This site of 8.9 ha is situated in the south-west of the Killarney National Park, Co. Kerry and consists of several woodland stands that broadly follow a stream gully from the middle slopes of Purple Mountain down to the northern shores of the Upper Lake (Figure 34).

The character of the woodland is that of rocky acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*), with abundant gnarly trees of Holly (*Ilex aquifolium*) forming the understorey. Other trees present on an occasional basis within the woodland include Downy Birch (*Betula pubescens*), Strawberry Tree (*Arbutus unedo*), Rowan (*Sorbus aucuparia*), Hazel (*Corylus avellana*), Yew (*Taxus baccata*), Grey Willow (*Salix cinerea*) and Crab Apple (*Malus sylvestris*). The canopy is rather gappy in many places and is breaking up in places as mature Oaks die and are not replaced. This is in part due to severe grazing from deer. The interior of the woodland is very rocky in nature with a high, bryophyte cover, but the field layer is scant due to the severe grazing pressure. Frequent components of the field layer include Bracken (*Pteridium aquilinum)*, Bilberry (*Vaccinium myrtillus*), Purple Moor-grass (*Molinia caerulea*) and Common Bent (*Agrostis capillaris*). Bryophyte cover is high and includes a diverse range of species including Little Shaggy-moss (*Rhytidiadelphus loreus*) Short-beaked Wood-moss (*Loeskeobryum brevirostre*) and White Earwort (*Diplophyllum albicans*). Western, oceanic species present include Western Earwort (*Scapania gracilis),* Straggling Pouchwort (*Saccogyna viticulosa)*, and Greater Whipwort (*Bazzania trilobata*) with Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*) frequently grows in luxuriance amongst the bryophytes.

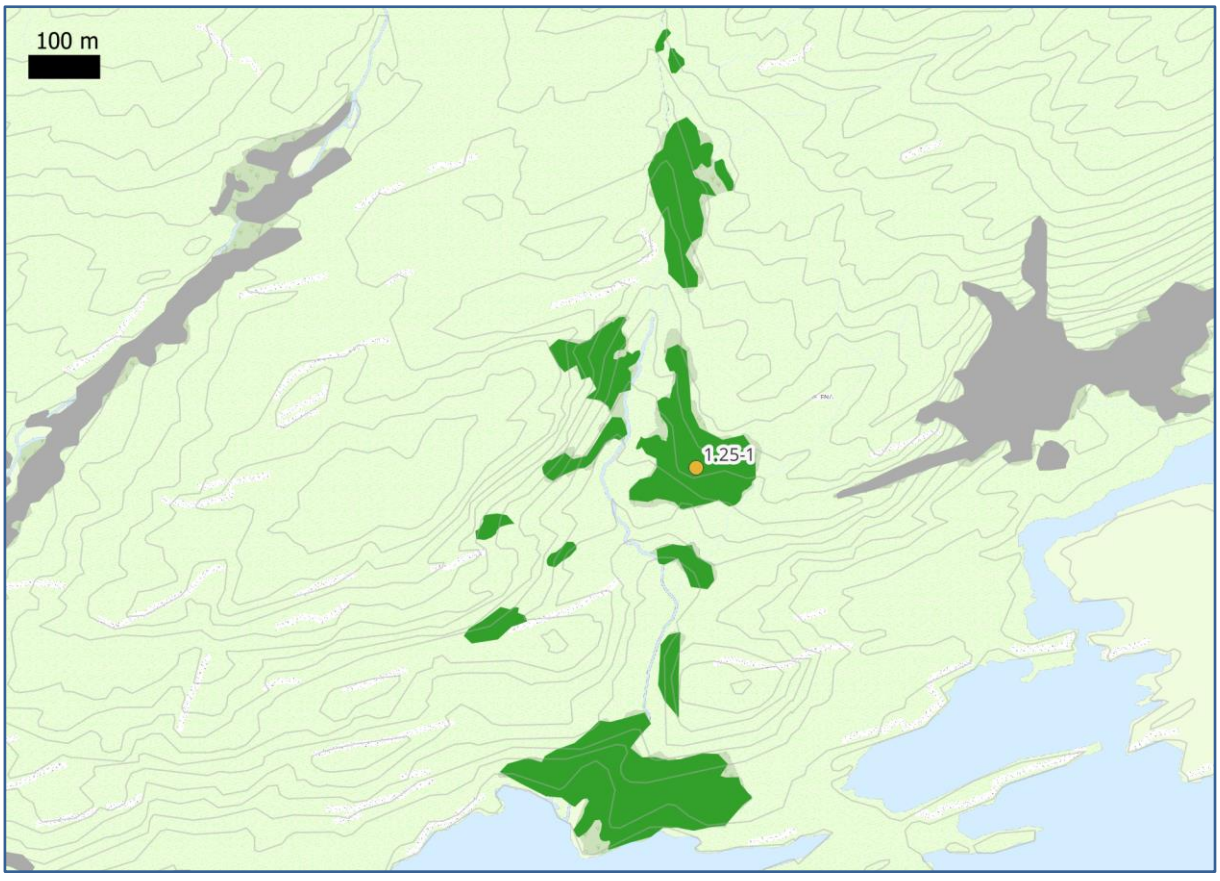

Figure 34 Site map for Kingsboro Wood. ■ = WN1, ■ = other sites, ● = relevé.

A number of flushy areas and streams run through the woodland and in association with these can be found species such Bulbous Rush (*Juncus bulbosus*), Remote Sedge (*Carex remota*),

Star Sedge (*Carex echinata*), Lesser Skullcap (*Scutellaria minor),* Bog Pondweed (*Potamogeton polygonifolius*), Common Haircap (*Polytrichum commune*), Hart's-tongue Thyme-moss (*Plagiomnium undulatum*) and Dotted Thyme-moss (*Rhizomnium punctatum*).

A cascading stream falls through parts of the woodland and this adds biodiversity to the site and provides a niche for a number of species including Lesser Spearwort (*Ranunculus flammula*), St Patrick's-cabbage (*Saxifraga spathularis*) and, rarely, Lemon-scented Fern (*Oreopteris limbosperma*).

Rhododendron (*Rhododendron ponticum*) is present but overall is rare and represented by only younger plants. Some recent treatment of these has been conducted. Around the margins of the woods, especially in the southerly sections, trees and shrubs exhibit damage caused by wildfires and deadwood habitat has been lost.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

Old-growth forest status:

This site is highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=15) had a DBH range of 47-73 cm with a median of 59 cm, Holly DBH measurements of 39 and 42 cm, and a Downy Birch had single DBH measurement of 58 cm. Only four of these trees were recorded from the woodland edge despite the site being long and narrow, with thirteen being from the interior. Three of these trees were classified as 'old/gnarly', thirteen as 'straight' and two as 'multi-stemmed'. There is an abundance and high diversity of deadwood within the site including large-scale instances. Subjective samples of these large-scale instances by different species were as follows: Sessile Oak (*n*=7) had a diameter range of 31-87 cm with a median of 56 cm, Holly (*n*=6) had a diameter range of 33-38 cm with a median of 36 cm and Downy Birch had diameter measurements of 39 and 47 cm. Three of these instances were 'standing dead', seven were 'fallen dead' and five were 'old/senescent'. Excluding the conservation actions of Rhododendron clearance there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=18) supported 14 different TReMs, the most frequent being epiphytic bryophytes and lichens (18 trees), breakage (14), root buttresses (11), epiphytic ferns (7) and microsoils (7). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are occasional root plates, while hollows, mounds and slumping are rare. The dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Kingsboro Wood fulfils the requirements for old-growth forest status.

3.3.26 Knockreer (Site 1.26)

This site of 67.7 ha is situated in the very north of the Killarney National Park, Co. Kerry, immediately to the west of Killarney town (Figure 35). It is an old demesne used for amenity and contains a number of tracks and roads, including parts of the Fossa Way.

Modified broadleaved woodland (WD1) is the primary woodland type. The canopy generally contains a mixture of broadleaf species including Beech (*Fagus sylvatica*), Ash (*Fraxinus excelsior*), Oak (*Quercus* spp.), Lime (*Tilia* sp.), Sycamore (*Acer pseudoplatanus*), Holly (*Ilex aquifolium*) and Rowan (*Sorbus aucuparia*). The field layer varies depending on light levels but frequent components include Bramble (*Rubus fruticosus* agg.), Irish Ivy (*Hedera hibernica*), Wood Sanicle (*Sanicula europaea*), Dog-violets (*Viola* sp.) and False-brome (*Brachypodium sylvaticum*).

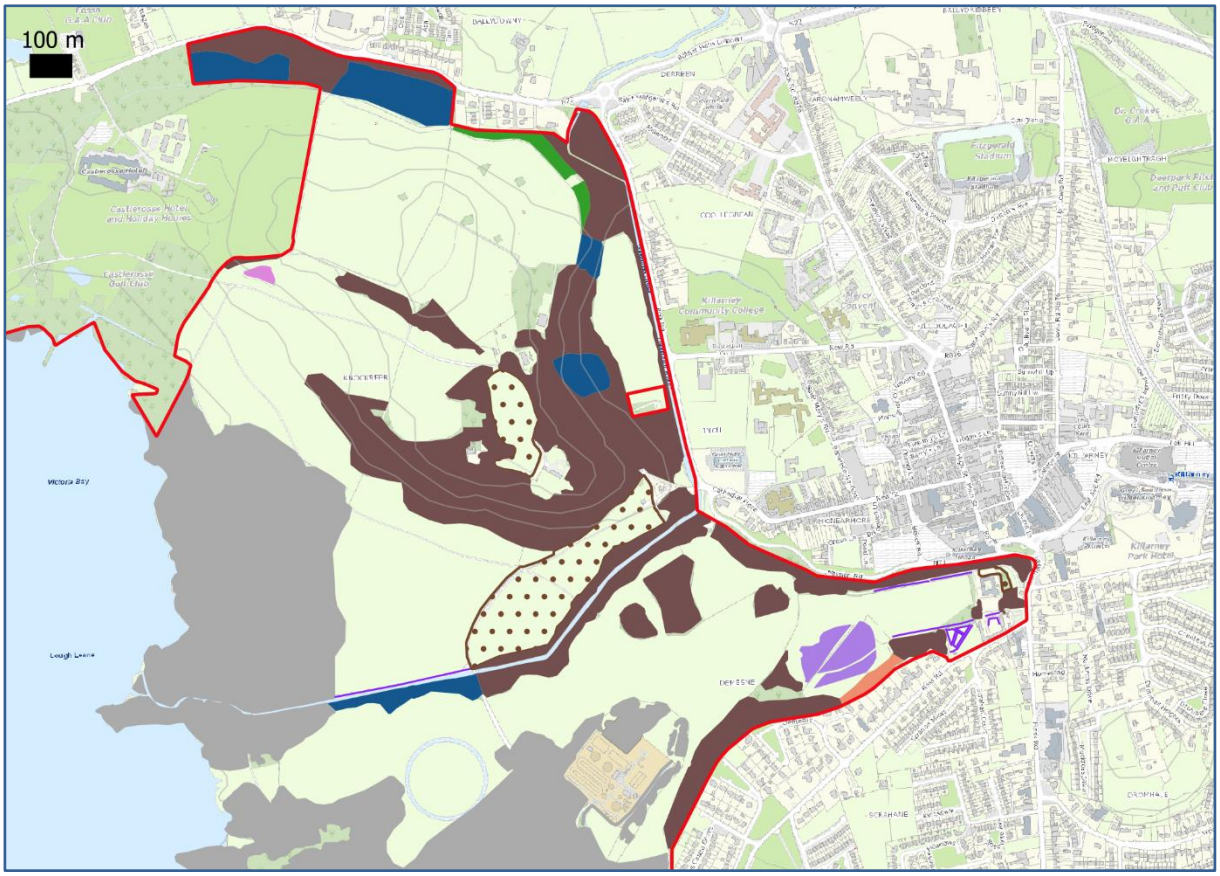

Figure 35 Site map for Knockreer. ■ = WN1, ■ = WN6, ■ = WD1, ■ = WD2, ⁘ = WD5, ■ = WS1, ■ = WS2, ■ = other sites, / = WL2, / = property boundary.

There are also several stands of wet woodland (WN6/91E0), such as in Bellview Wood. Two slightly different variants of wet woodland occur. In the eastern half of this wood Grey Willow (*Salix cinerea*) dominates with Ash (*Fraxinus excelsior*) abundant and both Alder (*Alnus glutinosa*) and Downy Birch (*Betula pubescens*) occasional. Here the field layer is dominated by Remote Sedge (*Carex remota*) whilst Soft Rush (*Juncus effusus*), Water Mint (*Mentha aquatica*), Yellow Iris (*Iris pseudacorus*), Creeping Buttercup (*Ranunculus repens*) and Marsh Bedstraw (*Galium palustre*) all occur frequently. Ash dieback is common and in areas where it is more severe, Beech regeneration is plentiful. In the western half of Bellview Wood, Alder is more frequent in the canopy with Grey Willow now occasional and Ash remaining frequent. The field layer here is dominated by an extensive carpet of Greater Horsetail (*Equisetum telmateia*) and Remote Sedge, along with other characteristic species such as Water Mint, Marsh Bedstraw, Meadowsweet (*Filipendula ulmaria*) and Opposite-leaved Golden-saxifrage (*Chrysosplenium oppositifolium*). Standing water is frequent throughout and a number of old drains exist within the woodland with little to no flow of water and provide habitat for aquatic

species such as Water-cress (*Nasturtium officinale*) and Lesser Spearwort (*Ranunculus flammula*). Wet woodland also occurs along the River Walk and in two patches due north of the Education Centre. Here the canopy is dominated by Alder and Grey Willow with Ash frequent.

Also occurring within the site are a few areas of immature woodland (WS2), mixed conifer/broadleaved woodland (WD2), parkland (WD5), treelines (WL2) and hedgerows (WL1). An area of young, oak woodland that has been planted in recent years, (WN1) contains Sessile Oak (*Quercus petraea*), Rowan (*Sorbus aucuparia*) and Holly (*Ilex aquifolium*).

Grazing levels are extremely high within the site with topiary effect and bark stripping are frequent throughout. A number of Japanese Knotweed (*Reynoutria japonica*) plants occur adjacent to the path that runs through Bellview Wood. Other alien invasive species in varying quantities include Rhododendron (*Rhododendron ponticum*), Cherry Laurel (*Prunus laurocerasus*), Snowberry (*Symphoricarpos albus*), Traveller's-joy (*Clematis vitalba*), Montbretia (*Crocosmia* × *crocosmiiflora*), Winter Heliotrope (*Petasites pyrenaicus*), Portugal Laurel (*Prunus lusitanica*) and Bamboo (*Sasa* spp.).

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Remove other non-native species including Japanese Knotweed, Cherry Laurel, Snowberry, Traveller's-joy, Montbretia, Winter Heliotrope, Portugal Laurel and Bamboo.

4. Convert the areas of modified woodland (WD1) to native broadleaved woodland by removing mature and regenerating non-native species of broadleaves. Allow these areas to naturally regenerate, protecting regeneration if necessary.

Old-growth forest status:

The WN6 areas in Bellview Wood and along the River Walk were considered. These areas have medium native status but large old native trees are frequent and there is a medium standing volume. Subjective samples of these trees by different species were as follows: Grey Willow (*n*=8) had a DBH range of 50-61 cm with a median of 56 cm, Downy Birch (*n*=4) had a DBH range of 45-53 cm with a median of 51 cm, Alder had DBH measurements of 37 and 59 cm, and Sessile Oak had DBH measurements of 65 and 110 cm. Six of these trees were from the woodland edge with the remaining ten from the interior. Four of these trees were classified as 'old/gnarly' and twelve as 'straight'. Deadwood has low diversity and is only occasional but large-scale instances do occur. Subjective samples of these large-scale instances by different species were as follows: Downy Birch (*n*=5) had a diameter range of 32-61 cm with a median of 43 cm, Ash (*n*=4) had a diameter range of 35-48 cm with a median of 40 cm, Alder had diameter measurements of 32, 39 and 48 cm, and Grey Willow had diameter measurements of 31 and 43 cm. Three of these instances were 'standing dead', four were 'fallen dead' and seven were 'old/senescent'. Four of the measured trees appeared to have died due to ash dieback, two others due to old age and five fallen due to shallow or waterlogged soils. Drains are present but it is unclear the level of impact these have.

Between them, the sample of large trees (*n*=16) supported 15 different TReMs, the most frequent being epiphytic bryophytes and lichens (16 trees), epiphytic climbers (15), microsoils (11), breakage (10) and cankers/burrs (10). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are

frequent hollows and occasional root plates. Wet woodland areas such as these would not be expected to support species typical of late-seral development phases.

Based on these observations the WN6 areas in Bellview Wood in the north of Knockreer are considered to fulfil the requirements for old-growth forest status. The strip of WN6 woodland along the River Walk has insufficient large trees and deadwood.

3.3.27 Looscaunagh (Site 1.27)

This site of 23.6 ha is situated in the far south-west of the Killarney National Park, Co. Kerry, on the north-eastern slopes of Foardal (Figure 36). The woodland occurs east of Lake Looscaunagh and is bordered to the north by the N71.

The largest extent of habitat within the site is that of conifer plantation (WD4) that occurs as several smaller stands in the west and an extensive block in the east. The plantation is dominated by non-native conifers including Spruce (*Picea* spp.), Lodgepole Pine (*Pinus contorta*), Western Hemlock-spruce (*Tsuga heterophylla*) and Fir (*Abies* sp.). The ground is typically covered in a dense layer of needles and the field layer under canopy is largely absent except for areas where some more light gets through where it includes species such as Wood-sorrel (*Oxalis acetosella*), Irish Ivy (*Hedera hibernica*) and Bramble (*Rubus fruticosus* agg.). Areas of windthrow are frequent and here the field layer is more developed and includes species such as Foxglove (*Digitalis purpurea*), Purple Moor-grass (*Molinia caerulea*), Soft Rush (*Juncus effusus*) and Bracken (*Pteridium aquilinum*). In the north of the site, mixed conifer/broadleaved woodland (WD2) occurs that contains conifers alongside typical WN1 species including Sessile Oak (*Quercus petraea*), Holly (*Ilex aquifolium*) and Rowan (*Sorbus aucuparia*).

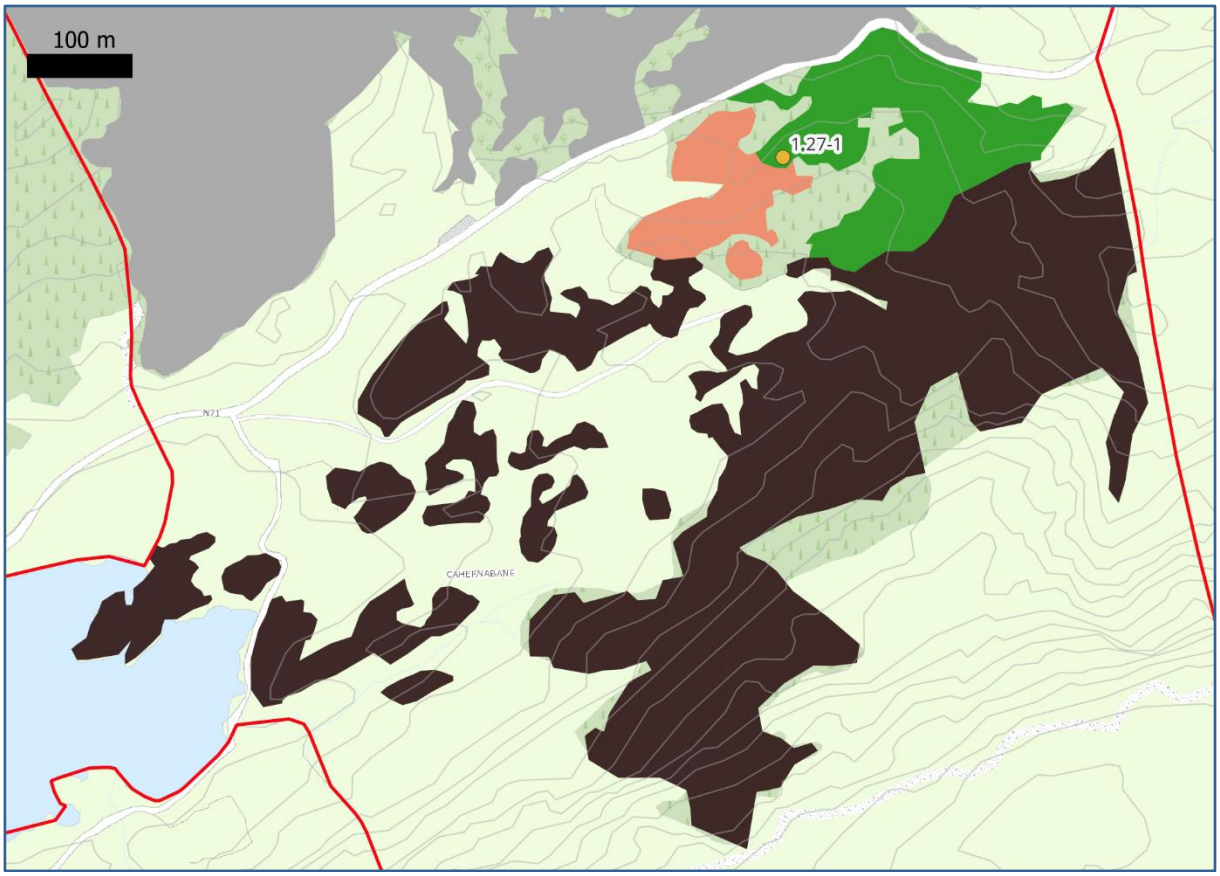

Figure 36 Site map for Looscaunagh. ■ = WN1, ■ = WD2, ■ = WD4, ■ = other sites, ● = relevé, / = property boundary.

In the north-east corner of the site, the conifers mostly dissipate and the woodland here is more that of rocky acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak with Holly forming the understory. Sitka Spruce (*Picea sitchensis*) is present but only occasional. The field layer includes Bracken, Purple Moor-grass, Wood-sorrel, Great Wood-rush (*Luzula sylvatica*) and Hard Fern (*Blechnum spicant*). Bryophyte cover is high and includes Little Shaggy-moss (*Rhytidiadelphus loreus*), Short-beaked Wood-moss (*Loeskeobryum brevirostre*), Straggling Pouchwort (*Saccogyna viticulosa*) and Slender Mouse-tail Moss (*Isothecium myosuroides*), along with oceanic species such as Western Earwort (*Scapania gracilis*) and Greater Whipwort (*Bazzania trilobata*).

Grazing levels are high throughout and have contributed to a sparse field layer and an absence of natural regeneration in the oak woodland. Overall levels of Rhododendron were fairly low with the species mostly occurring in north of the site. Recent treatment has taken place although there is some regrowth.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Restore the area of oak woodland by removing Sitka Spruce and any other conifers and allowing natural regeneration to replace them.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

5. Convert the areas of non-native woodland (WD2 and WD4) to native broadleaved woodland by removing mature and regenerating species of conifers.

Old-growth forest status:

The WN area of this site is highly native with large old trees abundant and a medium standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=6) had a DBH range of 46-81 cm with a median of 57 cm, Downy Birch (*Betula pubescens*) had DBH measurements of 44 and 54 cm, and Holly and Rowan had single DBH measurements of 21 cm and 35 cm, respectively. Only four of these trees were recorded from the woodland interior with the remaining six being from near the edge. Four of these trees were classified as ‘old/gnarly’, five as ‘straight’ and one, the Holly, as ‘multi-stemmed’. Deadwood is occasional at the site and has a medium diversity. Subjective samples of the large-scale instances which occur by species type were as follows: Holly had diameter measurements of 31, 33, and 33 cm, Downy Birch had diameter measurement of 52 and 31 cm, and a single Sessile Oak had a diameter measurement of 57 cm. Four of these instances were ‘standing dead’ and three were ‘old/senescent’. Despite the adjoining forestry and modified woodland there is no significant human intervention evident, apart from the conservation actions of Rhododendron clearance.

Between them, the relatively small sample of large trees (*n*=10) supported 13 different TReMs, the most frequent being epiphytic bryophytes and lichens (10 trees), microsoils (7), epiphytic ferns (7) and breakage (6). In terms of structural complexity, the site frequently has a multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures hollows, mounds and slumping occur but are rare. The dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN area at Looscaunagh fulfils the requirements for old-growth forest status.

3.3.28 Lower Lake Islands (Site 1.28)

This site of 28.1 ha is comprised of more than a dozen wooded islands that are scattered across Lough Leane, in the Killarney National Park, Co. Kerry (Figure 37). These islands contain a range of woodland types including semi-natural and highly modified woodland. Most of these islands do not have a lot of human footfall with the exception of Brown Island and Inishfallen which are popular stop-off points for lake boat tours.

In the north of the lake is Inishfallen, the largest of all the islands, and the most frequented by humans. The woodland here is mainly composed of often rocky, modified broadleaved woodland that has a varying canopy including Pedunculate Oak (*Quercus robur*), Yew (*Taxus baccata*), Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*) and Beech (*Fagus sylvatica*). Understorey species include Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*) and Elder (*Sambucus nigra*). Due to the dense canopy, the field layer in parts is relatively scant but includes species such as Bramble (*Rubus fruticosus* agg.), Irish Ivy (*Hedera hibernica*) and Enchanter's Nightshade (*Circaea lutetiana*). Wet woodland (WN6/91E0) occurs at the lake edge in the west of the island and receives seasonal inundation. The canopy is rather low and is dominated by Grey Willow (*Salix cinerea*) with Ash, Alder (*Alnus glutinosa*) and Buckthorn (*Rhamnus cathartica*) also occurring frequently. Other species present but occurring only occasionally include Downy Birch (*Betula pubescens),* Hawthorn and Guelder-rose (*Viburnum opulus*). The field layer is somewhat grassy and short, and includes species such as Creeping Bent (*Agrostis stolonifera*), Lesser Spearwort (*Ranunculus flammula*), Marsh Ragwort (*Jacobaea aquatica*), Hemlock Water-dropwort (*Oenanthe crocata*), Water Mint (*Mentha aquatica*), Marsh Marigold (*Caltha palustris*), Marsh Bedstraw (*Galium palustre)* and Marsh Pennywort (*Hydrocotyle vulgaris*). Along areas of sandy shoreline, Variegated Horsetail (*Equisetum variegatum)* occurs and in places can be considered frequent.

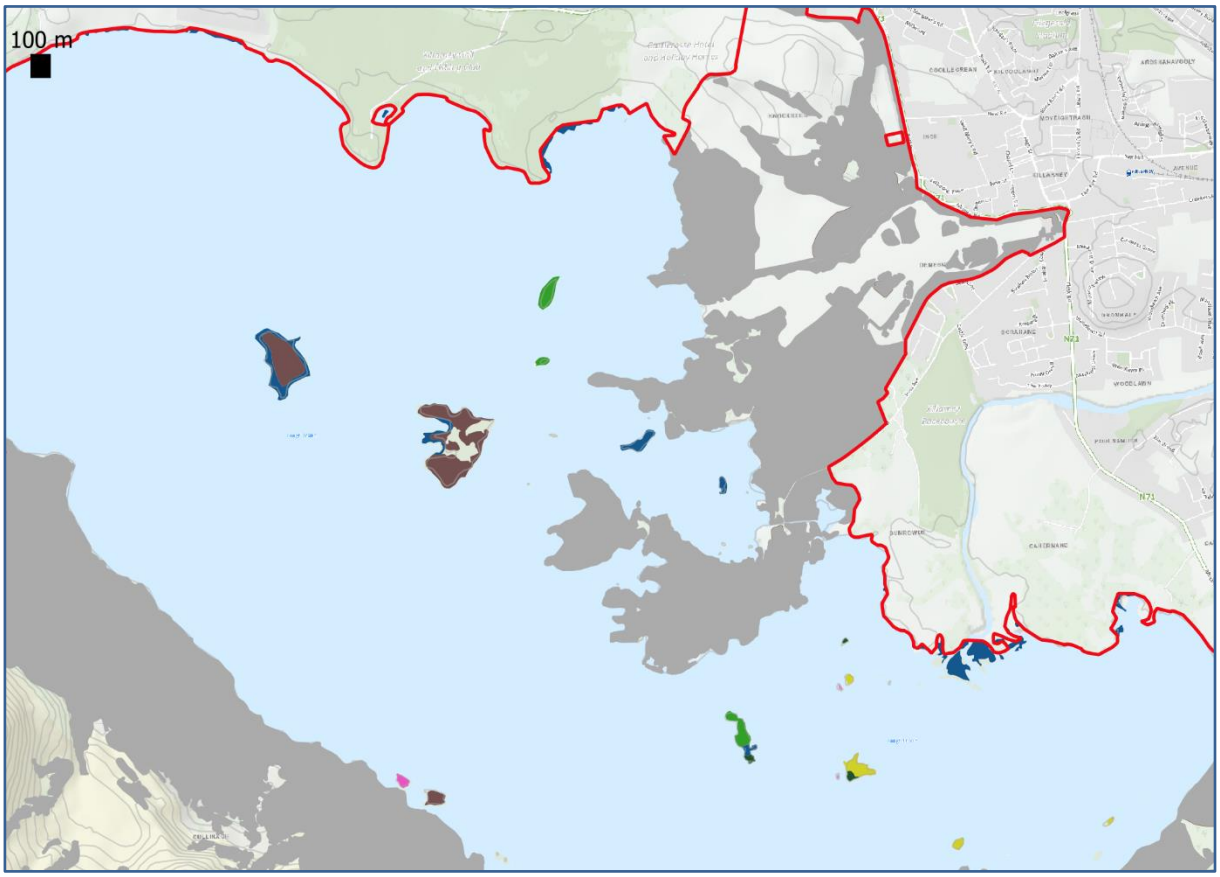

Figure 37 Site map for Lower Lake Islands. ■ = WN1, ■ = WN6, ■ = WD1, ■ = WS3, ■ = WN2, ■ = other sites, / = property boundary.

North-west of Inishfallen is Brown Island which is covered in dry, modified broadleaved woodland (WD1) surrounded by a fringe of wet woodland. The dry woodland is dominated by Beech and Sycamore with Pedunculate Oak, Ash and Holly also occurring. The majority of the field layer is poorly developed owing to the rocky ground and high canopy cover, but includes Primrose (*Primula vulgaris*), Wood Sanicle (*Sanicula europaea*) and Lords-and-Ladies (*Arum maculatum*). The wet woodland species here are similar to those found on Inishfallen. Rhododendron (*Rhododendron ponticum*) is present on site and signs of previous clearance and treatment are visible, however regrowth is frequent in some areas.

South of Ross Island (not part of this site) is the narrow Rough Island that supports oak woodland (WN1/91A0) and wet woodland (WN6/91E0). The wet woodland is dominated by a canopy of Ash and Grey Willow with Buckthorn also abundant. Alder and Guelder-rose are occasional species and Crab Apple (*Malus sylvestris*) is rare. The ground layer is well-developed and includes species such as Water Mint, Hemlock Water-dropwort, Wild Angelica (*Angelica sylvestris*), Meadowsweet (*Filipendula ulmaria*), Marsh Bedstraw and Lesser Meadow-rue (*Thalictrum minus*). Commonly occurring bryophytes include Tree-moss (*Climacium dendroides*) and Fox-tail Feather-moss (*Thamnobryum alopecurum*). Several extensive patches of Montbretia (*Crocosmia* × *crocosmiiflora*), occur on the edge of this wet woodland where it transitions to oak woodland and they are beginning to outcompete native species. In the north of the island, the area of oak woodland is dominated by a canopy of Sessile Oak (*Quercus petra*ea) with some Pedunculate Oak present and with Holly occurring in the understorey. Strawberry Tree (*Arbutus unedo*) and Rowan (*Sorbus aucuparia*) are also present but only on an occasional basis. The field layer includes a well-developed cover of Great Wood-rush (*Luzula sylvatica*), Bracken (*Pteridium aquilinum*), Bramble and Irish Ivy. Bryophytes are frequent and include Little Shaggy-moss (*Rhytidiadelphus loreus*), Large White-moss (*Leucobryum glaucum*), Swan's-neck Thyme-moss (*Mnium hornum*) and White Earwort (*Diplophyllum* albicans). On the northern woodland edge, Betony (*Betonica officinalis*) occurs somewhat frequently. On the southern tip of the island is a small stand of yew (WN3). Some Beech occur here but have been ring-barked. Grazing levels on this island are low, but not absent, resulting in some regeneration of native species. A small number of trees have been fire-damaged after a campfire went out of control. Some Rhododendron treatment has taken place.

East of Rough Island is Cow Island. The character of the woodland is that of mostly rocky oak-ash-hazel woodland (WN2) with areas dominated by Yew on outcropping limestone (WN3/91J0). The field layer contains species such as Wood Sanicle, Irish Ivy, False Brome and Hart's-tongue Fern (*Asplenium scolopendrium*). Ivy Broomrape (*Orobanche hederae*) also occurs abundantly in a number of areas and Adder's-tongue Fern (*Ophioglossum vulgatum*) grows at the edge of the woods in a slightly wetter depression. Betony (*Betonica officinalis*) is somewhat frequently around the edges of the woodland. A number of non-native species occur on this island and include Chilean Myrtle (*Luma apiculata*) and Portugal Laurel (*Prunus lusitanica*).

Three of the smaller islands, Ash Island, Crow Island and Osprey Rock contain further examples of oak-ash-hazel woodland (WN2) with species such as Ash and Spindle (*Euonymus europaeus*), along with non-native trees such as Sycamore. A tiny stand of yew woodland (WN3) occurs on Swallow Island. Stands of oak woodland (WN1/91A0) occur on Lamb Island and Heron Island both north-east of Inishfallen. Wet woodland (WN6/91E0) also occurs on Cherry Island and Boathouse Island, both north of Ross Island, and along parts of the shore at Fossa, Lackabane, Bunrower and Cahernane. A scattering of tiny islands supports scrubby, stunted groups of trees and shrubs (WS1).

A further variant of highly modified broadleaved woodland (WD1) occurs on Burnt Island in the south-west of the lake close to Glena. The island contains a native canopy of Sessile Oak but is infested with Rhododendron (*Rhododendron ponticum*) to such an extent that is now lacks the typical understorey and field layer for acidophilous oak woodland. Finally, north of this same island is Stag Island which is dominated by Rhododendron scrub (WS3).

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. This is particularly true for Inishfallen and Brown Island which are severely grazed and contain deer that are actively breeding.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Although past treatment has occurred on a number of islands, regeneration has occurred in some areas and Burnt Island and Stag Island are both infested.

3. Remove other non-native species including Montbretia, Portugal Laurel and Chilean Myrtle.

4. Improve the native status of the oak-ash-hazel woodland by removing the Sycamore.

5. Protect the woodlands on the various islands from fire damage by taking all reasonable precautions to reduce wildfires, for example, dissuading the use of campfires.

6. Convert the areas of modified woodland (WD1) to native broadleaved woodland by removing from the canopy native species of broadleaves, particularly Beech and Sycamore. In their place, native species should be promoted through the planting of local provenance saplings or through natural regeneration. Extant regeneration of non-native species should also be removed.

Old-growth forest status:

The WN areas on the islands are generally highly native with frequent large, old trees and a medium standing volume. Subjective samples of these large trees by species were as follows: Yew (*n*=6) had a DBH range of 57-107 cm with a median of 77 cm, Pedunculate Oak (*n*=5) had a DBH range of 51-113 cm with a median of 79 cm, Strawberry Tree had DBH measurements of 49 and 57 cm, and Alder, Downy Birch, Scots Pine (*Pinus sylvestris*), Hybrid Oak (*Quercus* × *rosacea*) and Grey Willow had single DBH measurements of 68 cm, 53 cm, 59 cm, 89 cm and 39 cm, respectively. Almost half of these trees were recorded from the woodland edge as might be expected from islands. Nine of these trees were classified as ‘old/gnarly’, ten as ‘straight’ and two as ‘multi-stemmed’. Deadwood is frequent within the site and has medium diversity including large-scale instances. Subjective samples of these large-scale instances by different species were as follows: Ash (*n*=6) had a diameter range of 33-61 cm with a median of 43 cm, Sessile Oak had diameter measurements of 43, 45 and 64 cm, Grey Willow had diameter measurements of 33, 38 and 45 cm, and Downy Birch, Holly and an unidentified instance had single diameter measurements of 37 cm, 47 cm and 42 cm, respectively. Three of these instances were ‘standing dead’, nine were ‘fallen dead’ and three were ‘old/senescent’. No significant human intervention is evident.

Between them, the sample of large trees (*n*=21) supported 17 different TReMs, the most frequent being epiphytic bryophytes and lichens (21 trees), microsoils (13) and branch holes (10). In terms of structural complexity, the site has an abundance of multi-layer structure and horizontal structural diversity is high due to lower grazing levels. In terms of natural soil microrelief structures, there are occasional mounds, root plates and slumping. The local dominance of Sessile Oak, Yew and Ash is indicative of a late-seral developmental phase for the different terrain types present, whereas the wet woodland areas would not be expected to support significant numbers of these species.

These observations are from a subset of the islands within the Lower Lake Islands site and are the only ones which can be considered here. On Inishfallen, the area of WN6 has only a few large trees and insufficient deadwood. A number of deadwood records were made from Brown Island, but they were modest in size and there was only one large tree, a Scots Pine. Cow Island has a sufficient number of large trees but of the three instances of deadwood recorded there, two were modest in size. Consequently, these areas are considered not to fulfil the mandatory requirements for old-growth forest status. Rough Island, however, can be considered to fulfil the requirements.

3.3.29 Muckross Abbey (Site 1.29)

This site occurs of 48.5 ha occurs in the east of the Killarney National Park, Co. Kerry (Figure 38). It sits north of Muckross House and the south-eastern shores of Lough Leane form the western boundary of the site. It is very popular with walkers and a number of tracks and paths occur.

The wooded areas chiefly comprised modified broadleaved woodland (WD1) and two main variants occur. The first is chiefly dominated by Beech (*Fagus sylvatica*) with Sycamore (*Acer pseudoplatanus*) abundant and Horse Chestnut (*Aesculus hippocastanum*), Wych Elm (*Ulmus glabra)* and Lime (*Tilia* sp.) all occasional. Holm Oak (*Quercus ilex*) is rare. The field layer varies but includes species such as Bramble (*Rubus fruticosus* agg.), Irish Ivy. (*Hedera hibernica*), Great Wood-rush (*Luzula sylvatica*) and False-brome (*Brachypodium sylvaticum*) together with fern species such as Hart's-tongue Fern (*Asplenium scolopendrium*) and Soft Shield-fern (*Polystichum setiferum*). The second variant occurs in the southern part of Abbey Wood and is dominated by Grey Willow (*Salix cinerea*) and Downy Birch (*Betula pubescens*). Although the canopy is native, this woodland is infested with dense Rhododendron (*Rhododendron ponticum*) and is now modified to the extent that the entire woodland lacks the typical understorey and field layer for wet woodland.

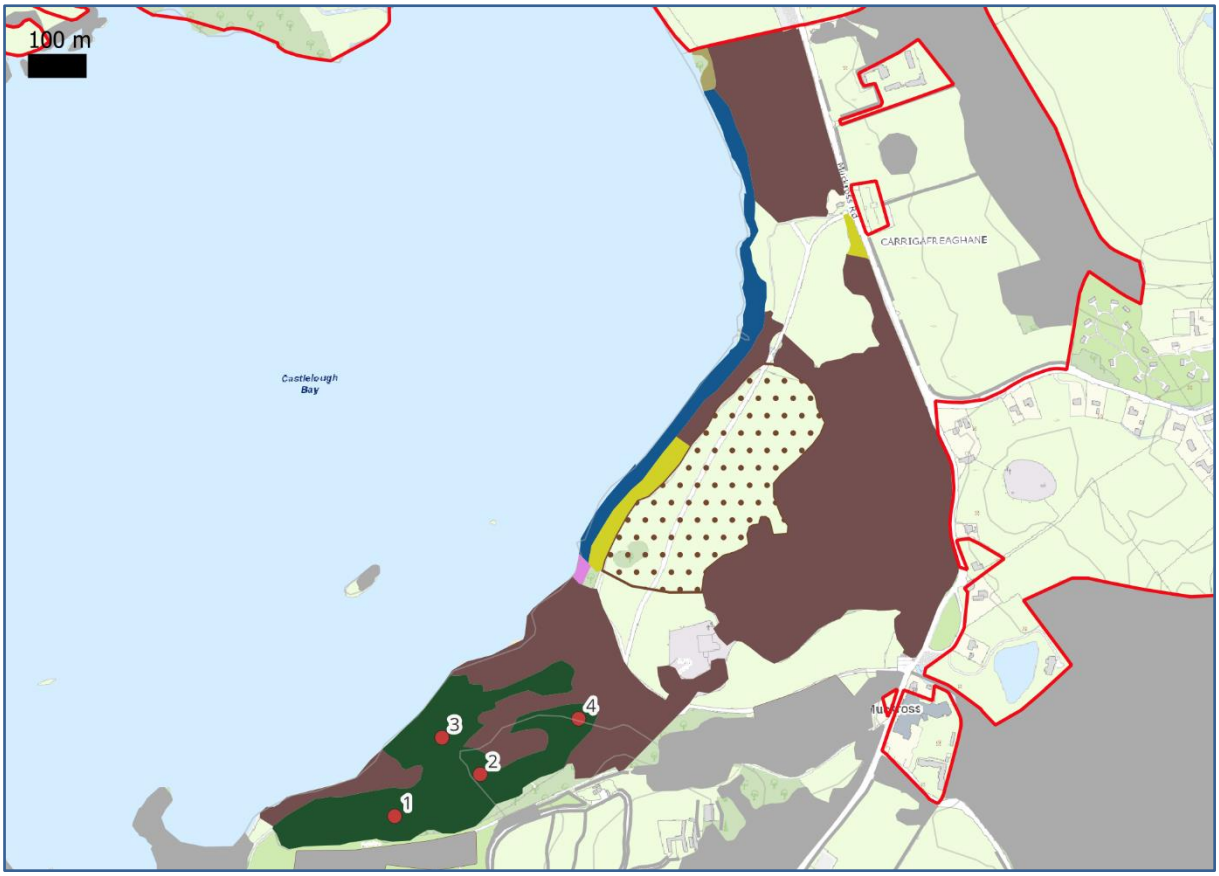

Figure 38 Site map for Muckross Abbey. ■ = WN2, ■ = WN3, ■ = WN6, ■ = WD1, ■ = WD3, ⁘ = WD5, ■ = WS1, ■ = other sites, / = property boundary.

Yew woodland (WN3/91J0) occurs in Monks Wood, an area of outcropping limestone in the south-west of the site. Here the woodland is dominated a canopy of Yew (*Taxus baccata*) with Ash (*Fraxinus excelsior*) frequent and Wild Cherry (*Prunus avium*) occasional. Holly (*Ilex aquifolium*) and Hazel (*Corylus avellana)* form the understorey. The field layer includes Hart's-tongue Fern, False Brome, Wood Sanicle (*Sanicula europaea*), Irish Ivy, Dog-violets (*Viola* spp.) and Barren Strawberry (*Potentilla sterilis*). Both Tutsan (*Hypericum androsaemum*) and the non-native lookalike Rose-of-Sharon (*Hypericum calycinum*) occur, the latter being sometimes more frequent. Non-native Hybrid Bluebell (*Hyacinthoides* × *massartiana*) also

occurs occasionally. The bryophyte layer is typically dominated by Fox-tail Feather-moss (*Thamnobryum alopecurum*) but also includes Big Shaggy-moss (*Hylocomiadelphus triquetrus* syn. *Rhytidiadelphus triquetrus*), Crisped Neckera (*Neckera crispa*) and Forked Veilwort (*Metzgeria furcata*).

Wet woodland (WN6/91E0) occurs in the west of the site, along the shores of Lough Leane. Here the woodland is low-lying and with a fairly open canopy dominated by Grey Willow with Ash and Alder (*Alnus glutinosa*) also occurring frequently. An occasional understorey is formed of Hawthorn (*Crataegus monogyna*) and Elder (*Sambucus nigra*). The field layer contains Purple Moor-grass (*Molinia caerulea*), Pale Sedge (*Carex pallescens*) Hemlock Water-dropwort (*Oenanthe crocata*), Dog-rose (*Rosa canina*), Meadowsweet (*Filipendula ulmaria*), Lesser Meadow-rue (*Thalictrum minus*), Hemp-agrimony (*Eupatorium cannabinum*) and, occasionally, Heath Dog-violet (*Viola canina*). Commonly occurring bryophytes include Pointed Spear-moss (*Calliergonella cuspidata*) and Tree-moss (*Climacium dendroides*).

In the centre of the site is a large area of parkland with scattered veteran trees (WD5) and a small block of conifer woodland (WD3) dominated by Scots Pine (*Pinus sylvestris*) occurs adjacent to rowing club in the north of the site. Small areas of oak-ash-hazel woodland (WN2) occurs with Pedunculate Oak (*Quercus robur*).

Rhododendron (*Rhododendron ponticum*) and Cherry Laurel (*Prunus laurocerasus*) are both frequent throughout the site and form large thickets in places. Large areas of the infestation of Abbey Wood mentioned above have recently been treated. Dense Cherry Laurel has been cleared from the southern margins of Monks Wood. Other alien species occurring include Three-cornered Leek (*Allium triquetrum*), Cotoneaster (*Cotoneaster* sp.). Traveller's-joy (*Clematis vitalba*) and Bamboo (*Sasa* sp.). Traveller's-joy has been cleared from small areas near a bridge in the north of the site.

In the east of the site, close to the N71, there is a pipe that is leaking sewage directly into the woodland and some felling has occurred in the north of the site behind the gate lodge. Grazing levels are high and regeneration of native species is virtually absent.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Despite previous works, regeneration is occurring.

3. Remove other non-native species including Cherry Laurel, Three-cornered Leek, Cotoneaster, Traveller's-joy, Rose-of-Sharon, Hybrid Bluebells and Bamboo.

4. Improve the native status of the yew woodlands at Monks Wood by removing non-native conifers and broadleaves.

5. Convert the areas of modified woodland (WD1) to native broadleaved woodland by removing mature and regenerating non-native species of broadleaves. Allow these areas to naturally regenerate, protecting regeneration if necessary.

6. Retain deadwood within the woodlands where felling operations occur.

7. The sewage pipe situation should be rectified to stop further leaking of effluent into the woodland and its environs.

Old-growth forest status:

The WN areas of this site have a reasonably high native status with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as

follows: Yew (*n*=7) had a DBH range of 62-100 cm with a median of 77 cm, Sessile Oak (*Quercus petraea*) had DBH measurements of 84 and 102 cm, and Beech, Ash and Monterey Pine (*Pinus radiata*) had single DBH measurements of 90 cm, 72 cm and 194 cm respectively. Three of these trees were recorded from the woodland edge, with the remainder from the interior. Six of these trees were classified as 'old/gnarly' and six as 'straight'. As some of these trees are non-native, they received less weighting in the consideration. Deadwood is frequent at this site with medium diversity including large-scale instances. Subjective samples of these large-scale instances by different species were as follows: Yew had diameter measurements of 37 and 62 cm, Pine (*Pinus* sp.) had diameter measurements of 54 and 54 cm, Sessile Oak had a single diameter measurement of 95 cm and an unidentified instance had a diameter measurement of 35 cm. Two of these instances were 'standing dead', three were 'fallen dead' and five were 'old/senescent'. Excluding the conservation actions of clearance of non-natives, no significant human intervention is evident.

Between them, the sample of large trees (*n*=12) supported 7 different TReMs, the most frequent being breakage (9 trees), epiphytic climbers (8) and microsoils (8). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is rather low. In terms of natural soil microrelief structures, there are occasional hollows and root plates, while burrows are rare. The dominance of Yew is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN3 area of Muckross Abbey, where the majority of the data comes from fulfils the requirements for old-growth forest status. The WN6 areas along the lakeshore and the WN2 section which adjoins this lack the required deadwood habitat and woodland structure, despite some large trees being present.

3.3.30 Muckross Forest (Site 1.30)

This vast site of 275.0 ha lies on the eastern edge of Killarney National Park in the Killarney National Park, Co. Kerry, stretching from the slopes of Mangerton Mountain as far north as the village of Muckross (Figure 39). A number of streams and streamlets run through the site, including the Owengarriff River which form part of the western boundary. The site is a very popular site for amenity purposes and a number of paths and trails traverse the wooded areas. Infestation of mature Rhododendron (*Rhododendron ponticum*) is abundant across the site and it frequently dominates the shrub and understory layers of woodland.

The vast majority of the site is dominated by conifer plantation (WD4). Two variants of this habitat occur. The first type contains a range of densely planted conifers including Sitka Spruce (*Picea sitchensis*), Larch (*Larix* spp.) and Scots Pine (*Pinus sylvestris*). The ground is typically covered in a dense layer of needles and the field layer is largely absent and except for areas where more light gets through and then a scant cover of species such as Wood-sorrel (*Oxalis acetosella*), Irish Ivy (*Hedera hibernica*) and Bramble (*Rubus fruticosus* agg.) occur. Rarely, Lesser Twayblade (*Neottia cordata*) occurs growing under the shade amongst leaf litter.

The second variant arises where the conifers are less densely planted and are primarily dominated by Scots Pine. Owing to greater light levels, the field layer is thus more well-developed and includes carpets of Great Wood-rush (*Luzula sylvatica*), along with Hard Fern (*Blechnum spicant*) and Bracken (*Pteridium aquilinum*). Rhododendron is once again frequent across these areas.

Bryophyte include typical woodland species such as Short-beaked Wood-moss (*Loeskeobryum brevirostre*), Little Shaggy-moss (*Rhytidiadelphus loreus*), Common Striated Feather-moss (*Eurhynchium striatum*), White Earwort (*Diplophyllum albicans*), Slender Mouse-tail Moss (*Isothecium myosuroides*), Broom Fork-moss (*Dicranum scoparium*) and Greater Fork-moss (*Dicranum majus*), along with a number of oceanic species such as Western Earwort (*Scapania gracilis),* Rock Fingerwort (*Lepidozia cupressina*), Straggling Pouchwort (*Saccogyna viticulosa)* and Greater Whipwort (*Bazzania trilobata*).

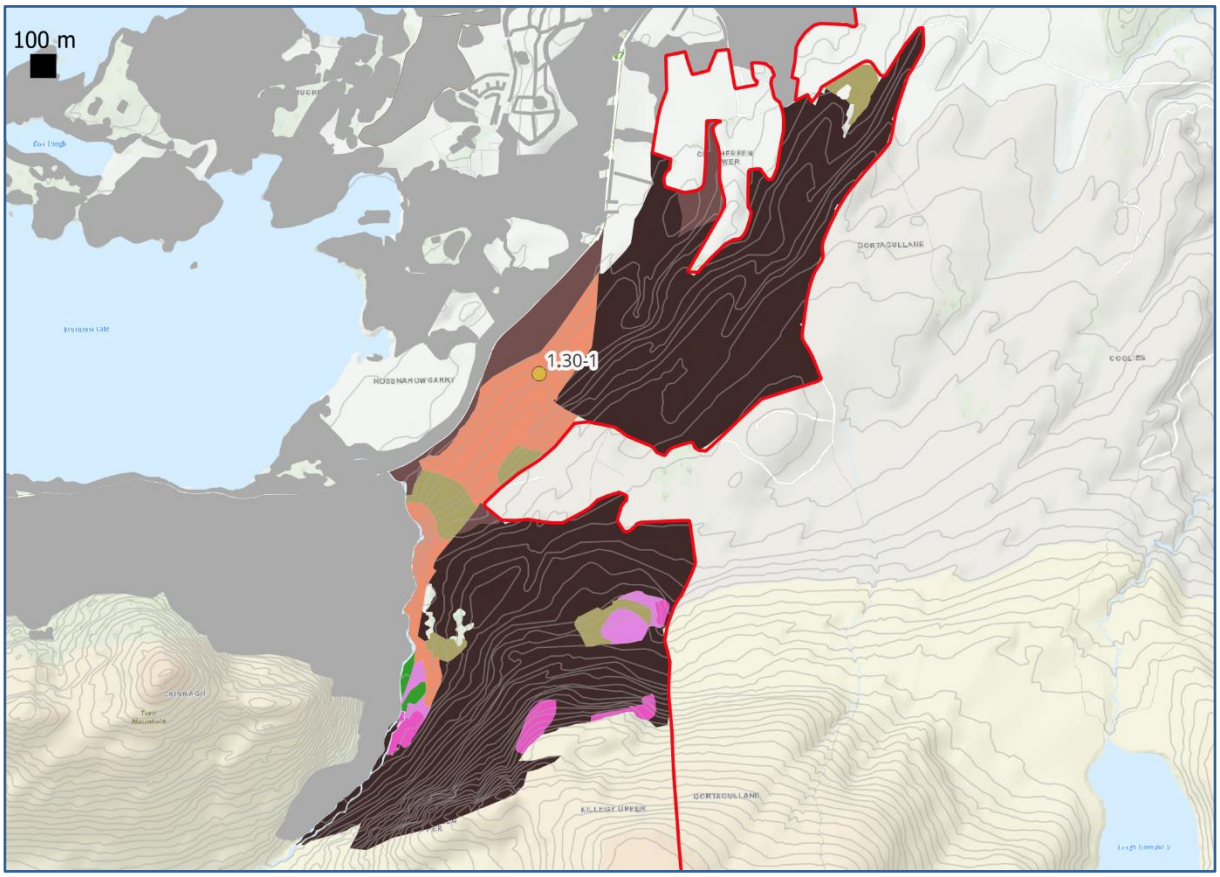

Figure 39 Site map for Muckross Forest. ■ = WN1, ■ = WD1, ■ = WD2, ■ = WD3, ■ = WD4, ■ = WS1, ■ = WS3, ■ = other sites, ● = relevé, / = property boundary.

The second most common type of habitat is mixed conifer/broadleaved woodland (WD2). The broadleaf component includes species such as Sessile Oak (*Quercus petraea*), Ash (*Fraxinus excelsior*), Rowan (*Sorbus aucuparia*), Beech (*Fagus sylvatica*) and Sycamore (*Acer pseudoplatanus)* while conifers include Western Hemlock-spruce (*Tsuga heterophylla*), Spruce and Scots Pine. The field layer is variable but generally includes Bracken, Hard Fern and carpets of Great Wood-rush. Damp, boggy hollows occur occasionally supporting species such as Bulbous Rush (*Juncus bulbosus*), Soft Rush (*Juncus effusus*), Lesser Spearwort (*Ranunculus flammula*) and Bog-mosses (*Sphagnum* spp.).

In the south of the site are two small pockets of oak woodland. In the first instance, the stand (WN1/91A0) is dominated by Sessile Oak and Downy Birch (Betula pubescens) with Holly (*Ilex aquifolium*) in the understorey. A handful of Beech and conifers occur scattered throughout. The field layer is well-developed and contains a carpet of Great Wood-rush, Bilberry (*Vaccinium myrtillus*), Hard Fern and Irish Spurge (*Euphorbia hyberna*). The second pocket of oak woodland (WN1/not 91A0) is more recently planted but contains Sessile Oak, Downy Birch and Rowan. The field layer contains Great Wood-rush, Wood-sorrel and Hard Fern along with bryophytes such as Little Shaggy-moss, Bank Haircap (*Polytrichum formosum*) and Common Tamarisk-Moss (*Thuidium tamariscinum*). A band of modified broadleaved woodland (WD1) runs parallel to the N71 road. Here the canopy is composed of Beech and some Oak (*Quercus* spp.) with Holly occurring in the understorey. The field layer again contains Great Wood-rush, Wood-sorrel and Bracken. The rest of the site comprises a few smaller areas that primarily contain Scots Pine (WD3), some of Rhododendron scrub (WS3) and scrubby areas (WS1) dominated by European Gorse (*Ulex europaeus*).

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural

regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Although some treatment has occurred, large areas are infested with dense thickets of mature plants that dominate the shrub and understory layers.

3. Convert the areas of modified woodland and conifer plantations (WD1, WD2 and WD4) to native broadleaved woodland. This should entail the felling of the conifers and non-native broadleaves and allowing the area to naturally regenerate. The area should be temporarily fenced to protect natural regeneration from deer and trespassing sheep. Follow-up actions will be required to remove regenerating non-natives. This is a massive task and requires long-term planning and commitment of resources.

4. Improve the native status of the oak woodland by removing Beech and promoting natural regeneration to replace them.

5. Remove dumped refuse and dissuade reoccurrence.

Old-growth forest status:

Of the two small WN areas in this site, one is recently planted so does not qualify as old-growth forest. The other is highly native with large old trees abundant resulting in a high standing volume, but in this small area just one record of a large tree was recorded, a Sessile Oak with a DBH of 63 cm. This was a 'straight' tree recorded in the woodland interior. Deadwood was rare with a low diversity and no sample measurements were collected. Excluding the conservation actions of clearance of non-natives, no significant human intervention is evident.

Based on these observations, no areas of Muckross Forest fulfil the mandatory requirements for old-growth forest status.

3.3.31 Muckross House (Site 1.31)

This site of 61.1 ha lies in the east of the Killarney National Park, Co. Kerry, adjacent to and surrounding Muckross House and Gardens and including the Muckross Arboretum (Figure 40). The site is primarily comprised of modified woodland, with a few semi-natural wooded areas. It is focal point for visitors to the park and a number of tracks and paths occur throughout.

In the south of the site is an area of wet woodland (WN6/91E0) fringing the eastern shores of Dundag Bay. Here the canopy is dominated by Grey Willow (*Salix cinerea*) with Alder (*Alnus glutinosa*), Ash (*Fraxinus excelsior*) and Downy Birch (*Betula pubescens*) also occurring frequently. The field layer contains Creeping Bent (*Agrostis stolonifera*), Marsh Bedstraw (*Galium palustre*), Meadowsweet (*Filipendula ulmaria*), Water Mint (*Mentha aquatica*) and Gypsywort (*Lycopus europaeus*). The bryophyte layer includes species such as Tree-moss (*Climacium dendroides*) and Pointed Spear-moss (*Calliergonella cuspidata*). American Skunk-cabbage (*Lysichiton americanus*) occurs abundantly in a number of areas in the woodland as well as in nearby swamp areas around the lakeshore edge; it appears have spread from upstream where it also occurs in the manicured gardens. Further small areas of wet woodland occur in the north-east and south-east of the site and occur adjacent to the N71. The south-east stand example is swampy wet willow woodland with standing water and no field layer.

A significant area of oak-ash-hazel woodland (WN2) occurs in the east of the site. Here the canopy contains Pedunculate Oak (*Quercus robur*), Ash, and Wild Cherry (*Prunus avium*) with Holly (*Ilex aquifolium*) and Hazel occurring in the understorey. Beech (*Fagus sylvatica*) and Sycamore (*Acer pseudoplatanus*) are somewhat frequent across this area. The field layer contains Bramble (*Rubus fruticosus* agg.), Irish Ivy (*Hedera hibernica*), Wood Sanicle (*Sanicula europaea*), Dog-violets (*Viola* spp.), Pignut (*Conopodium majus*), Barren Strawberry (*Potentilla sterilis*) and False-brome (*Brachypodium sylvaticum*) along with the ferns Hart's-tongue Fern (*Asplenium scolopendrium*) and Bracken (*Pteridium aquilinum*). An active badger sett occurs in the west of this area. In the south of this stand is a small area of yew woodland

(WN3/91J0) that occurs on outcropping limestone. The woodland is dominated by Yew (*Taxus baccata*) with Holly and Hazel occurring in the understory. The field layer includes False-brome, Irish Ivy and Wood Sanicle and the bryophyte layer is dominated by Fox-tail Feather-moss (*Thamnobryum alopecurum*).

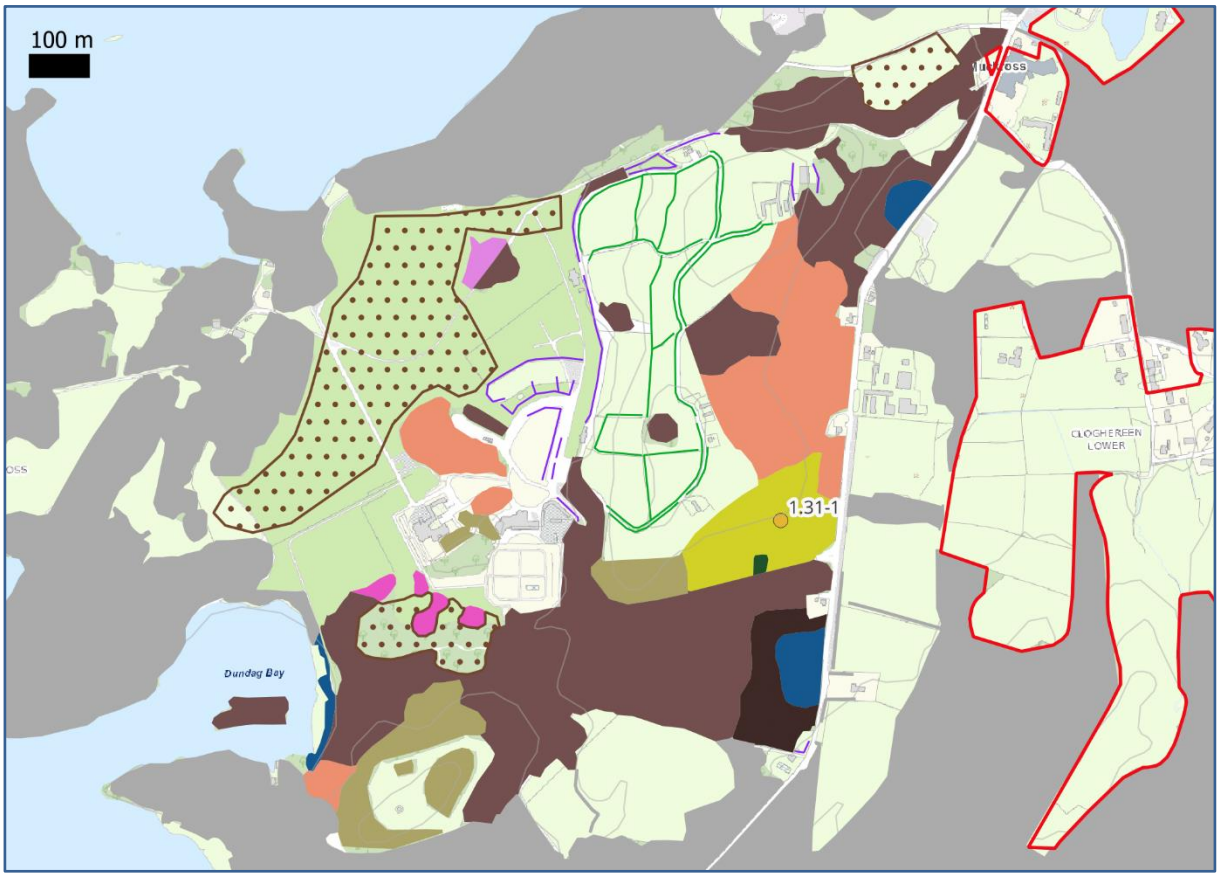

Figure 40 Site map for Muckross House. ■ = WN1, ■ = WN2, ■ = WN6, ■ = WD1, ■ = WD3, ■ = WD4, ⁘ = WD5, ■ = WS3, ■ = other sites, / = WL1, / = WL2, / = property boundary.

Modified broadleaved woodland (WD1) covers the largest area within the site and ranges from narrow blocks around the carpark areas to larger extents in the south and north of the site. These areas are generally dominated by non-native tree species such as Beech and Sycamore, with Ash also occurring frequently. Other frequently occurring species include Horse Chestnut (*Aesculus hippocastanum),* Sweet Chestnut (*Castanea sativa*) and Lime (*Tilia* spp.). The field layer includes species such as Bracken, Bramble, False-brome, Hart's-tongue Fern and Irish Ivy. Mixed broadleaved/conifer woodland (WD2) occurs in three places, in the north-east, west and south-west of the site and contains a number of conifer species, primarily Scots Pine (*Pinus sylvestris*) and Yew, along with broadleaves such as Beech, Sycamore, Ash and Horse Chestnut. Holly occurs in the understorey. The field layer contains Hart's-tongue Fern, Lords-and-Ladies (*Arum maculatum*) and Irish Ivy. Rhododendron also occurs frequently here.

The remaining areas include conifer woodland (WD3) that occurs primarily in the south of the site and a small area of conifer plantation (WD4) in the south-east, together with substantial areas of parkland (WD5). Rhododendron scrub (WS3) occurs in a handful of locations around the vicinity of Muckross House and Gardens, and a small area of scrub (WS1) occurs in the north of the site. Finally, the site also includes a number of hedgerows (WL1) and treelines (WL2) which occur mostly in the north.

Along with American Skunk-cabbage, Rhododendron and Cherry Laurel, a number of other alien species occur including Montbretia (*Crocosmia* × *crocosmiiflora*), Chilean Myrtle (*Luma*

apiculata), Himalayan Honeysuckle (*Leycesteria formosa*), Winter Heliotrope (*Petasites pyrenaicus*), Snowberry (*Symphoricarpos albus*), Cotoneaster (*Cotoneaster* spp.) and Traveller's-joy (*Clematis vitalba*). In the north-east of the site, black plastic appears to have been dumped.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Remove other non-native species including American Skunk-cabbage, Cherry Laurel Montbretia, Chilean Myrtle, Himalayan honeysuckle, Winter Heliotrope, Snowberry, Cotoneaster, and Traveller's-joy. The source of the Skunk-cabbage should be identification and the plants there also removed.

4. Convert the areas of modified woodland (WD1, WD2, WD3, WD4) to native broadleaved woodland by removing mature and regenerating non-native species of broadleaves. Allow these areas to naturally regenerate, protecting regeneration if necessary.

5. Remove dumped refuse and dissuade reoccurrence.

Old-growth forest status:

The WN areas at this site are of medium native status and have a high standing volume. Subjective samples of large trees were as follows: Grey Willow (*n*=4) had a DBH range of 16-57 cm with a median of 36 cm, Pedunculate Oak had DBH measurements of 87, 99 and 139 cm, and Alder, Ash, Wild Cherry, Sessile Oak, White Willow and Yew had single DBH measurements of 38 cm, 45 cm, 38 cm, 58 cm, 31 cm and 96 cm, respectively. One tree was 'old/gnarly', eight were 'straight' and three 'multi-stemmed'. Deadwood was noted as being rare and with a low diversity. Subjective samples of large-scale deadwood instances were as follows: Grey Willow (*n*=4) had diameter range of 35-63 cm with a median of 44 cm, Yew had diameter measurements of 62 and 76 cm, and Ash, Holly, Pedunculate Oak and an unidentified instance had diameter measurements of 31 cm, 49 cm, 96 cm and 42 cm, respectively. The majority of these were 'fallen dead', with three 'being old/senescent'. There are no significant human interventions evident.

Based on these observations, the WN areas at Muckross House do not fulfil the mandatory requirements for old-growth forest status; primarily this was due to the frequency of non-natives and the paucity of deadwood.

3.3.32 North Face Torc (Site 1.32)

This large site of 135.6 ha occurs in the east of the Killarney National Park, Co. Kerry covering the very steep north face of Torc Mountain from the N71 up to the higher slopes (Figure 41). In the east, the site wraps around the mountain and follows the west bank of the Owengarriff River. The area is a very popular amenity site and a number of paths and trails traverse it.

The central part of the site and area in the southeast are dominated by mixed conifer/broadleaved woodland (WD2) which contains a range of species including Sitka Spruce (*Picea sitchensis*), Larch (*Larix* spp.) and Scots Pine (*Pinus sylvestris*) along with some lesser cover of broadleaves such as Downy Birch (*Betula pubescens*), Sessile Oak (*Quercus petraea*), Ash (*Fraxinus excelsior*), Rowan (*Sorbus aucuparia*), Holly (*Ilex aquifolium*) and Beech (Fagus sylvatica). Dense thickets of Rhododendron (*Rhododendron ponticum*) dominate much of the shrub and understorey layers. The field layer is scanty due to the Rhododendron and high grazing pressure but includes species such as Wood-sorrel (*Oxalis*

acetosella), Irish Ivy (*Hedera hibernica*), Great Wood-rush (*Luzula sylvatica*) and Bramble (*Rubus fruticosus* agg.).

Damp rocks faces are frequent and sport species such as St Patrick's-cabbage (*Saxifraga spathularis*), Kidney Saxifrage (*Saxifraga hirsuta*) and their hybrid (*Saxifrage* × *polita*). Ferns are represented well with species such as Hard Fern (*Blechnum spicant*), Lady-fern (*Athyrium filix-femina*), Hay-scented Buckler Fern (*Dryopteris aemula*), Broad Buckler-fern (*Dryopteris dilatata*), Soft Shield-fern (*Polystichum setiferum*), Hard Shield-fern (*Polystichum aculeatum*), Hart's-tongue Fern (*Asplenium scolopendrium*), Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*) and Wilson's Filmy-fern (*Hymenophyllum wilsonii*). The rare Beech Fern (*Phegopteris connectilis*) also occurs in a few instances under deep shade. Bryophytes include typical species such as Little Shaggy-moss (*Rhytidiadelphus loreus*), White Earwort (*Diplophyllum albicans*) and Common Striated Feather-moss (*Eurhynchium striatum*), but also oceanic species such as Western Earwort (*Scapania gracilis),* Rock Fingerwort (*Lepidozia cupressina*), Straggling Pouchwort (*Saccogyna viticulosa*) and Greater Whipwort (*Bazzania trilobata*).

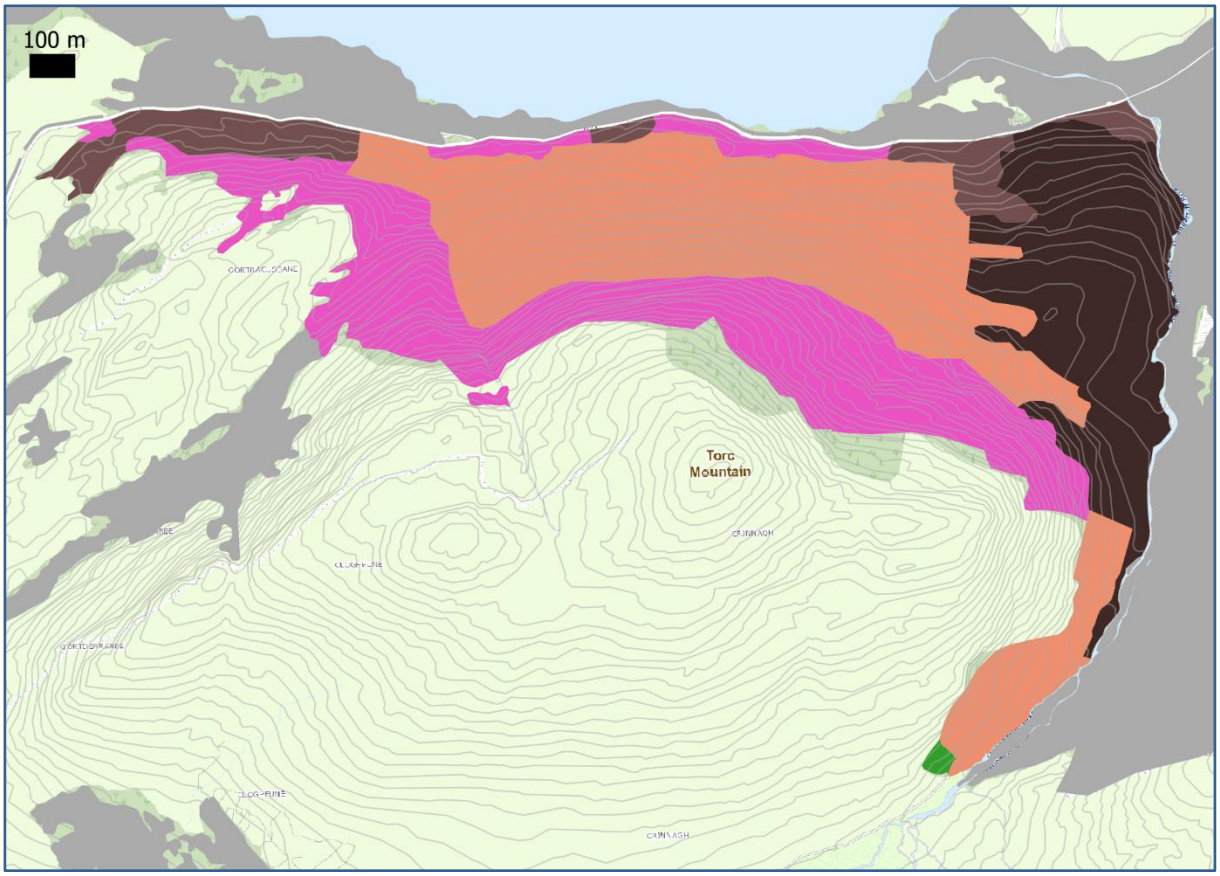

Figure 41 Site map for North Face Torc. ■ = WN1, ■ = WD1, ■ = WD2, ■ = WD4, ■ = WS3, ■ = other sites.

In the east of the site, next to the Owengarriff River, a conifer plantation (WD4) occurs which contains a number of non-native conifer species including Spruce, Scots Pine, Larch and Fir (*Abies* sp.). Under the dense shade cast by the conifers, the field layer is largely absent and the ground is typically covered in a dense layer of needles. Species such as Wood-sorrel and Great Wood-rush provide sparse cover. Along the N71 are some stands of highly modified broadleaved woodland (WD1). The area in the far west has a native canopy of Sessile Oak, but is infested with Rhododendron to such an extent that is now lacks the typical understorey and field layer for acidophilous oak woodland. The other stands contain Beech, Downy Birch, Ash and Holly. Rhododendron infestation again mean that the field layer is negligible in these stands

In the far south of the site near the Old Kenmare Road is a small area of oak woodland (WN1/91A0) with a canopy of Sessile Oak (*Quercus petraea*) and Holly occurring in the understorey. The field layer here is rather grassy and contains species such as Common Bent (*Agrostis capillaris*) along with Wood-sorrel and Hard Fern.

The higher slopes are and some smaller patches along the road are covered in Rhododendron scrub (WS3) occur within the site. Some clearance of Rhododendron has taken place in the last 5 years at viewpoints along the path system.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. The majority of the site is infested with dense thickets of mature plants. Due to the steep terrain of the site, access to these areas is challenging.

3. Improve the native status of the oak woodland by removing the Sitka Spruce.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

5. Convert the areas of modified woodland (WD1, WD2 and WD4) to native broadleaved woodland by removing mature and regenerating non-native species of conifers and broadleaves.

Old-growth forest status:

There is just one small WN area at this site. Trees bearing TReMs and large deadwood instances are present but measurements for large trees and deadwood were not recorded area. Consequently, old-growth forest status was not considered.

3.3.33 Oak Island (Site 1.33)

Description:

This site of 6.4 ha lies on the southern shore of the Upper Lake in the south of the Killarney National Park, Co. Kerry (Figure 42). The site is largely separated from the rest of the shore by areas of low-lying bog. The woodland consists of a larger stand in the east of the island of 4.0 ha and several fragmented stands in the west.

The character of the woodland is that of acidophilous oak woodland (WN1/91A0). The canopy is composed of mature Sessile Oak (*Quercus petraea*) accompanied by some Downy Birch (*Betula pubescens*) and there is an understorey of Holly (*Ilex aquifolium*). Rowan (*Sorbus aucuparia*) is occasional. The woods have fairly recently been cleared of Rhododendron (*Rhododendron ponticum*) infestation. Consequently, the field layer is very sparse in some areas. Constituent species include Bilberry (*Vaccinium myrtillus*), Bracken (*Pteridium aquilinum*), Irish Ivy (*Hedera hibernica*), Hard Fern (*Blechnum spicant*) and Wood-sorrel (*Oxalis acetosella*). Round the landwards margins of the stands can be found Heather (*Calluna vulgaris*), Bell Heather (*Erica* cinerea) and Purple Moor-grass (*Molinia caerulea*). On rock faces can be found St Patrick's-cabbage (*Saxifraga spathularis*) and Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*). There is a ruined stone building in the eastern stand which provides a niche for Maidenhair Spleenwort (*Asplenium trichomanes*). Bryophytes at this site include Common Tamarisk-moss (*Thuidium tamariscinum*), Little Shaggy-moss (*Rhytidiadelphus loreus*), Short-beaked Wood-moss (*Loeskeobryum brevirostre*), Bank Haircap (*Polytrichum formosum*) and Acute-leaved Bog-moss (*Sphagnum capillifolium*). Patches of Large White-moss (*Leucobryum glaucum*) are particularly common in areas where

Rhododendron has been cleared. Strawberry Tree (*Arbutus unedo*) is present and both Crab-apple (*Malus sylvestris*) and Yew (*Taxus baccata*) occur.

The site is severely grazed by deer and there is very little natural regeneration. Rhododendron is still present (probably as regrowth) but it is at very low levels.

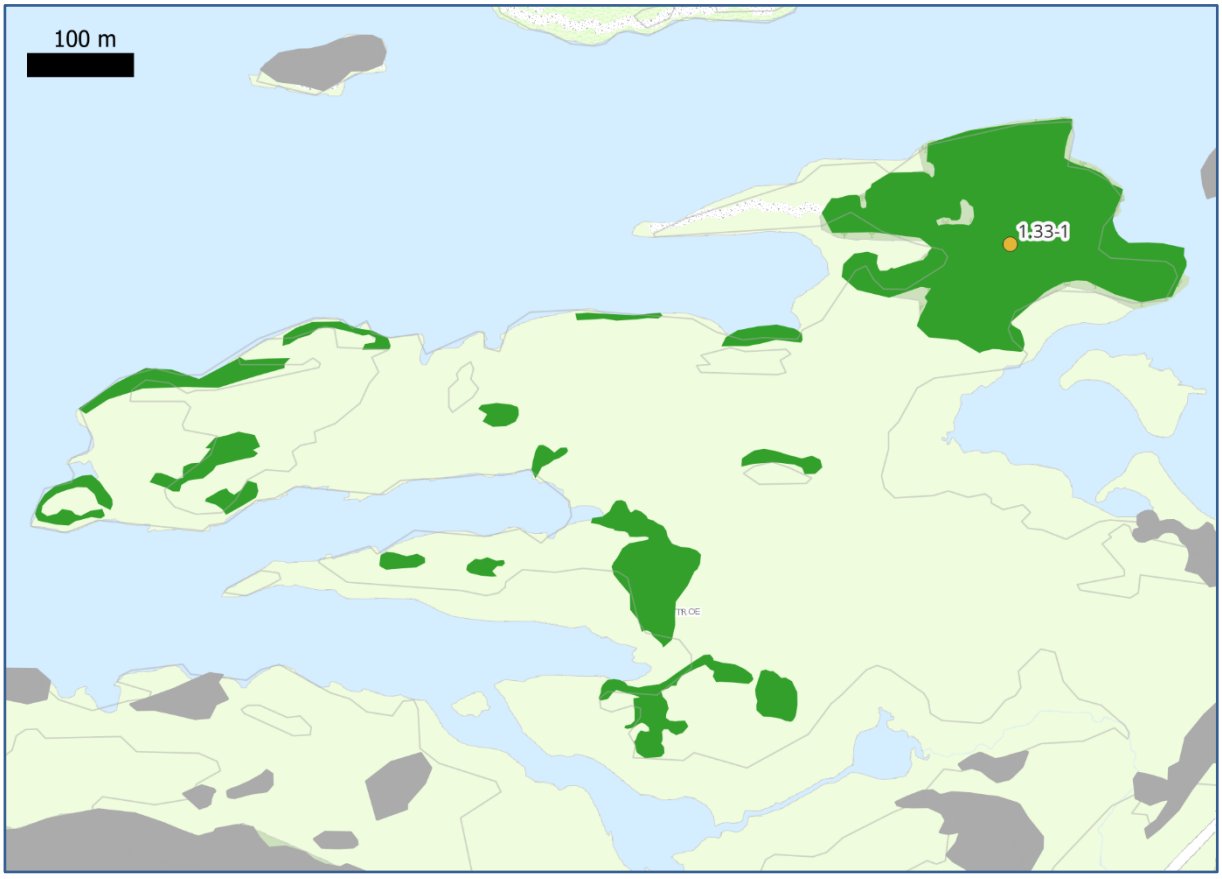

Figure 42 Site map for Oak Island. ■ = WN1, ■ = other sites, ● = relevé.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers. Many of the stands are currently too small to support the environmental conditions of a woodland interior.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires including removal of pile of Rhododendron brash.

Old-growth forest status:

This site is highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=6) had a DBH range of 67-161 cm with a median of 92 cm, Holly (*n*=6) had a DBH range of 41-67 cm with a median of 55 cm, Downy Birch had DBH measurements of 48 and 87 cm. Only four of these trees were recorded from the interior of the woodland while the remaining ten were located

near an edge. Six of these trees were classified as 'old/gnarly', six as 'straight' and two as 'multi-stemmed'. There is a high diversity of deadwood within the site including large-scale instances, but it is frequent rather than abundant. Subjective samples of these large-scale instances by different species were as follows: Sessile Oak (*n*=14) had a diameter range of 32-108 cm with a median of 53 cm, Downy Birch had diameter measurements of 50 and 56 cm, Holly had a single diameter measurement of 58 cm and Strawberry Tree had a single diameter measurement of 31 cm. Six of these instances were standing dead, seven were fallen dead and five were old/senescent. Excluding the conservation actions of Rhododendron clearance, the only significant sign of former human intervention is the old stone building which has been ruined for decades.

Between them, the sample of large trees (*n*=14) supported 12 different TReMs, the most frequent being breakage (12 trees), bark loss (10), branch holes (10), insect holes (10), other cavities (8), cracks/scars (7) and root buttresses (7). In terms of structural complexity, the site only rarely has a multi-layer structure where Holly forms a distinct understorey beneath Sessile Oak and horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are rare root plates and occasional hollows. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Oak Island fulfils the requirements for old-growth forest status.

3.3.34 Reen Wood (Site 1.34)

This site of 94.9 ha lies in the north-east of Killarney National Park, Co. Kerry, on the eastern shore of Lough Leane just north of Ross Island (Figure 43). The woods are a popular area for amenity and numerous walking trails and bridle paths traverse through the site.

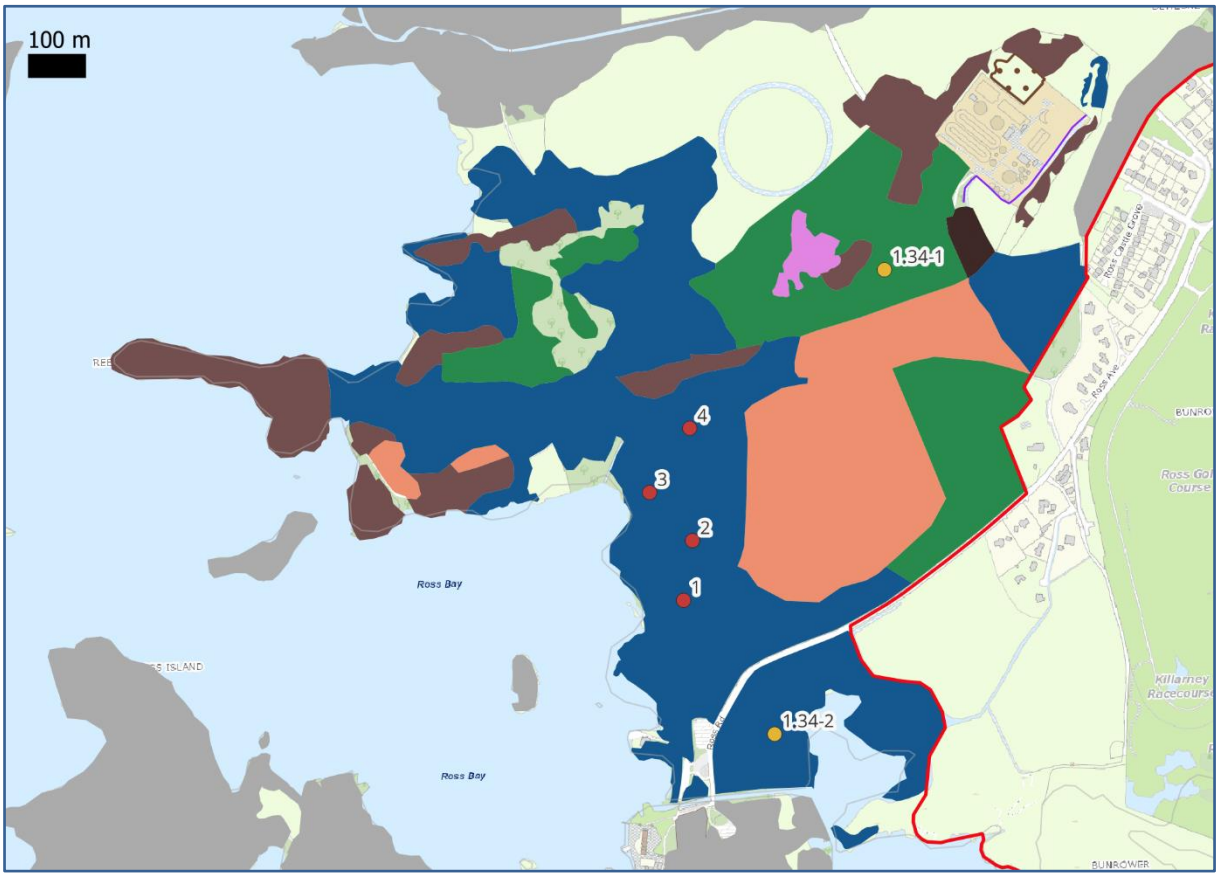

Figure 43 Site map for Reen Wood. ■ = WN1, ■ = WN6, ■ = WD1, ■ = WD2, ■ = WD4, ■ = WS1, ■ = other sites, ● = stops, ● = relevés, / = WL2, / = property boundary.

Over half of the site is comprised of wet woodland (WN6/91E0) occurring over alluvial gley soils which are subjected to seasonal inundation by the nearby lake waters. The canopy is dominated by Alder (*Alnus glutinosa*) with Grey Willow (*Salix cinerea*) and Ash (*Fraxinus excelsior*) occurring frequently and with Hawthorn (*Crataegus monogyna*) and Buckthorn (*Rhamnus cathartica*) in the understorey. This last species primarily occurs close to the lakeshore edges. Downy Birch (*Betula pubescens*) also occurs but only occasionally. The field layer is quite grassy in nature but fairly species-rich and well developed, containing species such as Creeping Bent (*Agrostis stolonifera*), Remote Sedge (*Carex remot*a), Purple Moor-grass (*Molinia caerulea*), Reed Canary-grass (*Phalaris arundinacea*) and Soft Rush (*Juncus effusus),* along with herbs such as Meadowsweet (*Filipendula ulmaria*), Water Mint (Mentha aquatica), Nodding Bur-marigold (*Bidens cernua*), Common Nettle (*Urtica dioica*), Gypsywort (*Lycopus europaeus*), Water-pepper (*Persicaria hydropiper*), Yellow Iris (*Iris pseudacorus*) and Marsh Bedstraw (*Galium palustre*). The bryophyte layer includes Fox-tail Feather-moss, Pointed Spear-moss (*Calliergonella cuspidata*), Heart-leaved Spear-moss (*Calliergon cordifolium*) and Tree-moss (*Climacium dendroides*). A couple of smaller areas of wet woodland also occur in the north-east of the site.

In the north-west of the site some pockets of Birch-dominated bog woodland (WN7) occur, occasionally containing Rowan (*Sorbus aucuparia*) and Ash. In damper areas they contain a small amount of Alder. The field layer here supports Remote Sedge, Soft Rush, Bramble (*Rubus fruticosus* agg.), Honeysuckle (*Lonicera periclymenum*), False Brome (*Brachypodium sylvaticum*) and ferns including Hard Fern (*Blechnum spicant*) and Broad Buckler-fern (*Dryopteris dilatata*). The bryophyte layer includes Swan's-neck Thyme-moss (*Mnium hornum*), Common Feather-moss (*Kindbergia praelonga*), Common Tamarisk Moss (*Thuidium tamariscinum*) and Bank Haircap (*Polytrichum formosum*). These areas are relatively recent stands that have developed where plantations have been cleared. In the east of the site is another area of WN7 with similar origins but it is younger with a uniform structure and a poor field layer.

A larger area of bog woodland (WN7) occurs in the north-east. Again, the woodland is dominated by Downy Birch with occasional Holly (*Ilex aquifolium*) and Grey Willow. Scots Pine (*Pinus sylvestris*) occurs rarely. A number of non-native conifers occur within the woodland here but they have been ring-barked and the majority of them are dead. The field layer contains Bracken (*Pteridium aquilinum*), Purple Moor-grass and Common Bent (*Agrostis capillaris*). In wetter depressions, Soft Rush and Remote Sedge also occur. The bryophyte layer here includes a slightly more diverse range of species including Large White-moss (*Leucobryum glaucum)*, Broom Fork-moss (*Dicranum scoparium*), Greater Fork-moss (*Dicranum majus*), Common Feather-moss*,* Common Tamarisk Moss, and Bank Haircap. Rhododendron occurs frequently throughout. In the north of this area of woodland, domestic refuse has been dumped.

A larger extent of mixed broadleaf/conifer woodland (WD2) occurs in the east of the site. It is dominated by Scots Pine with Downy Birch frequent. The woodland here has been cleared of Rhododendron and brash piles are frequent throughout. The field layer contains species including Bramble and Tormentil (*Potentilla erecta*), and Gorse (*Ulex europaeus*) is occasional in the shrub layer. Commonly occurring bryophytes include Bank Haircap and Large White-moss. In the west of the site, smaller patches of this stand time occur.

Stands of modified broadleaved woodland (WD1) are scattered across the north of the site with canopies of Beech (*Fagus sylvatica*), Sycamore (*Acer pseudoplatanus*), Ash and Sessile Oak (*Quercus petraea*). The field layer includes False Brome, Bramble and Bracken. Near the water treatment plant, large areas of Bamboo (*Sasa* sp.) and thickets of Cherry Laurel (*Prunus laurocerasus*) occur.

Within one of the bog woodland areas, a large area of Rhododendron (*Rhododendron ponticum*) has been cleared (but is now regenerating) and has since been colonized by Bramble, Gorse and conifer regeneration (WS1). Brash piles are frequent here and there are a number of standing dead conifers that have been ring-barked.

The remaining habitats of the site occur in the north-east: are a small pocket of conifer plantation (WD4), some parkland (WD5) and some treelines (WL2) around the nearby water treatment plant.

Grazing levels are severe across the site and natural regeneration of trees is largely absent. A number of exclosures exist within the site, primarily in the areas of bog woodland and some regeneration is evident within them. Opposite-leaved Pondweed (*Groenlandia densa*) occurs in a stagnant drain located within the wet woodland, along with other aquatic species.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Although treatment has occurred across the site, regeneration is frequent

3. Remove other non-native species including Bamboo and Cherry Laurel.

4. Improve the native status of the bog woodland and wet woodland areas by removing the remaining non-native conifers.

5. Remove piles of Rhododendron brash from the site. These would be a liability in the event of a wildfire.

6. Convert the areas of modified woodland (WD1, WD2, WD4) to native broadleaved woodland by removing mature and regenerating non-native species of broadleaves and conifers, particularly Beech and Sycamore. Allow these areas to naturally regenerate, protecting regeneration if necessary.

7. Remove dumped refuse and dissuade reoccurrence.

Old-growth forest status:

The WN7 areas that have developed recently on former plantation were thus omitted from consideration. The remaining WN areas is quite native, though there are occasional non-native conifers which are being removed. These areas have abundant large, old native trees and a high standing volume. Subjective samples of these large trees by different species were as follows: Alder (*n*=7) had a DBH range of 31-59 cm with a median of 41 cm, Downy Birch (*n*=7) had a DBH range of 32-66 cm with a median of 46 cm, Grey Willow had DBH measurements of 43, 50 and 58 cm, and Ash and Sessile Oak had single DBH measurements of 92 and 62 cm, respectively. Fifteen of these trees were recorded from the woodland interior. Two of these trees were classified as ‘old/gnarly’, thirteen as ‘straight’ and three as ‘multi-stemmed’. Deadwood is frequent at the site and deadwood diversity is medium. Subjective samples of large-scale instances by different species were as follows: Alder (*n*=10) had a diameter range of 32-53 cm with a median of 35 cm, Downy Birch had diameter measurements of 33 and 37 cm, Sessile Oak had diameter measurements of 51 and 62 cm, and Ash, Grey Willow and unidentified instances had single diameter measurements of 31 cm, 48 cm and 56 cm, respectively. Four of these instances were ‘standing dead’, ten were ‘fallen dead’ and three ‘old/senescent’. Excluding the conservation actions of Rhododendron clearance and removal of non-native conifers, there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=19) supported 17 different TReMs, the most frequent being epiphytic bryophytes and lichens (19 trees), cankers/burrs (15), breakage (10) and microsoils (10). In terms of structural complexity, the site occasionally has a multi-layer structure and horizontal structural diversity is high. The site is rich in terms of natural soil microrelief structures with frequent hollows, root plates and burrows, and occasional slumping. Wet woodland areas such as these would not be expected to support species typical of late-seral development phases as defined in section 1.3.2.

Based on these observations, the WN6 areas at Reen Wood and the WN7 area in the north-east of the site fulfil the requirements for old-growth forest status.

3.3.35 Reenadinna (Site 1.35)

This site of 82.3 ha covers the eastern half of the Muckross Peninsula in the Killarney National Park, Co. Kerry (Figure 44), lying between Lough Leane and Muckross Lake. The site is a popular amenity area and a network of footpaths and trails traverse the woodland.

Yew woodland over outcropping limestone (WN3/91J0) covers the largest area within the site and indeed is the largest expanse of this habitat in the country. In the centre of site, Yew (*Taxus baccata*) grows at a high density and forms almost pure stands whereas in the west, the habitat is still generally dominated by yew, but has a slightly more diverse and mixed canopy where some depth of mineral soil has accumulated. Across the habitat, other frequently occurring canopy species include Ash (*Fraxinus excelsior*) and Pedunculate Oak (*Quercus robur*) with Hazel (*Corylus avellana*) and Hawthorn (*Crataegus monogyna*) typically forming the understorey alongside the occasional Elder (*Sambucus nigra*). Other species present on an occasional basis include Wild Cherry (*Prunus avium*), Rowan (*Sorbus aucuparia*) and Beech (*Fagus sylvatica*). The field layer includes Hart's-tongue Fern (*Asplenium scolopendrium*), False Brome (*Brachypodium sylvaticum*), Wood-sedge (*Carex sylvatica*), Wild Madder (*Rubia peregrina*), Wood Sanicle (*Sanicula europaea*), Dog-violets (*Viola* spp.) and Barren Strawberry (*Potentilla sterilis*). The bryophyte layer is typically dominated by Fox-tail Feather-moss (*Thamnobryum alopecurum*) but other frequently occurring species include Big Shaggy-moss (*Hylocomiadelphus triquetrus*), Crisped Neckera (*Neckera crispa*) and Forked Veilwort (*Metzgeria furcata*). Stands on outcrops in the east of the site have similar flora but Beech is frequent, Sycamore (*Acer pseudoplatanus*) is occasional and Portugal Laurel (*Prunus lusitanica*) is a localised problem.

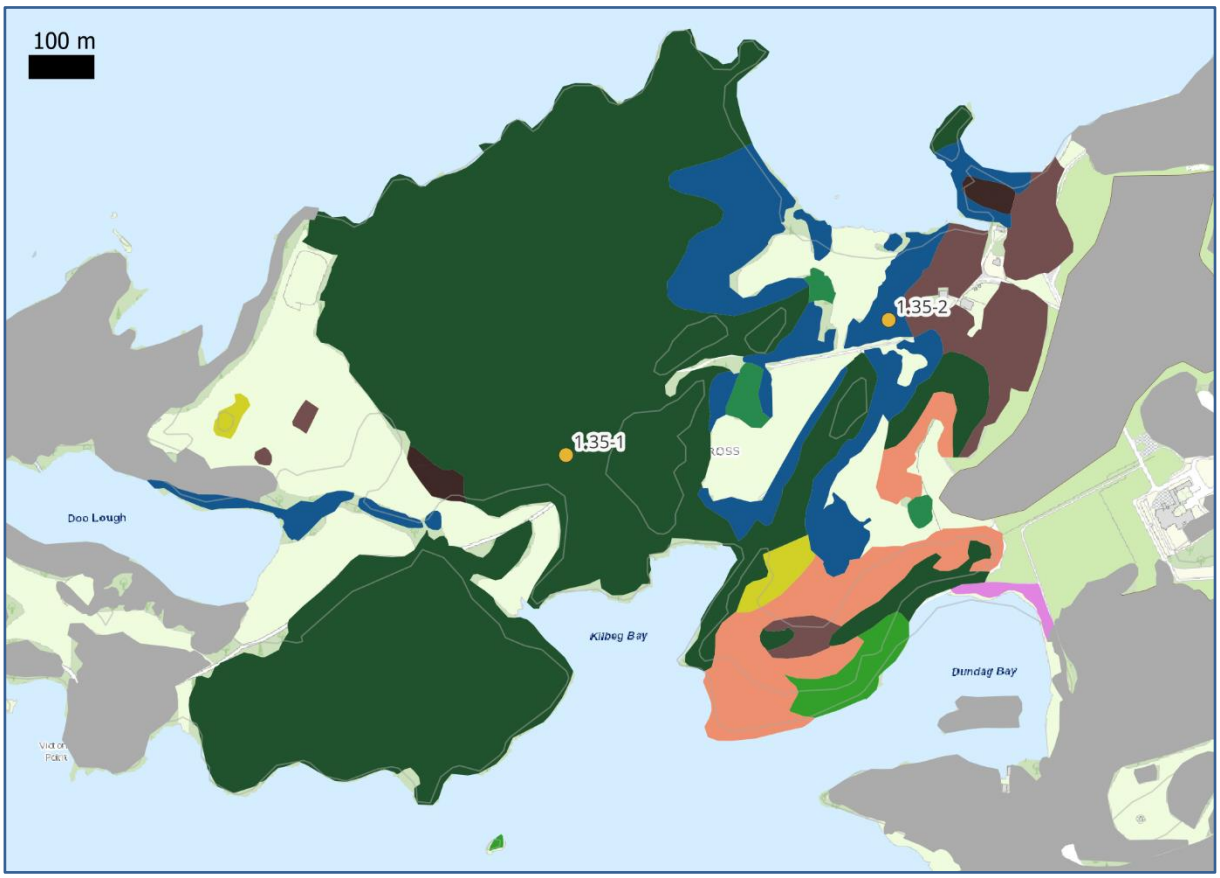

Figure 44 Site map for Reenadinna. ■ = WN1, ■ = WN2, ■ = WN3, ■ = WN6, ■ = WD1, ■ = WD2, ■ = WD4, ■ = WS1, ■= other sites, ● = relevés.

A number of Cotoneaster (*Cotoneaster* spp.) species have naturalised in the yew woodland, particularly along the edges of the woodland in Kilbeg Bay and Dundag Bay near the Arthur Young Trail. These species include Himalayan Cotoneaster (*Cotoneaster simonsii*), Wall Cotoneaster (*Cotoneaster horizontalis*) and Entire-leaved Cotoneaster (*Cotoneaster integrifolius*), the latter forming the most extensive patches. In a number of areas, these Cotoneaster species are dominating the ground and shrub layer and outcompeting native flora. Other alien species occurring frequently in this include Laurustinus (*Viburnum tinus*) and Traveller's-joy (*Clematis vitalba*).

A number of areas of wet woodland (WN6/91E0) occur in low-lying areas in the east. The canopy here is typically dominated by Grey Willow (*Salix cinerea*) with Alder (*Alnus glutinosa*) and Ash both also frequent. The field layer is typically species-rich and well developed, containing graminoids such as Purple Moor-grass (*Molinia caerulea*), Reed Canary-grass (*Phalaris arundinacea*), Common Reed (*Phragmites australis*), Creeping Bent (*Agrostis stolonifera*) and Remote Sedge (*Carex remot*a), along with herbs such as Water Mint (*Mentha aquatica*), Yellow Iris (*Iris pseudacorus*), Marsh Bedstraw (*Galium palustre*) and Meadowsweet (*Filipendula ulmaria*). Less frequently occurring species include Gypsywort (*Lycopus europaeus*), Skullcap (*Scutellaria galericulata*) and Creeping Jenny (*Lysimachia nummularia*). Marsh Fern (*Thelypteris palustris*) occurs in a handful of areas. Species that occur frequently in the bryophyte layer include Fox-tail Feather-moss, Pointed Spear-moss (*Calliergonella cuspidata*), Heart-leaved Spear-moss (*Calliergon cordifolium*) and Tree-moss (*Climacium dendroides*). In the north-east of the site, near Muckross Rowing Club, a non-native species of Michaelmas-daisy (*Symphyotrichum* sp.) is growing in the field layer and is beginning to outcompete native species. Close to these wet woodland stands are a few small areas of bog woodland (WN7) possessing a canopy mainly of Downy Birch (*Betula pubescens*) with Rowan and Holly (*Ilex aquifolium*) also occurring. The field layer includes Purple Moor-grass, Bracken (*Pteridium aquilinum*) and Heather (*Calluna vulgaris*). Bryophytes here include Bank Haircap (*Polytrichum formosum*) and Glittering Wood-moss (*Hylocomium splendens*).

In the west of the site, in the West Meadow, is a small isolated block (WN2), possibly planted, that contains Wild Cherry, Ash and Oak, with Hawthorn and Blackthorn (*Prunus spinosa*) occurring in the understorey. The field layer here includes False-brome, Bracken, Herb-robert (*Geranium robertianum*), Enchanter's-nightshade (*Circaea lutetiana*), Primrose (*Primula vulgaris*) and Bluebell (*Hyacinthoides* sp.). In the south-east of the site is a stand (WN2) composed of Ash, Hazel and Holly with only occasional Yew. Close by, overlooking Dundag Bay, is an area of oak woodland (WN1/91A0) that contains Sessile Oak (*Quercus petraea*) and Pedunculate Oak with Rowan and Holly in the understorey. The field layer here includes Purple Moor-grass, Bracken, Wood-sorrel (*Oxalis acetosella*), Great Wood-rush (Luzula sylvatica) and Hard Fern (*Blechnum spicant*).

In the east of the site, surrounding Arthur Young House, is a block of modified broadleaved woodland (WD1) that is Beech-dominated, with species such as Sycamore, Pedunculate Oak, and Yew also present. On the promontory between Kilbeg Bay and Dundag Bay, there is a large area of mixed broadleaved/conifer woodland (WD2) that includes Oak, Holly, Lime (*Tilia* sp.), Beech, Sycamore and Scots Pine (*Pinus sylvestris*). In both of these modified stands, Cherry Laurel is frequent in the shrub layer forming extensive thickets in places and other alien species such as Cotoneaster occur.

Finally, the remaining areas of the site are composed of two of small blocks of planted conifers (WD4) and an area of scrub (WS1) at the back of Dundag Bay

Grazing levels throughout the site are severe and regeneration of native trees is absent. Damage from deer, such as bark stripping and topiary effect is frequent. There have been several unsuccessful efforts to address this issue. Large areas of the site were fenced c. 2000. However, only the section around the south-west block of yew woodland now remains. Recently, a number of exclosures made from movable metal fence panels have been erected in the central yew woodland stand. Rhododendron (*Rhododendron ponticum*) is present within the site at varying quantities. As eluded to above, Cherry Laurel is frequent in a number of areas and forms extensive thickets.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Remove other non-native species including Cotoneaster, Cherry Laurel, Michaelmas-daisy, Bay (*Laurus nobilis*), Traveller's-joy, Montbretia (*Crocosmia x crocosmiiflora*), Winter Heliotrope, Portugal Laurel and Laurustinus.

4. Improve the native status of the yew woodland by removing Beech and Sycamore and allowing natural regeneration to replace them.

5. Convert the areas of modified woodland (WD1, WD2 and WD4) to native broadleaved woodland by removing mature and regenerating non-native species of broadleaves and conifers. Allow these areas to naturally regenerate, protecting regeneration if necessary.

Old-growth forest status:

The WN areas of this site are highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Yew (*n*=11) had a DBH range of 65-124 cm with a median of 88 cm, Grey Willow (*n*=5) had a DBH range of 33-96 cm with a median of 48 cm, Alder had DBH measurements of 48 and 56 cm, Sessile Oak had DBH measurements of 71 and 112 cm, Pedunculate Oak had DBH measurements of 135 and 137 cm, and Downy Birch, Hazel, Holly and Wild Cherry had single DBH measurements of 36 cm, 22 cm, 68 cm and 108 cm, respectively. The majority of these were from the woodland interior with just five from near the edge. Eight of these trees were classified as 'old/gnarly', fifteen were 'straight' and three were 'multi-stemmed'. Deadwood is frequent at the site and with a medium range of diversity. Subjective samples of the large-scale instances of deadwood by different species were as follows: Yew (*n*=10) had a diameter range of 34-68 cm with a median of 47 cm, Ash (*n*=7) had a diameter range of 32-54 cm with a median of 37 cm, Sessile Oak had diameter measurements of 84 and 97 cm, and Alder, Downy Birch and Grey Willow had single diameter measurements of 53 cm, 36 cm and 33 cm, respectively. Eight of these instances were 'standing dead', fourteen were 'fallen dead' and three were 'old/senescent'. Excluding the conservation actions of Rhododendron clearance and fencing, there are no signs of human intervention.

Between them, the sample of large trees (*n*=26) supported 15 different TReMs, the most frequent being epiphytic bryophytes and lichens (26 trees), breakage (22), microsoils (19) and epiphytic climbers (15). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is rather low. In terms of natural soil microrelief structures root plates are frequent, burrows occasional and hollows, mounds and slumping are rare. Lastly, the dominance of Yew is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Reenadinna Wood fulfils the requirements for old-growth forest status. Many of the above records are from the large WN3 areas though considerable numbers are from the other woodland types present and as the native areas are largely contiguous and with a shared history of management it seems reasonable for the status to apply across the native areas of the site.

3.3.36 Ross Island (Site 1.36)

This site of 68.0 ha is a claw-shaped peninsula on the eastern side of Lough Leane in the Killarney National Park, Co. Kerry (Figure 45). The whole site is very popular as an area of amenity and includes a number of tracks and roads occurring throughout the site.

A substantial proportion of the site is seasonally flooded wet woodland (WN6/91E0). The canopy is dominated by a mix of Grey Willow (*Salix cinerea*) and Alder (*Alnus glutinosa*) with Ash (*Fraxinus excelsior*) occurring frequently. Downy Birch is (*Betula pubescens*) occasional. Rarely, Buckthorn (*Rhamnus cathartica*) and Alder Buckthorn (*Frangula alnus*) also occur, primarily close to the lakeshore edges. Occasionally, Hawthorn (*Crataegus monogyna*) Blackthorn (*Prunus spinosa*) and Guelder-rose (*Viburnum opulus*) form an understorey. The field is typically grassy and varies slightly depending on the degree of wetness but frequent species include the graminoids Remote Sedge (*Carex remota*), Purple Moor-grass (*Molinia caerulea*), Creeping Bent (*Agrostis stolonifera*) and Soft Rush (*Juncus effusus),* along with herbs such as Meadowsweet (*Filipendula ulmaria*), Water Mint (*Mentha aquatica*), Marsh Bedstraw (*Galium palustre*), Creeping Buttercup (*Ranunculus repens*), Common Nettle (*Urtica dioica*), Yellow Iris (*Iris pseudacorus*) and Lesser Spearwort (*Ranunculus flammula)*. Less commonly occurring species include Royal Fern (*Osmunda regalis*), Cypress Sedge (*Carex pseudocyperus*), Nodding Bur-marigold (*Bidens cernua*) and Gypsywort (*Lycopus europaeus*). The bryophyte layer includes Fox-tail Feather-moss (*Thamnobryum alopecurum),* Pointed Spear-moss (*Calliergonella cuspidata*), Heart-leaved Spear-moss (*Calliergon cordifolium*) and Tree-moss (*Climacium dendroides*).

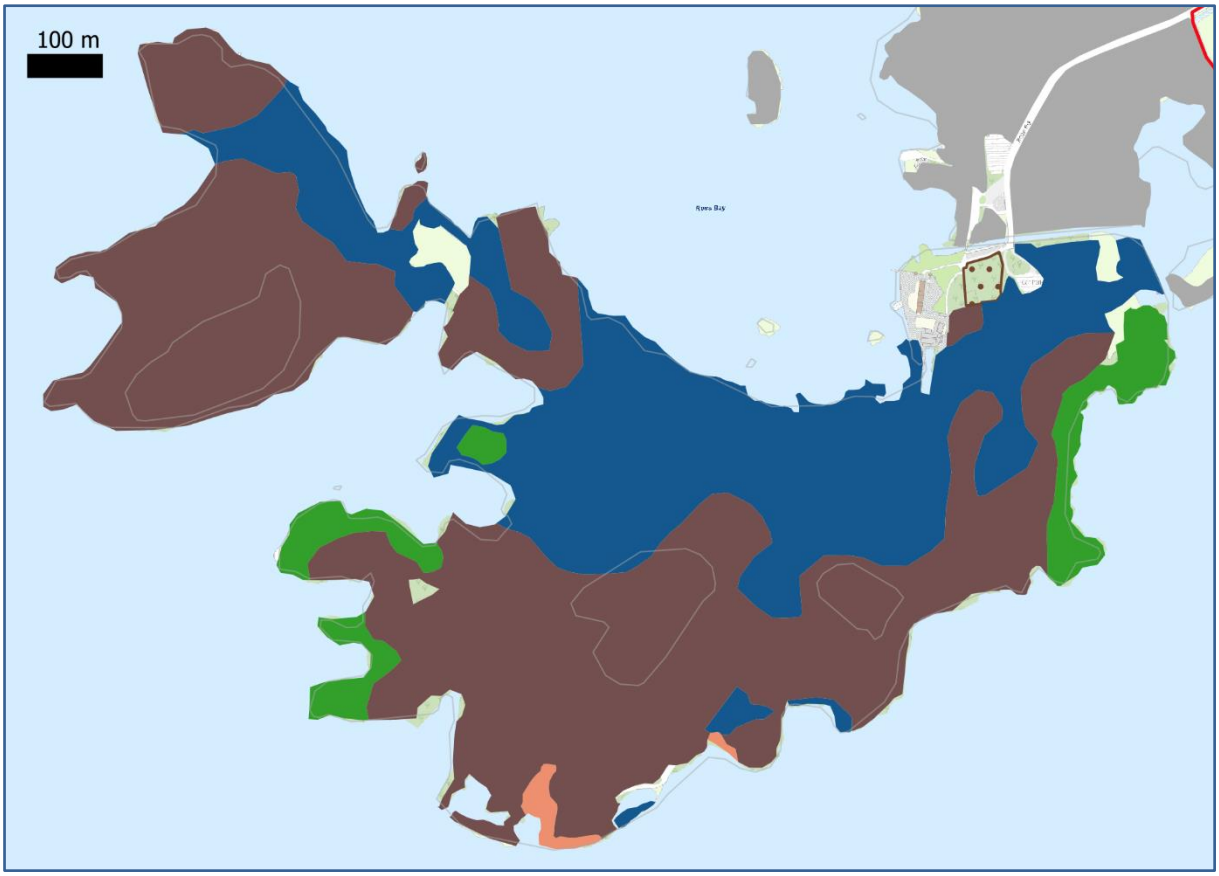

Figure 45 Site map for Ross Island. ■ = WN1, ■ = WN6, ■ = WD1, ■ = WD2, ■ = WS1, ⋰ = WD5, ■ = other sites, / = property boundary.

Modified broadleaved woodland (WD1) covers a large area across the site and is typically dominated by a tall canopy of Beech (*Fagus sylvatica*). Frequent canopy trees are Sycamore (*Acer pseudoplatanus*), Pedunculate Oak (*Quercus robur*), Horse Chestnut (*Aesculus hippocastanum*), Sweet Chestnut (*Castanea sativa*), Ash, Rowan (*Sorbus aucuparia*), Wych

Elm (*Ulmus glabra*) and Yew (*Taxus baccata*). Holm Oak (*Quercus ilex*) is occasional. Holly typically forms most of the understorey with Hazel (*Corylus avellana*) and Elder (*Sambucus nigra)* occasional. Under the heavy canopy of Beech, the field layer is typically sparse, but where it is more developed species include Irish Ivy (*Hedera hibernica*), Bramble (*Rubus fruticosus* agg.), Wood Sanicle (*Sanicula europaea*), Primrose (*Primula vulgaris)* and Dog-violets (*Viola* spp.), along with ferns including Hart's-tongue Fern (*Asplenium scolopendrium*), Soft Shield-fern (*Polystichum setiferum*) and Bracken (*Pteridium aquilinum*). The bryophyte layer includes Common Tamarisk-moss (*Thuidium tamariscinum*), Slender Mouse-tail Moss (*Isothecium myosuroides*), Common Feather-moss (*Kindbergia praelonga*), and Swan's-neck Thyme-moss (*Mnium hornum*).

A few small areas of oak woodland (WN1/91A0) occur in the west and east of the site. These areas are dominated by a canopy of Sessile Oak (*Quercus petraea*) with Holly forming the understorey. Occasional tree species include Rowan and Downy Birch. Beech also occurs, but is rare. The field layer contains Bilberry (*Vaccinium myrtillus*), Great Wood-rush (*Luzula sylvatica*), Bracken, Wood-sorrel (*Oxalis acetosella*) and, occasionally, Common Cow-wheat (*Melampyrum pratense*). The bryophyte layer includes species such as Little Shaggy-moss (*Rhytidiadelphus loreus*) Short-beaked Wood-moss (*Loeskeobryum brevirostre*), Hart's-tongue Thyme-moss (*Plagiomnium undulatum*), Slender Mouse-tail Moss and Straggling Pouchwort (*Saccogyna viticulosa*). The remainder of the site consists of a small area of parkland (WD5) in the north of the site and two small areas of mixed broadleaved/conifer woodland (WD2) in the south.

Scannell's Whitebeam (*Hedlundia scannelliana* syn. *Sorbus scannelliana*), a species that is endemic to Ross Island, grows in an exclosure in the south of the site. Within the same exclosure, regeneration of other native species is occurring. Betony (*Betonica officinalis*) occurs around the woodland edges in a number of areas.

Rhododendron (*Rhododendron ponticum*) is present in varying quantities. Cherry Laurel (*Prunus laurocerasus*) is frequent in a number of areas and occasionally forms extensive thickets. A number of other alien species occur within the site, including Bamboo (*Sasa* sp.), Bay (*Laurus nobilis*), Portugal Laurel (*Prunus lusitanica),* Snowberry (*Symphoricarpos albus*) and Winter Heliotrope (*Petasites pyrenaicus*).

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Remove other non-native species including Cherry Laurel, Bamboo, Bay, Portuguese Laurel, Snowberry and Winter Heliotrope.

4. Improve the native status of the oak woodland by removing the Beech.

5. Convert the areas of modified woodland (WD1, WD2) to native broadleaved woodland by removing mature and regenerating non-native species of broadleaves and conifers. Allow these areas to naturally regenerate, protecting regeneration if necessary.

Old-growth forest status:

The WN areas of the site are highly native and have a medium standing volume. Subjective samples of the large trees present in these areas by different species were as follows: Grey Willow had DBH measurements of 34, 39 and 53 cm, Alder had DBH measurements of 33 and 51 cm, Downy Birch had DBH measurements of 48 and 49 cm, and Sessile Oak and Pedunculate Oak had single DBH measurements of 89 cm and 114 cm, respectively. Two of

these trees were classified as 'old/gnarly', five as 'straight' and two as 'multi-stemmed'. Deadwood is frequent through the site with a medium diversity including large-scale instances. Subjective samples of these large-scale instances by different species were as follows: Downy Birch, Sessile Oak and Oak (*Quercus* sp.) each had single diameter measurements of 51 cm, 56 cm and 75 cm, respectively. There were a further two unidentified instances with measurements of 34 and 64 cm. Two of these instances were 'standing dead' and three were 'fallen dead'. Excluding the conservation actions of Rhododendron clearance and fencing, there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=9) supported 13 different TReMs, the most frequent being epiphytic bryophytes and lichens (9 trees), breakage (8) and microsoils (9). In terms of structural complexity, the site occasionally has a multi-layer structure but horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, hollows and root plates are occasional. Sessile Oak is dominant in the WN1 areas, but wet woodland areas would not be expected to support species typical of late-seral development phases as defined in section 1.3.2.

Based on these observations, Ross Island fulfils the requirements for old-growth forest status. Most of the above records are from the WN6 areas but it seems reasonable for the status to apply across the native areas of the site.

3.3.37 Tomies Wood (Site 1.37)

This very large site of 249.0 ha sits in the west of the Killarney National Park, Co. Kerry on the middle and lower slopes of Tomies Mountain, running down to the western shores of Lough Leane (Figure 46). The woodland is a popular amenity site with a loop walk and a separate track leading down to O'Sullivan's Cascade. Within the woodland, there are several ruined stone buildings and walls, along with evidence of old farming systems in the form of lazy beds in the south-east of the site. A number of long breaks occur in the woodland, running across the slope and filled by Bracken (*Pteridium aquilinum*).

Most of the woodland occurs in a single large tract. The character of the majority of it is that of rocky acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) with Holly (*Ilex aquifolium*) forming the understorey. Other tree species frequently occurring include Downy Birch (*Betula pubescens*), Rowan (*Sorbus aucuparia*), Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*) and Yew (*Taxus baccata*). Crab Apple (*Malus sylvestris*) and Grey Willow (*Salix cinerea*) also occur within the site but are rare. Due to the severe grazing pressure of deer and trespassing sheep, the field layer is extremely scant and in places negligible, but where it occurs it includes Bracken (*Pteridium aquilinum),* Great Wood-rush (*Luzula sylvatica*), Bilberry (*Vaccinium myrtillus*), Hard Fern (Blechnum *spicant),* Wood-sorrel (*Oxalis acetosella*) and Wood-sedge (*Carex sylvatica*). Regeneration of native trees is absent. Bryophyte cover is high throughout the oak woodland and typical species include Little Shaggy-moss (*Rhytidiadelphus loreus*), Slender Mouse-tail Moss (*Isothecium myosuroides*), Short-beaked Wood-moss (*Loeskeobryum brevirostre*), White Earwort (*Diplophyllum albicans*), Large White-moss (*Leucobryum glaucum*), Broom Fork-moss (*Dicranum scoparium*) and Greater Fork-moss (*Dicranum majus*), along with oceanic species such as Western Earwort (*Scapania gracilis),* Straggling Pouchwort (*Saccogyna viticulosa*) and Greater Whipwort (*Bazzania trilobata*).

Damp flushy areas occur occasionally and create a niche for graminoids such as Bulbous Rush (*Juncus bulbosus*), Soft Rush (*Juncus effusus*), Star Sedge (*Carex echinata*), Remote Sedge (*Carex remota*) and Smooth Stalked-sedge (*Carex laevigata*), along with herbs such as Lesser Spearwort (*Ranunculus flammula*), and Marsh Bedstraw (*Galium palustre*). Rarely, Ivy-leaved Bellflower (*Wahlenbergia hederacea*) occurs in these flushes

In the south of the site, between the peaks of Tomies and Shehy, is the upland valley of Coomclochan. Here, there are some fragmented stands (WN1/not 91A0) dominated by low, old, gnarly trees of Holly with few other tree species occurring apart from the occasional Downy

Birch and Rowan. The canopy is very gappy with the resulting field layer grassy, containing species such as Common Bent (*Agrostis capillaris*), Purple Moor-grass (*Molinia caerulea*), Bracken and Wood-Sorrel (Oxalis acetosella).

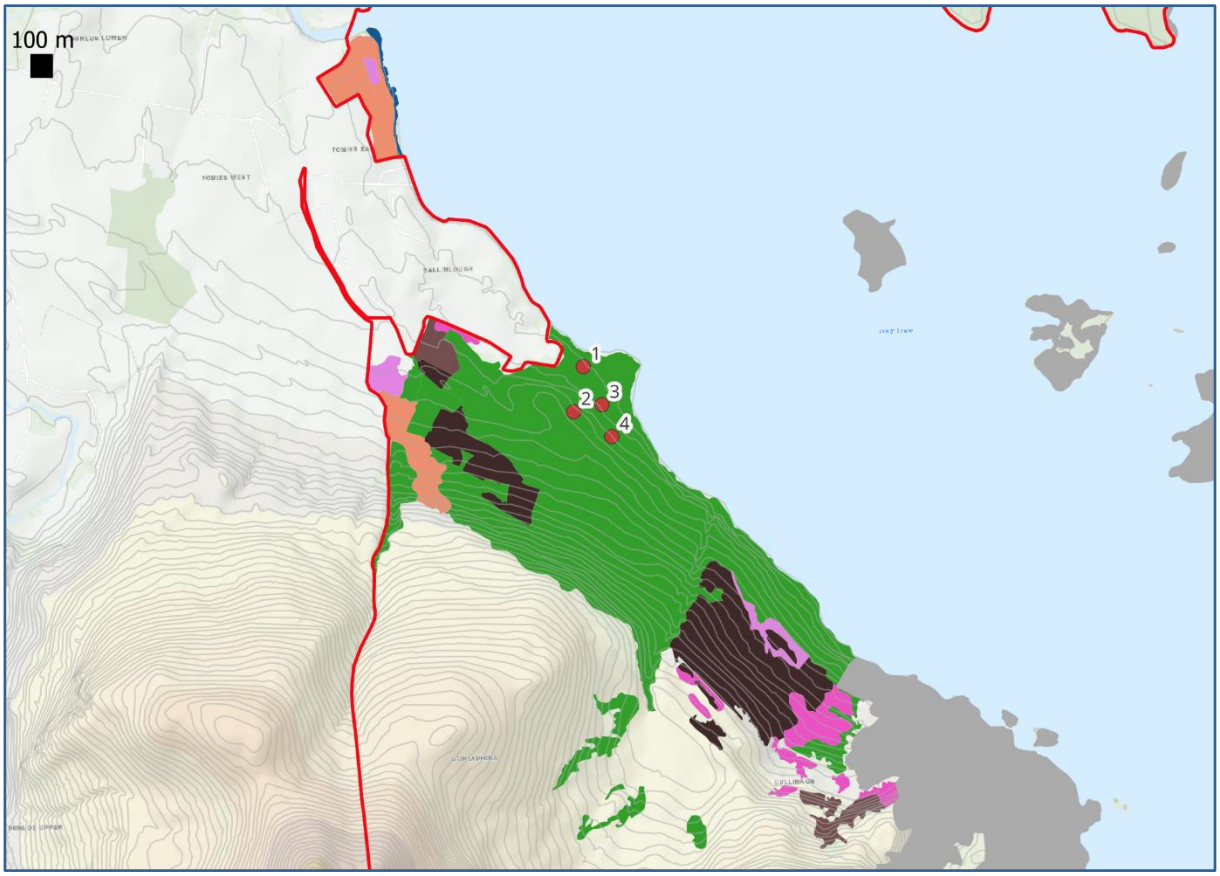

Figure 46 Site map for Tomies Wood. ■ = WN1, ■ = WN6, ■ = WD1, ■ = WD2, ■ = WD4, ■ = WS1, ■ = WS3, ■ = other sites, ● = stops, / = property boundary.

There are several conifer plantations (WD4) with the largest being in the south-east of the site. It contains a mixture of conifer species including Spruce (*Picea* spp.), Scots Pine (*Pinus sylvestris*), Lodgepole Pine (*Pinus contorta*) and Larch (*Larix* sp.). The ground is typically covered in a dense layer of needles but in places contains a cover of species such as Wood-sorrel, Irish Ivy (*Hedera hibernica*) and Bramble (*Rubus fruticosus* agg.). Rhododendron (*Rhododendron ponticum*) is frequent in these plantations and often forms extensive thickets. Some areas have canopies dominated by Downy Birch but are infested with dense Rhododendron to the extent that the entire stand lacks a typical understorey and field layer. These areas were deemed modified broadleaved woodland (WD1).

In the far north of the site, is a separate block of woodland that is mostly mixed conifer/broadleaved woodland (WD2) with native tree species such as Sessile Oak, Rowan, Birch and Scots Pine together with non-native conifers. The field layer includes Bracken, Wood-sorrel and Hard Fern. Rhododendron is frequent and the south-west of this block is infested with dense, mature plants that form extensive thickets and dominate the shrub and understorey layer. Wet woodland (WN6/91E0) occurs along the lake edge here and is dominated by Grey Willow and Alder (*Alnus glutinosa*), with occasional Ash. The field layer is grassy, well-developed and relatively species-rich, including graminoids such as Remote Sedge, Purple Moor-grass, Creeping Bent (*Agrostis stolonifera*), Reed Canary-grass (*Phalaris arundinacea*), Common Reed (*Phragmites australis*) and herbs such as Water Mint (*Mentha aquatica*), Water-pepper (*Persicaria hydropiper*), Marsh Pennywort (*Hydrocotyle vulgaris*), Yellow Iris (*Iris pseudacorus*) and Marsh Bedstraw (*Galium palustre*). Gypsywort (*Lycopus europaeus)*, Marsh Marigold (*Caltha palustris*), Hemlock Water-dropwort (*Oenanthe crocata*), Water-plantain (*Alisma plantago-aquatica*) and Nodding Bur-marigold (*Bidens cernua)* are

occasional plants. Standing water is frequent throughout and there are numerous channels and runnels. Here, Rhododendron is occasional; the wetness of this area seems to be limiting it's from the adjacent modified stand.

A further stands of WD2 lies in the west of the main block. Other habitats present on this site are Rhododendron scrub (WS3)—which occurs most extensively in the south-east of the site—and areas of scrub (WS1) that contain Gorse (*Ulex europaeus*) and Bramble. Although Rhododendron (*Rhododendron ponticum*) is frequent across the site large areas of the main block of oak woodland are clear, with treatment currently ongoing.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

5. Convert the areas of modified woodland conifer plantation (WD1, WD2, WD4) to native broadleaved woodland by removing mature and regenerating non-native species of conifers and broadleaves.

Old-growth forest status:

The WN areas of the site are highly native with large old trees dominant and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=15) had a DBH range of 60-148 cm with a median of 94 cm, Holly (*n*=7) had a DBH range of 33-94 cm with a median of 50 cm, and Alder, Downy Birch, Crab Apple and Hybrid Oak (*Quercus* × *rosacea*) had single DBH measurements of 86 cm, 41 cm, 80 cm and 124 cm, respectively. Six of these trees were classified as 'old/gnarly', sixteen as 'straight' and three as 'multi-stemmed'. There is a medium diversity of deadwood within the site including large-scale instances, but deadwood is frequent rather than abundant. Subjective samples of large-scale deadwood by different species were as follows: Sessile Oak (*n*=15) had a diameter range of 36-106 cm with a median of 62 cm, Holly had diameter measurements of 43, 76 and 82 cm, Downy Birch had a single diameter measurement of 56 cm and an unidentified instance had a measurement of 32 cm. Four of these instances were 'standing dead', ten were 'fallen dead' and six were 'old/senescent'. The breaks that cut through the site indicate past woodland management, either fire control or for shooting. These are probably many decades old although continued grazing prevents them from scrubbing over. Conservation actions of Rhododendron clearance and fencing have also been conducted in the recent past.

Between them, the sample of large trees (*n*=26) supported 17 different TReMs, the most frequent being epiphytic bryophytes and lichens (26 trees), breakage (23), epiphytic ferns (22) and microsoils (22). In terms of structural complexity, the site frequently has a multi-layer structure but horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are frequent root plates and occasional hollows. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN areas within Tomies Wood fulfil the requirements for old-growth forest status. An exception is a small block of young Downy Birch and Sessile Oak in the north-west of the main block.

3.3.38 Tower Bog (Site 1.38)

This site of just 0.9 ha lies in the middle of Killarney National Park, Co. Kerry and comprises small fragments of woodland and lengths of treeline (WL2) on the western side of the N71 (Figure 47).

The character of the woodland is that of rocky acidophilous oak woodland (WN1/91A0). The canopy is of Downy Birch (*Betula pubescens*) and Rowan (*Sorbus aucuparia*) with some Sessile Oak (*Quercus petraea*) whilst Holly (*Ilex aquifolium*) occurs in the understorey. The field layer contains Purple Moor-grass (*Molinia caerulea*) and Bracken (*Pteridium aquilinum*), along with Hard Fern (*Blechnum spicant*) and Wood-sorrel (*Oxalis acetosella*). Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*) also occurs on damp rock faces. The bryophyte layer includes typical species such as Little Shaggy-moss (*Rhytidiadelphus loreus*) and Large White-moss (*Leucobryum glaucum)* together with oceanic species such as Western Earwort (*Scapania gracilis*) and Straggling Pouchwort (*Saccogyna viticulosa*). A number of flushy areas occur that provide niches for species such as Soft Rush (*Juncus effusus*), Star Sedge (*Carex echinata*), Lesser Skullcap (*Scutellaria minor*) and Bog-mosses (*Sphagnum* spp.)

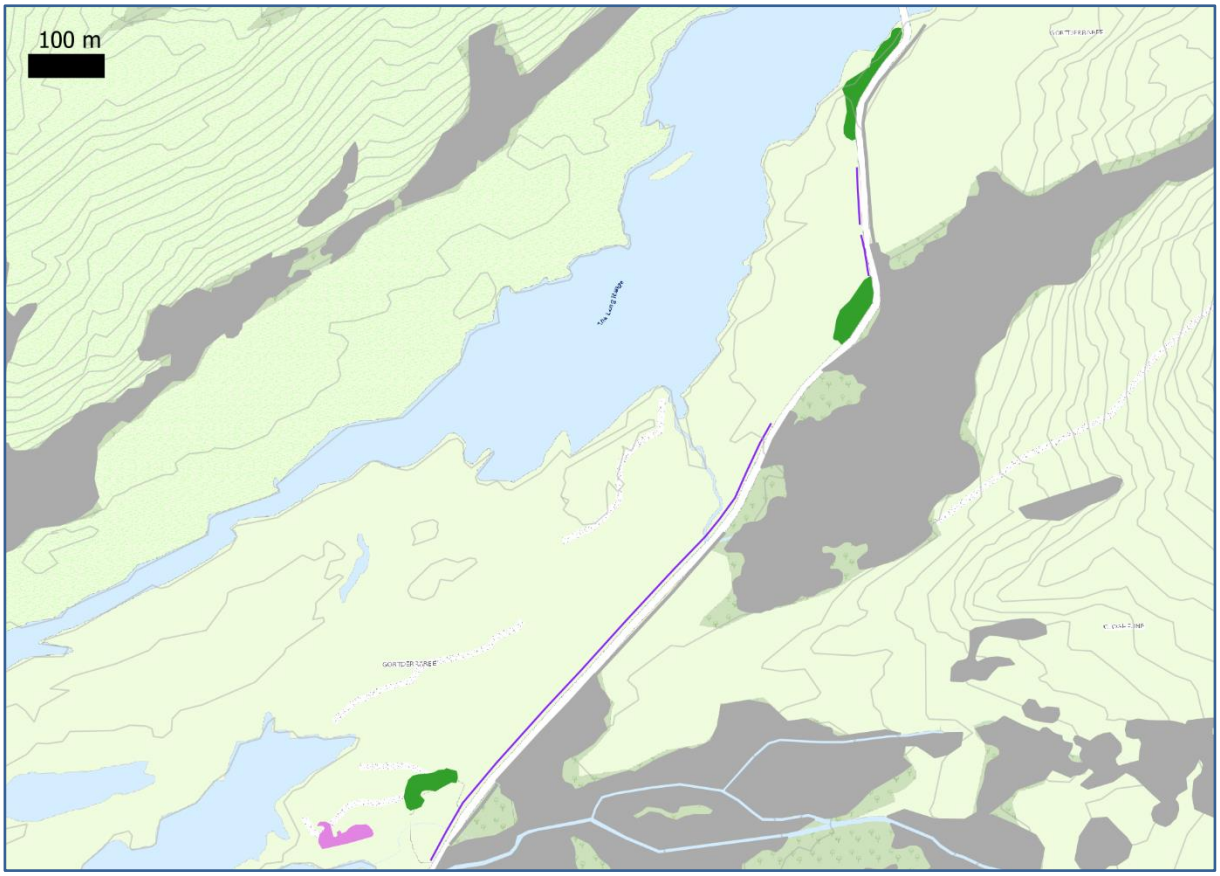

Figure 47 Site map for Tower Bog. ■ = WN1, ■ = WS3, ■ = other sites, / = WL2.

Rhododendron clearance has been conducted in the last few years in these stands and numerous brash piles occur. A small area of Rhododendron scrub (WS3) is still extant in the south of the site. The southernmost oak stand has been damaged by wildfires around its margins. Rhododendron regrowth is now vigorously occurring in burnt areas. Grazing levels across the site are severe and natural regeneration of native species is absent

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires including the removal of piles of Rhododendron brash.

Old-growth forest status:

The WN areas at this site are highly native with large old trees and a medium standing volume. Subjective samples of these trees by different species were as follows: Downy Birch had DBH measurements of 54, 55 and 56 cm, Holly, Grey Willow (*Salix cinerea*) and Rowan had single DBH measurements of 57 cm, 54 cm and 53 cm, respectively. Half of the trees were recorded as being located near the edge which reflects the small size of the stands. Two of these trees were classified as 'old/gnarly', three as 'straight' and one as 'multi-stemmed'. Deadwood is occasional at the site but has low diversity. Subjective samples of the large-scale instances were as follows: Sessile Oak had diameter measurements of 67 and 83 cm, and Holly, Grey Willow, Rowan and an unidentified instance had diameter measurements of 31 cm, 24 cm, 42 cm and 25 cm, respectively. Two of these instances were 'standing dead' and four were 'old/senescent'. Four trees had fire damage. Excluding the conservation actions of Rhododendron clearance, there are no significant signs of former human intervention.

Based on these observations, the WN areas at Tower Bog do not fulfil the mandatory requirements for old-growth forest status.

3.3.39 Tower Wood (Site 1.39)

This site of 94.8 ha is located in the south of the Killarney National Park, Co. Kerry (Figure 48). It descends from the upland townland of Crinnagh, which lies just south-west of the peak of Torc Mountain, onto the north face of Cromaglan Mountain and down to the Upper Lake. Towards the top of the site, it becomes more fragmented. Within the woodland there are several ruined stone buildings and walls, along with evidence of old farming systems in the form of lazy beds in the upper parts of the site. The Crinnagh River and other streams run down through the site and a number of cascades streams and waterfalls occur including Cromaglan Cascade. The N71 passes through the bottom of the site.

The character of the woodland is that of rocky acidophilous oak woodland (WN1/91A0). The canopy is dominated by Sessile Oak (*Quercus petraea*) and Downy Birch (*Betula pubescens*), with Holly (*Ilex aquifolium*) and Strawberry Tree (*Arbutus unedo*) forming the understorey with the occasional Hazel (*Corylus avellana*). Other frequently occurring species include Rowan (*Sorbus aucuparia*), Ash (*Fraxinus excelsior*), Yew (*Taxus baccata*). Crab Apple (*Malus sylvestris*), Alder (*Alnus glutinosa*), Grey Willow (*Salix cinerea*), Aspen (*Populus tremula*) and Hawthorn (*Crataegus monogyna*) also occur but are rare. In part, the canopy is rather gappy and breaking up, especially in the north-east of the site. This is partly because old, fallen trees are not being replaced. Some of the surviving Oaks are multi-stemmed suggesting that they were coppiced or at least felled in the past. The field layer includes Bracken (*Pteridium aquilinum*), Great Wood-rush (*Luzula sylvatica*), Hard Fern (*Blechnum spicant*), Wood-sorrel (*Oxalis acetosella*), Purple Moor-grass (*Molinia caerulea*), Common Bent (*Agrostis capillaris*), Sweet Vernal-grass (*Anthoxanthum odoratum*), Bilberry (*Vaccinium myrtillus*) and Heather (*Calluna vulgaris)*. Damp rock faces support St Patrick's-Cabbage (*Saxifraga spathularis*), Tunbridge Film-fern (*Hymenophyllum tunbrigense*) and, more rarely, Lemon-scented Fern (*Oreopteris limbosperma*) and Fir Clubmoss (*Huperzia selago*). Where there is mineral flushing, species that typically favour more basic conditions can be found including Primrose (*Primula vulgar*is), Ramsons (*Allium ursinum*) and Wood Anemone (*Anemone nemorosa*). The gametophyte of Killarney Fern (*Trichomanes speciosum*) also occurs. Bryophyte cover is high throughout the site and plants include Little Shaggy-moss (*Rhytidiadelphus loreus*) Large

White-moss (*Leucobryum glaucum*), Short-beaked Wood-moss (*Loeskeobryum brevirostre*), White Earwort (*Diplophyllum albicans*), Waved Silk-moss (*Plagiothecium undulatum),* Bank Haircap (*Polytrichum formosum*) and Swan's-neck Thyme-moss (*Mnium hornum*), and a number of oceanic species such as Western Earwort (*Scapania gracilis),* Rock Fingerwort (*Lepidozia cupressina*) and Greater Whipwort (*Bazzania trilobata*).

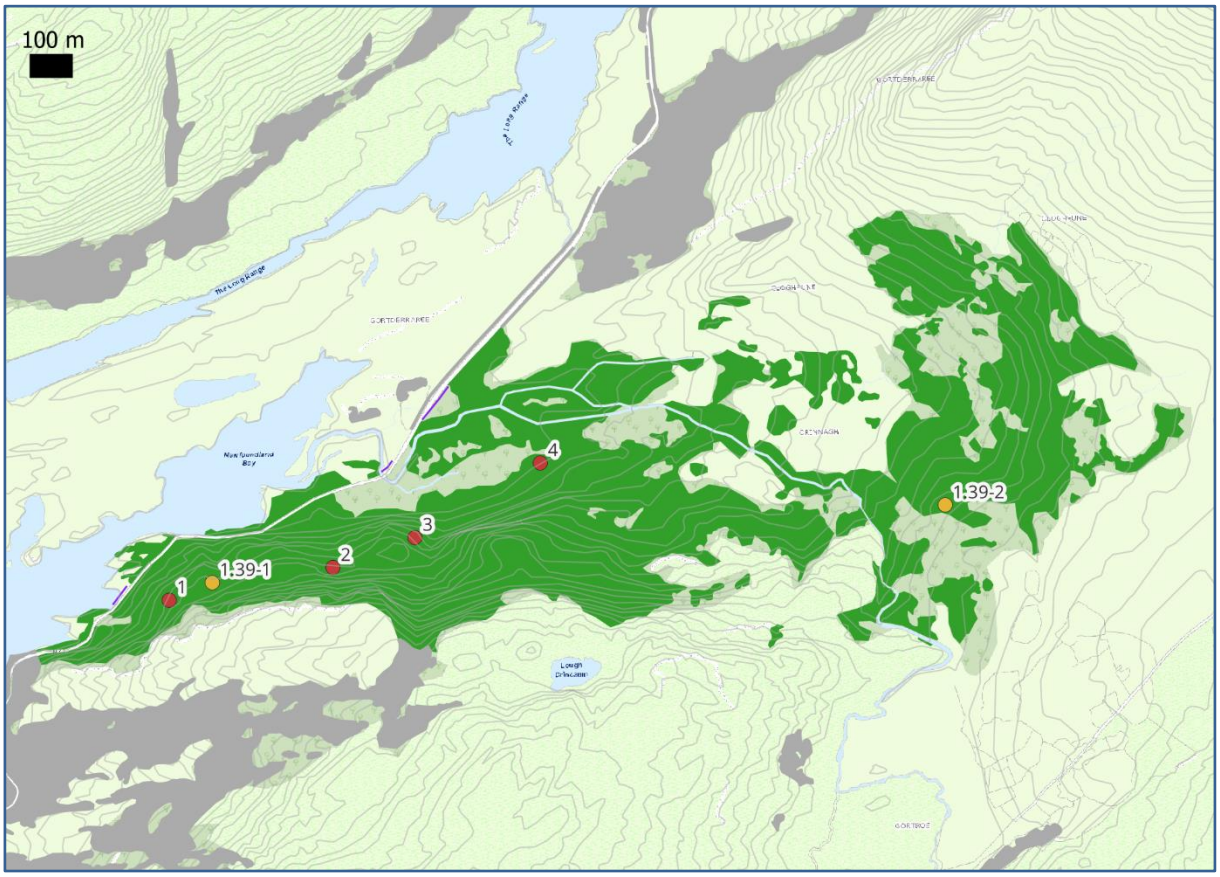

Figure 48 Site map for Tower Wood. ■ = WN1, ■ = other sites, / = WL2, ● = stops, ● = relevé.

Damp, flushy areas are frequent across the site and they here can be found Remote Sedge (*Carex remota*), Star Sedge (*Carex echinata*), Soft Rush (*Juncus effusus*) and Bulbous Rush (*Juncus bulbosus*), Lesser Skullcap (*Scutellaria minor*), Lesser Spearwort (*Ranunculus flammula*) and Marsh Bedstraw (*Galium palustre*) and bryophytes such as Common Haircap (*Polytrichum commune*), Hart's-tongue Thyme-moss (*Plagiomnium undulatum*), Dotted Thyme-moss (*Rhizomnium punctatum*) and Bog-mosses (*Sphagnum* spp.).

The woodland in the upper parts of the site is very open and gappy and is dominated by old gnarly Holly trees, along with scattered Ash, Rowan, Hazel and Hawthorn, but contains no Sessile Oak (WN1/not 91A0). The field layer is dominated by Bracken and Purple Moor-grass.

Grazing levels across the site are severe and natural regeneration of native species is absent. A number of exclosures occur in the flatter areas near the Cascade that are facilitating natural regeneration of native species. In the vicinity of these exclosures, in a number of places, Oaks have been planted in tree tubes.

Large-scale clearance of Rhododendron (*Rhododendron ponticum*) has taken place in recent years and a number of brash piles occur within the woodland. However, regeneration of this species is abundant across the site, particularly in the central part of the site. There is fire damage on some of the trees around the edges. At Cromaglan Cascasde, vegetation is experiencing signs of compaction and trampling from visitors.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers. Many of the stands are too small to support the environmental conditions of a woodland interior.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires, including removal of piles of Rhododendron brash.

5. Ensure the exclosures are maintained and remain fully functional.

Old-growth forest status:

This site is highly native with large old trees dominant and a high standing volume. Subjective samples of these large trees by different species were as follows: Sessile Oak (*n*=12) had a DBH range of 57-164 cm with a median of 114 cm, Ash (*n*=4) had a DBH range of 66-97 cm with a median of 82 cm, Holly had DBH measurements of 38 and 72 cm, and Downy Birch, Crab Apple and Grey Willow had single DBH measurements of 101 cm, 51 cm and 74 cm, respectively. Sixteen of these trees were recorded from the interior of the woodland while the remaining five were located near an edge. Ten trees were classified as 'old/gnarly', ten as 'straight' and one as 'multi-stemmed'. Deadwood is frequent through the site and it has a high diversity including large-scale instances. Subjective samples of these instances were as follows: Sessile Oak (*n*=7) had a diameter range of 44-79 cm with a median of 49 cm, Holly (*n*=8) had a diameter range of 33-59 cm with a median of 46 cm, and Strawberry Tree, Downy Birch, Hazel and Ash each had single diameter measurements of 41 cm, 43 cm, 37 cm and 40 cm respectively. There were additionally three fire-damaged standing dead trees which could not be identified measuring 35, 77 and 91 cm. Nine of these instances were 'standing dead', five were 'fallen dead' and eight were 'old/senescent'. Excluding the conservation actions of Rhododendron clearance, tree-planting and fencing there are no significant signs of human intervention.

Between them, the sample of large trees (*n*=21) supported 14 different TReMs, the most frequent being epiphytic bryophytes and lichens (21 trees), breakage (21), root buttresses (14), microsoils (13) and other cavities (12). In terms of structural complexity, the site frequently has a multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures, there are frequent hollows and occasional rare root plates. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, Tower Wood fulfils the requirements for old-growth forest status.

3.3.40 Ullauns (Site 1.40)

Description:

This site of 52.2 ha lies predominantly on the eastern slopes of the valley of the Ullauns River in the south of the Killarney National Park, Co. Kerry (Figure 49). At its northern end, it wraps around the lower slopes of Shaking Rock and follows the southern bank of Galway's River some distance to the east. This large central block of woodland is flanked by multiple outlying fragments to the west, south and east. Close to its northern end, the Old Kenmare Road footpath crosses through the site.

The vast majority of the site is acidophilous oak woodland (WN1/91A0) and the canopy is dominated by old, gnarly Sessile Oak (*Quercus petraea*) trees with Downy Birch (*Betula pubescens*) also frequent. There is an understorey of old Holly (*Ilex aquifolium*) and Rowan (*Sorbus aucuparia*) is occasional. The site is severely grazed by deer and the field layer is typically sparse; species include Bilberry (*Vaccinium myrtillus*), Bracken (*Pteridium aquilinum*), Great Wood-rush (*Luzula sylvatica*), Hard Fern (*Blechnum spicant*), Irish Ivy (*Hedera hibernica*), Wood-sorrel (*Oxalis acetosella*), Honeysuckle (*Lonicera periclymenum*) and Irish Spurge (*Euphorbia hyberna*). On mossy boulders and rockfaces can be found St Patrick's-cabbage (*Saxifraga spathularis*). The bryophyte flora is diverse and includes include Bank Haircap (*Polytrichum formosum*), Little Shaggy-moss (*Rhytidiadelphus loreus*), Common Tamarisk-moss (*Thuidium tamariscinum*), Slender Mouse-tail Moss (*Isothecium myosuroides*), Western Earwort (Scapania gracilis), Short-beaked Wood-moss (*Loeskeobryum brevirostre*) and Straggling Pouchwort (*Saccogyna viticulosa*).

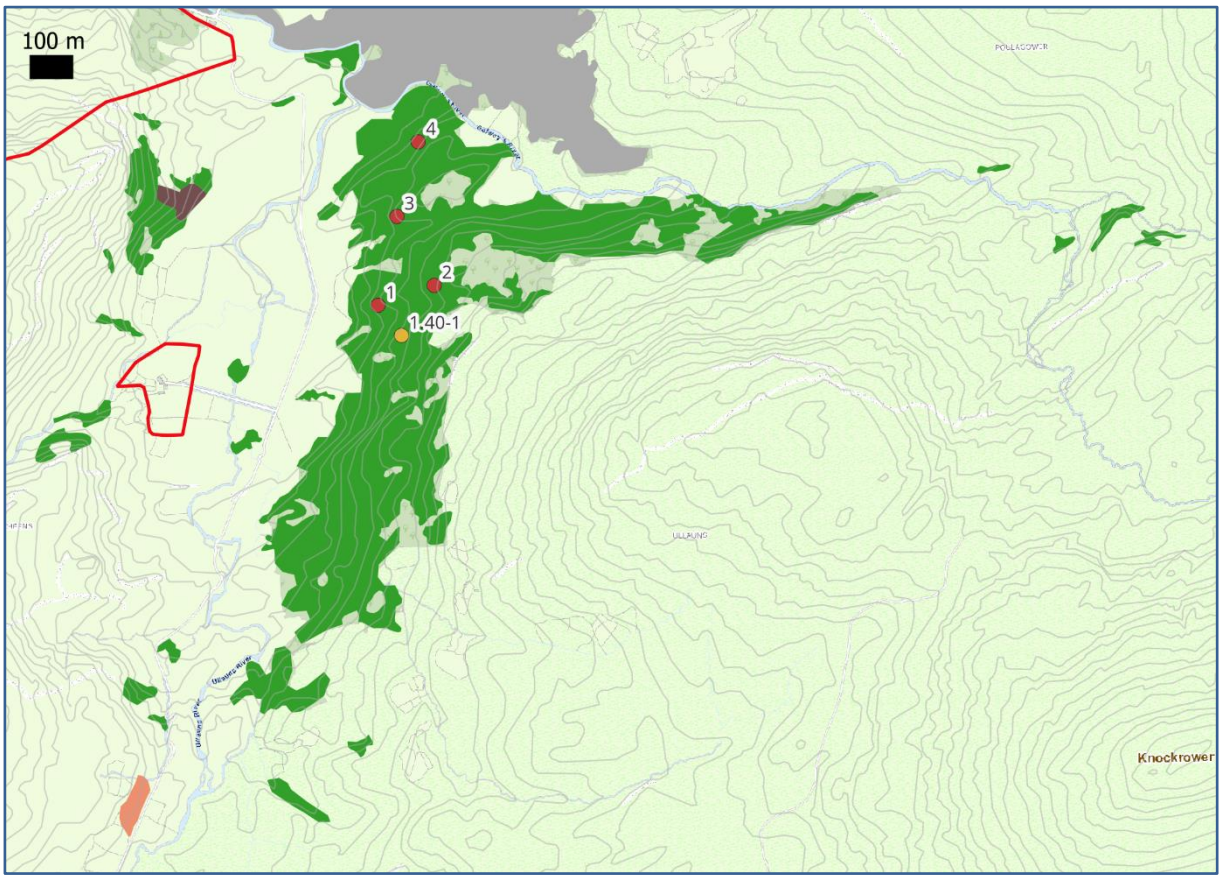

Figure 49 Site map for Ullauns. ■ = WN1, ■ = WD1, ■ = WD2, ■ = other sites, ● = stops, ● = relevé, / = property boundary.

There are frequent flushes on the slopes within the woodland in which can be found hydrophilous species such as Soft Rush (*Juncus effusus*), Bulbous Rush (*Juncus bulbosus*), Lesser Skullcap (*Scutellaria minor*), Marsh Thistle (*Cirsium palustre*), Marsh Bedstraw (*Galium palustre*) and Blunt-leaved Bog-moss (*Sphagnum palustre*). These flushes are one of the few Kerry stations for Girgensohn's Bog-moss (*Sphagnum girgensohnii*). To the west of the Ullauns River is a small stand (WD1) dominated by Beech (*Fagus sylvatica*) and there is also a small mixed broadleaved/conifer stand (WD2) at the old barracks in the very south of the site.

Rhododendron (*Rhododendron ponticum*) is present but not abundant. There are many fallen and decrepit Oaks, resulting in an abundance of dead wood habitat, but these trees have not been replaced in the canopy which is now breaking up. Contraction of the woodland is occurring in the far east of the site along Galway's River and within fragments high up on the slope.

Deer fences enclose much of the main block of woodland but these are non-functional as they have frequently collapsed and in places have been vandalised. They have generally failed to promote any natural regeneration of tree species although there are some small, scattered clumps of Downy Birch poles and in the north, above Galway's River, there are localised thickets of Holly regeneration.

Conservation measures:

1. Reduce deer numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing by deer throughout the site and an absence of natural regeneration. There is also a lack of structural stand diversity due to the absence of smaller trees. The reduction can be achieved through a combination of culling and exclusion. The existing fence should be repaired or, if necessary, replaced. Regular monitoring and maintenance of the fence is required. Once sufficient natural regeneration has been achieved, the fences should be opened to avoid the negative effects of long-term grazing exclusion.

2. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Convert the areas of modified broadleaved woodland to native broadleaved woodland. This should entail the gradual removal from the canopy of Beech and conifers. In their place, native species should be promoted through the planting of local provenance saplings or through natural regeneration.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

5. Reduce fragmentation by protecting the natural regeneration of native tree species in the gaps between stands using fencing/tree tubes. This measure must be conducted in combination with the reduction of deer numbers.

Old-growth forest status:

The WN1 areas of this site are highly native and within these areas large, old Sessile Oaks are dominant resulting in a high standing volume. A subjective sample of these trees (*n*=13) had a DBH range of 44-125 cm with a median of 81 cm. A Holly with a DBH of 67 cm was also recorded. The majority of these trees were recorded from the interior of the woodland and were classified as 'old/gnarly'. There is also an abundance and high diversity of deadwood within the site including large-scale instances. A subjective sample (*n*=12) of these instances, all Sessile Oak, had a diameter range of 38-103 cm with a median of 56 cm. Eight of these instances were standing dead, the remaining four were fallen dead. Most appeared to have died due to old age, although one may have toppled due to a shallow root plate. Excluding the conservation actions of Rhododendron clearance and fencing, there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=14) supported 15 different TReMs, the most frequent being breakage (12 trees), epiphytic bryophytes and lichens (11), epiphytic ferns (11), branch holes (9), bark loss (8), root buttresses (8) and microsoils (7). In terms of structural complexity, the site frequently has a multi-layer structure with Holly forming a distinct understorey beneath Sessile Oak but horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are frequent root plates and abundant hollows in the rocky terrain as well as some burrows. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN1 area within Ullauns amply fulfils the requirements for old-growth forest status.

3.3.41 Upper Lake Islands (Site 1.41)

This site of 2.5 ha consists of eight rocky wooded islands in the Upper Lake of the Killarney National Park, Co. Kerry (Figure 50).

In the west of the lake is a cluster of islands. The character of most of the woodland here is that of rocky acidophilous oak woodland (WN1/91A0). On Eagle Island, the largest, the canopy is dominated by Sessile Oak (*Quercus petraea*) with Downy Birch (*Betula pubescens*) and Yew (*Taxus baccata*) also occurring frequently. Holly (*Ilex aquifolium*) and Strawberry Tree (*Arbutus unedo*) form the understorey and Juniper (*Juniperus communis*) is also occasionally present. The field layer is composed of a lush, well-developed layer of Great Wood-rush (*Luzula sylvatica*) and Bilberry (*Vaccinium myrtillus*) accompanied by Bracken (*Pteridium aquilinum*) and Common Cow-wheat (*Melampyrum pratense*). Rock faces within the woodland provide a niche for species such as St Patrick's-cabbage (*Saxifraga spathularis*), Navelwort (*Umbilicus rupestris*), Maidenhair Spleenwort (*Asplenium trichomanes*) and swathes of Tunbridge Filmy-fern (*Hymenophyllum tunbrigense*). Mountain Everlasting (*Antennaria dioica*) can be found growing on rocky outcrops on the edge of the island. The bryophyte layer includes Little Shaggy-moss (*Rhytidiadelphus loreus*), Broom Fork-moss (*Dicranum scoparium*) and Greater Fork-moss (*Dicranum majus*), together with a number of oceanic species such as Western Earwort (*Scapania gracilis*), Straggling Pouchwort (*Saccogyna viticulosa*) and Greater Whipwort (*Bazzania trilobata*).

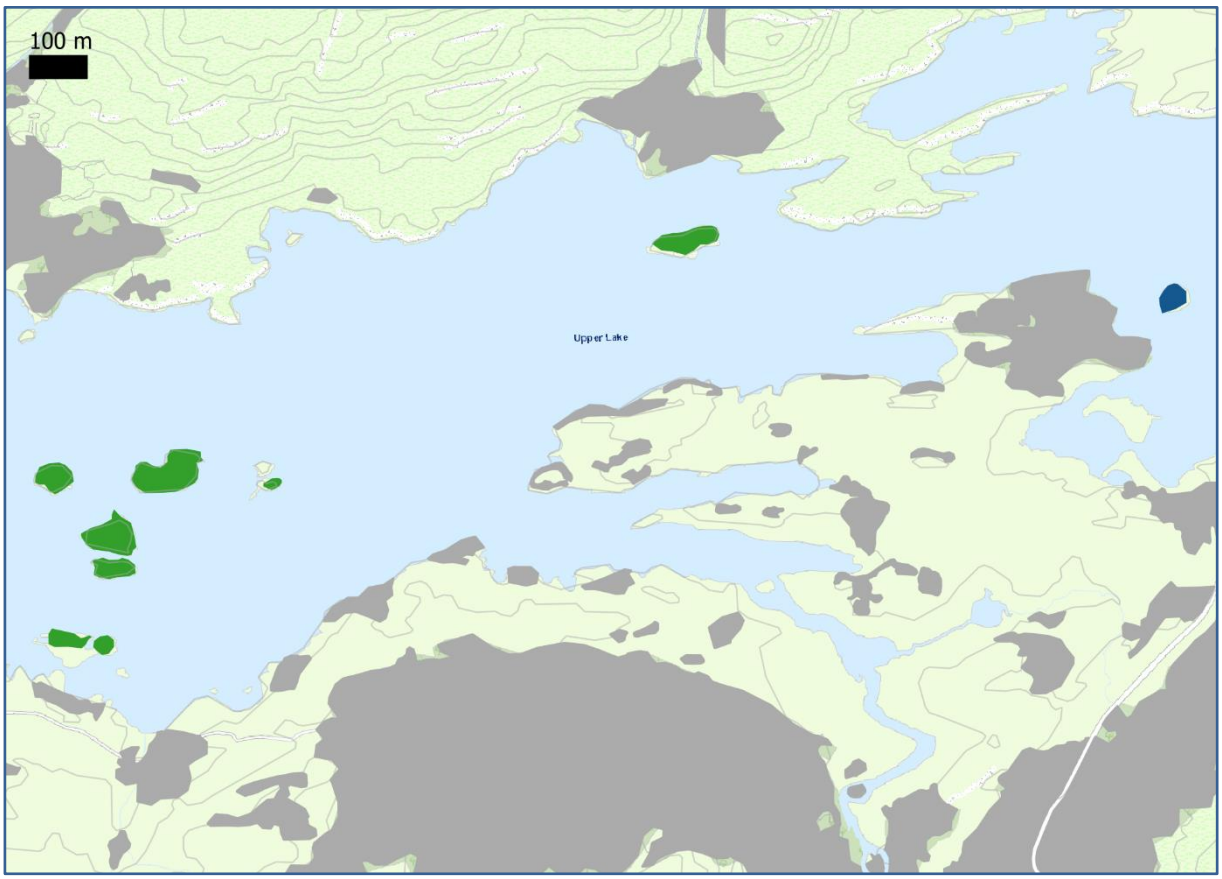

Figure 50 Site map for Upper Lake Islands. ■ = WN1, ■ = WN6, ■ = other sites.

West of Eagle Island, is McCarthy's Island. Here the canopy is dominated by Sessile Oak with Downy Birch and Rowan (*Sorbus aucuparia*) occurring frequently and with Strawberry Tree and Holly occurring in the understorey. A small handful of mature Beech (*Fagus sylvatica*) are also present in the canopy. The field layer contains a similar suite of species as Eagle Island. To the south of McCarthy's Island are Ronayne's Island and smaller unnamed islet. A small number of Cotoneaster (*Cotoneaster* sp.) plants occur on these islands. South of Ronayne's Island is Duck Island that sports a scrubby assemblage (WN1/not 91A0) of Strawberry Tree and Holly with a dense shrub layer of Heather (*Calluna vulgaris)* and Juniper. Mature, flowering Rhododendron (*Rhododendron ponticum*) is present, along with Cotoneaster.

In the centre of the lake is Arbutus Island. The oak woodland (WN1/91A0) here is similar to that on the previous islands, but Strawberry Tree is more prominent

In the east of the lake is Stag Island and a stand of wet woodland (WN6/91E0). Here the canopy is dominated by Grey Willow (*Salix cinerea*) and Ash (*Fraxinus excelsior*) with Buckthorn (*Rhamnus cathartica*), Guelder-rose (*Viburnum opulus*) and Hawthorn (*Crataegus monogyna*) occurring in the understorey. The field layer includes Common Reed (*Phragmites australis*), Lesser Spearwort (*Ranunculus flammula*), Creeping Bent (*Agrostis stolonifera*), Marsh Bedstraw (*Galium palustre*) and Creeping Buttercup (*Ranunculus repens*). Where the woodland meets the lakeshore, a narrow band of Great Fen-sedge (*Cladium mariscus*) occurs. The bryophyte layer includes species such as Fox-tail Feather-moss (*Thamnobryum alopecurum*) and Tree-moss (*Climacium dendroides*).

Overall, grazing levels are low to absent across most of the islands, and as a result the field layer is generally well developed and regeneration of native species frequently occurs. Rhododendron occurs on a number of the islands, but generally at low levels and treatment and clearance work has taken place.

Conservation measures:

1. Remove Rhododendron from Eagle Island, Duck Island and Ronayne's Island and conduct regular monitoring to detect and remove regrowth or reinvasion.

2. Remove Cotoneaster from Duck Island and Ronayne's Island.

3. Improve the native status of the oak woodland by removing Beech from McCarthy's Island.

Old-growth forest status:

The site is highly native with several large old trees and a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=6) had a DBH range of 43-83 cm with a median of 57 cm, Yew (*n*=4) had a DBH range of 39-61 cm with a median of 52 cm, Strawberry Tree had DBH measurements of 34, 39 and 64 cm, Downy Birch had DBH measurements of 37 and 38 cm, and Grey Willow had a single DBH measurement of 39 cm. Nine of these trees were recorded from the interior of the woodland while seven were located near an edge. Seven of these trees were classified as 'old/gnarly', seven as 'straight' and two as 'multi-stemmed'. There is a medium diversity of deadwood within the site including large-scale instances and deadwood occurs frequently. Subjective samples of the large-scale instances were as follows: Sessile Oak (*n*=5) had a diameter range of 33-57 cm with a median of 37 cm, Strawberry Tree (*n*=4) had a diameter range of 32-56 cm with a median of 44 cm, Holly had diameter measurements of 38, 41 and 64 cm, and unidentified instances had diameter measurements of 41, 48 and 53 cm. Seven of these instances were 'standing dead', five were 'fallen dead' and three were 'old/senescent'. There are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=16) supported 13 different TReMs, the most frequent being epiphytic bryophytes and lichens (16 trees), epiphytic climbers (14), breakage (12) and microsoils (11). In terms of structural complexity, the site has an abundant multi-layer structure and horizontal structural diversity is medium. In terms of natural soil microrelief structures, there are occasional root plates and hollows. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, McCarthy's Island, Arbutus Island and Eagle Island are considered to fulfil the requirements for old-growth forest status. Stag and Duck Island have insufficient large trees. The part of Ronayne's Island that was accessed had just one large tree and the area lacked sufficient deadwood.

3.3.42 Glengarriff Woods Nature Reserve (Site 2)

Description:

This large site contains 276.9 ha of woodland and occupies most of the bottom and lower slopes of the eponymous coastal glen in Co. Cork. (Figure 51). The Glengarriff River flows

through the centre of the site and its tributaries, the Canrooska River in the north and the Coomerkane River in the south, are also features. The site is further divided by public roads and a network of footpaths and is a very popular amenity site. It is a complex patchwork of different woodland stand types that are determined partly by the topography of the site and past management but also importantly by the variable abundance of a large suite of non-native species. Infestation by Rhododendron (*Rhododendron ponticum*) is a major problem; despite previous efforts to control the species, it is now abundant throughout the site and forms dense and extensive thickets in places. In addition, as much of the site was previously conifer plantation, there are a range of species of non-native conifers that are regenerating and/or occur as mature trees. These species primarily include Sitka Spruce (*Picea sitchensis*), Western Hemlock-spruce (*Tsuga heterophylla*), Western Red-cedar (*Thuja plicata*), Douglas-fir (*Pseudotsuga menziesii*), Scots Pine (*Pinus sylvestris*) and Lodgepole Pine (*Pinus contorta*).

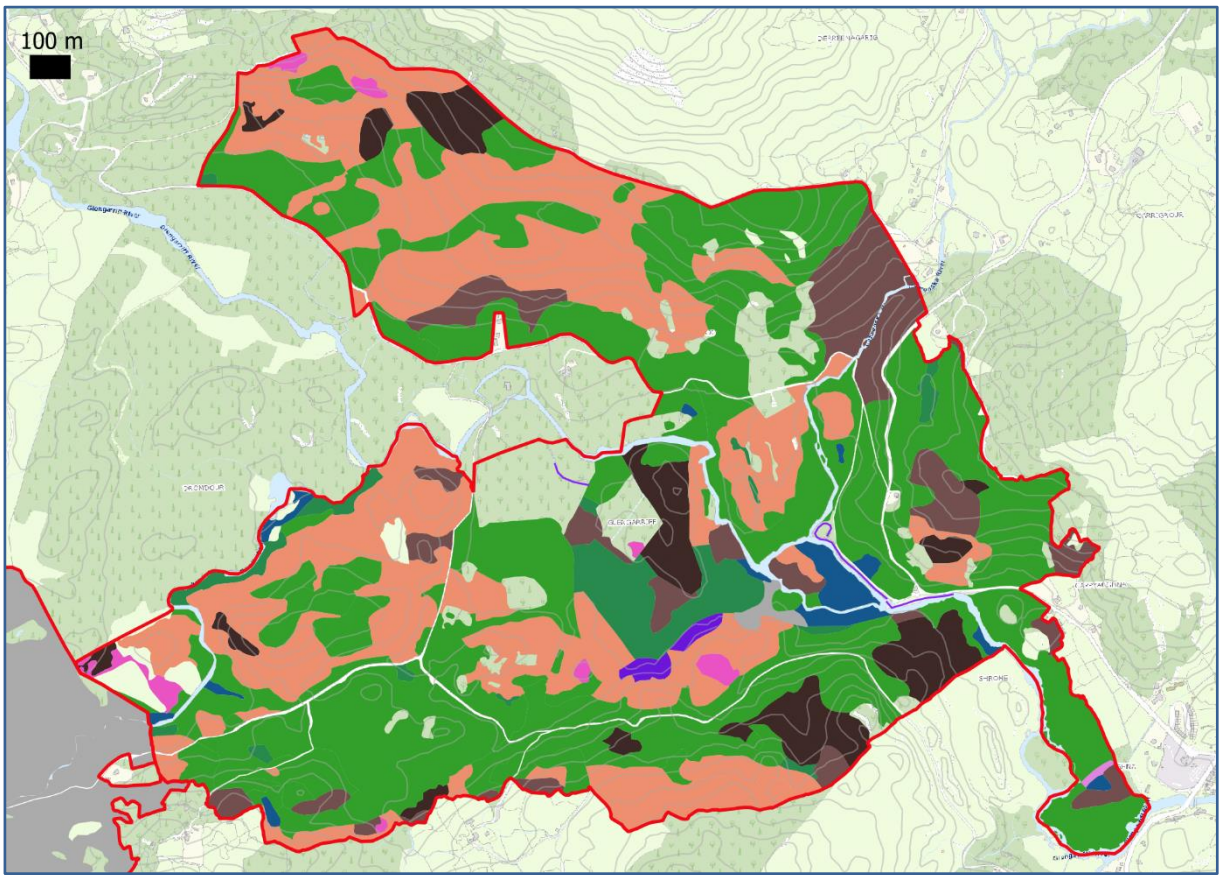

Figure 51 Site map for Glengarriff Woods Nature Reserve. ■ = WN1, ■ = WN6, ■ = WN7, ■ = WD1, ■ = WD2, ■ = WD4, ■ = WS1, ■ = WS3, ■ = WS5, ■ = other sites, / = WL2, / = property boundary.

Substantial areas of the site can be broadly classified as acidophilous oak woodland (WN1). In these stands, the aforementioned non-native conifers and Rhododendron may be frequent but not abundant. The stands can be divided into three main types. Firstly, there are stands (91A0) with a high canopy of mature Sessile Oak (*Quercus petraea*) and an understorey of Holly (*Ilex aquifolium*) that have a relatively well-developed field layer including Bilberry (*Vaccinium myrtillus*), Great Wood-rush (*Luzula sylvatica*) and Hard Fern (*Blechnum spicant*). The bryophyte layer contains typical species such as Short-beaked Wood-moss (*Loeskeobryum brevirostre*) and Little Shaggy-moss (*Rhytidiadelphus loreus*), and also oceanic species such as Greater Whipwort (*Bazzania trilobata*), Prickly Featherwort (*Plagiochila spinulosa*) and Straggling Pouchwort (*Saccogyna viticulosa*). Stands of this type occur, for example, at Buckley's Glen and immediately to the west of there, on the other side of the N71. Secondly, there are stands (91A0) which also possess mature Sessile Oak but where these trees form a discontinuous canopy. The understorey in these stands is usually a

dense thicket of regenerating Downy Birch (*Betula pubescens*), Holly and Rhododendron and there is little in the way of a field layer. Such stands appear to have developed where there has been selective felling in the past that retained the mature oaks. Thirdly, there are low canopy stands (not 91A0) that are dominated by Downy Birch of varying ages and which are succeeding towards acidophilous oak woodlands. Young Rowan (*Sorbus aucuparia*), Sessile Oak and Grey Willow (*Salix cinerea*) are occasional. Also typically present is a low understorey of Holly but the field layer is rather sparse. These stands have established in areas where plantations have been clear-felled in the past. An example occurs in the north-west of the site, just south of Flahive's Lodge.

Other areas of the site can be classified as highly modified broadleaved woodland (WD1), of which there are two main variants. Firstly, there are areas which possess a continuous or discontinuous high canopy of Sessile Oak but which are infested by dense Rhododendron and thus lack the typical understorey and field layer for acidophilous oak woodland. Secondly, there are areas where Beech (*Fagus sylvatica*) is at least co-dominant with Sessile Oak in the high canopy, for example just west of the Canrooska River. Here Chilean Myrtle (*Luma apiculata*) is also frequent.

Substantial areas of the site can be classified as mixed broadleaved/conifer woodland (WD2). Again, there are two main variants. Firstly, there are low canopy stands in which relatively young Downy Birch is abundant but where there is significant cover from both mature and regenerating examples of the non-native conifers listed above. Rhododendron is often abundant or locally dominant in these stands that have developed on clear-fells. An example of this variant occurs on the southern boundary on the lower northern slopes of Shrone Hill. Secondly, there are some mature mixed stands with a higher canopy, particularly at Esknamucky and Skehil where Gum (*Eucalyptus* sp.) is also occasional.

There are a few stands on flatter ground that had been drained in the past for forestry, planted and later clear-felled. The water table in these areas has now risen and they support boggy woodland dominated by Downy Birch (WN7). *Sphagnum* spp., in particular Blunt-leaved Bog-moss (*Sphagnum palustre*), is frequent and is some areas abundant (91D0). A large stand of this type occurs just to the north of the Big Meadow Path. There are also a few stands of wet woodland (WN6/91E0), for example on the island just west of the gate lodge and on the southern bank of the Coomarkane River (where the canopy is very low). The trees are mainly Grey Willow and Alder (*Alnus glutinosa*) and the field layer includes Water Mint (*Mentha aquatica*), Marsh Ragwort (*Senecio aquatica*), Marsh Pennywort (*Hydrocotyle vulgaris*), Soft Rush (*Juncus effusus*), Remote Sedge (*Carex remota*) and Tufted Hair-grass (*Deschampsia cespitosa*).

Just south of the Big Meadow Path, there are some small areas where conifers have very recently been felled leaving a scattered cover of native species (WS5). The remainder of the site consists of some remnant areas of conifer plantation (WD4) and some patches of Rhododendron scrub (WS3).

Deer and goat grazing is significant in the south-west of the site towards Derrynafulla but it appears to be a minor impact in the east. In the vicinity of the recent felling mentioned above, there has been some recent treatment of Rhododendron and removal of conifers. At Esknamucky, there is a small area that has been underplanted with Oaks.

Conservation measures:

1. Maintain deer and goat numbers at levels such that woodland processes including tree regeneration can occur across the site.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. Priority should be maintaining areas of Annex I habitat free of infestation.

3. Remove other non-native species including bamboo, Chilean Myrtle, Fuchsia (*Fuchsia magellanica*), Himalayan Honeysuckle (*Leycesteria formosa*) and Hydrangea (*Hydrangea macrophylla*), and the non-native Montbretia (*Crocosmia ×crocosmiiflora*).

4. Improve the status of the native woodland areas by removing mature and regenerating non-native species of conifers (in particular, Sitka Spruce, Western Hemlock-spruce, Western Red-cedar, Douglas-fir, Scots Pine and Lodgepole Pine) and broadleaves (including Beech and Gum). Removal of mature trees from high canopy stands should be gradual.

5. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires,

6. Convert the areas of modified woodland (WD1, WD2 and WD4) and Rhododendron scrub (WS3) to native broadleaved woodland by removing mature and regenerating non-native species of conifers and broadleaves. Allow these areas and the areas of WS5 to naturally regenerate, protecting regeneration if necessary.

Old-growth forest status:

Consideration of old-growth forest status at this site has been limited to the first type of WN1 stand described above, to wit stands with a high canopy of Sessile Oak and an understorey of Holly, that are lacking in terms of the abundance of non-native tree species and where there has not been selective felling in recent decades. These stands are scattered across the site, mainly in the east but with some examples along the Derrynafulla road and between that road at the Coomerkane River.

These stands are of moderate native status due mainly to the typical presence of Rhododendron. They do contain many large, old oaks, however, resulting in a high standing volume. Subjective samples of these trees by different species were as follows: Sessile Oak (*n*=12) had a DBH range of 64-128 cm with a median of 94 cm, Holly had DBH measurements of 33 and 56 cm, and Downy Birch had a single DBH measurement of 71 cm. The majority of these trees were recorded from the woodland interior. Eight of these trees were classified as ‘old/gnarly’, five ‘straight’ and one as ‘multi-stemmed’. There is a reasonable abundance and diversity of deadwood within the site including large-scale instances. A subjective sample (*n*=8) of these instances, all Sessile Oak, had a diameter range of 49-77 cm with a median of 65 cm. Three of these instances were standing dead, two were fallen dead and three were old/senescent. The majority appeared to have demised due to age. Excluding the conservation actions of Rhododendron clearance, there are no significant signs of former human intervention.

Between them, the sample of large, old trees (*n*=15) supported 11 different TReMs, the most frequent being breakage (14 trees), epiphytic ferns (13), branch holes (12), epiphytic bryophytes and lichens (12), bark loss (10), bark loss (10), epiphytic climbers (8) and insect holes (3). In terms of structural complexity, the site frequently has a multi-layer structure where Holly forms a distinct understorey beneath Sessile Oak although horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are occasional hollows. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, these WN1 areas within Glengarriff Woods Nature Reserve fulfil the requirements for old-growth forest status. WN6 and WN7 stand are probably lacking in terms of standing volume and large, old trees.

3.3.43 Derrynafulla (Site 3)

Description:

This site contains 55.3 ha of woodland. It adjoins a western boundary of the Glengarriff Woods Nature Reserve and lies predominantly in the valley of the Coomerkane River, Co. Cork (Figure 52). The vast majority of the site comprises conifer plantations (WD4) of Sitka Spruce

(*Picea sitchensis*) and Lodgepole Pine (*Pinus contorta*). Rhododendron (*Rhododendron ponticum*) is abundant throughout most of these stands and forms dense thickets in places. Control of this species has been limited to the margins of the public roads. The field layer is largely absent and the ground is typically covered in a dense layer of needles except for areas of impeded drainage where Bog Mosses (mostly *Sphagnum palustre*) can form carpets.

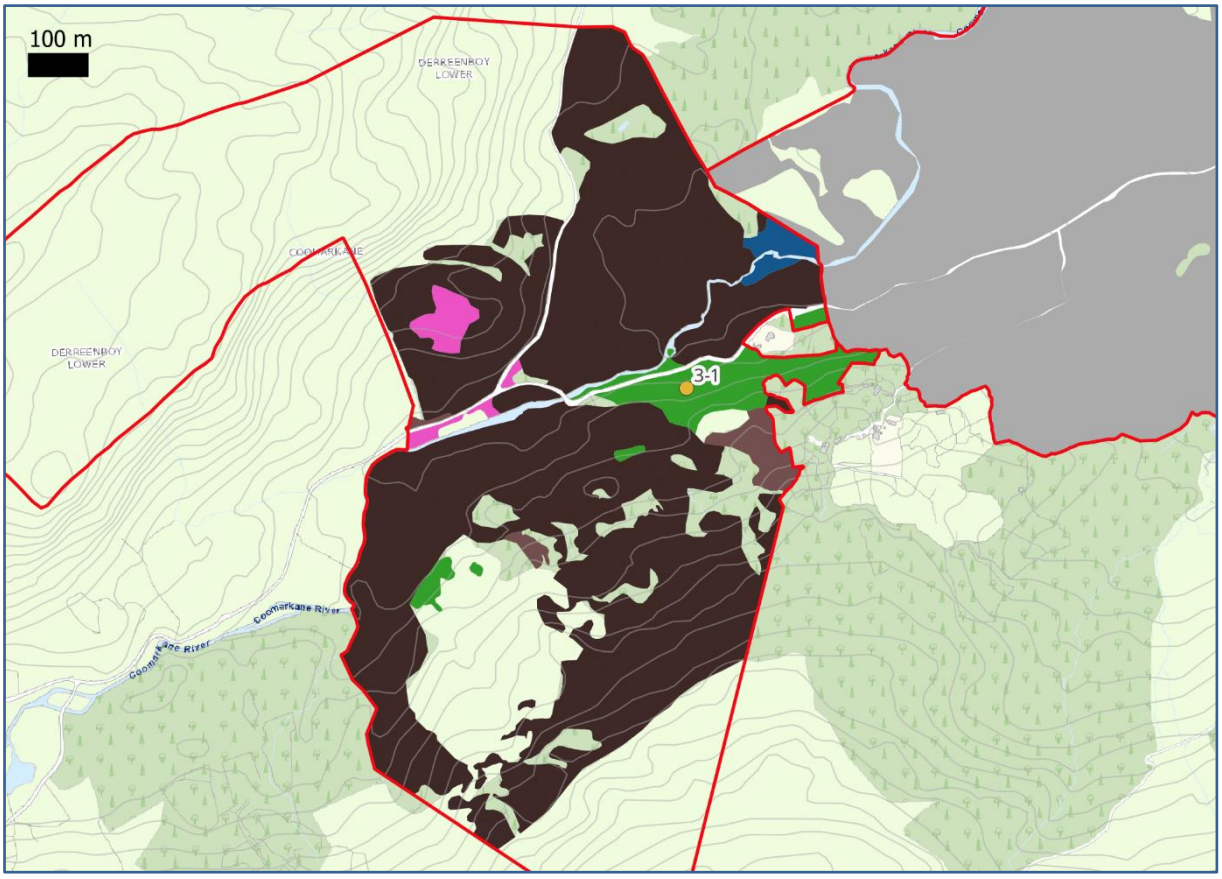

Figure 52 Site map for Derrynafulla. ■ = WN1, ■ = WN6, ■ = WD1, ■ = WD4, ■ = WS3, ■ = other sites, ● = relevé, / = property boundary.

On either side of the river in the east of the site is a small stand of wet woodland (WN6/91E0) with Grey Willow (*Salix cinerea*). Adjacent to the southern stand is a larger, seasonally flooded area that has been planted up with conifers (WD4) but which has still retained or developed flora typical of wet woodland. In these two areas can be found Remote Sedge (*Carex remota*), Soft Rush (*Juncus effusus*), Meadowsweet (*Filipendula ulmaria*), Greater Tussock-sedge (*Carex paniculata*), Water Mint (*Mentha aquatica*), Common Valerian (*Valeriana officinalis*) and Wild Angelica (*Angelica sylvestris*).

South of the road in the east of the site is a small area of acidophilous oak woodland (WN1/91A0). The canopy here is dominated by Downy Birch (*Betula pubescens*) with Sessile Oak (*Quercus petraea*) being frequent. Beneath is an understorey of Holly (*Ilex aquifolium*). Rowan (*Sorbus aucuparia*) can also be found here. The area is severely grazed by deer and goats as evidenced by the abundant hard-bitten leaves of Hard Fern (*Blechnum spicant*) and Male-fern (*Dryopteris affinis*). Natural regeneration is essentially absent. Other species in the field layer include Common Bent (*Agrostis capillaris*), Wood-sorrel (*Oxalis acetosella*), Bracken (*Pteridium aquilinum*), Bilberry (*Vaccinium myrtillus*), Honeysuckle (*Lonicera periclymenum*), Purple Moor-grass (*Molinia caerulea*), Wood Sedge (*Carex sylvatica*) and Irish Ivy (*Hedera hibernica*). There is a notable absence of Great Wood-rush (*Luzula sylvatica*), a plant that is typical of this habitat. The main bryophytes include Common Tamarisk-moss (*Thuidium tamariscinum*), Slender Mouse-tail Moss (*Isothecium myosuroides*) and Short-beaked Wood-moss (*Loeskeobryum brevirostre*). Flagellate Feather-Moss (Hyocomium armoricum) and Common Haircap (Polytrichum commune) can be found in flushed areas. To the south of this

oak woodland is an area with native broadleaves which is infested with dense Rhododendron (WD1).

Conservation measures:

1. Reduce deer and goat numbers to a level such that woodland processes including tree regeneration can occur. There are high levels of grazing pressure in the oak woodland area and a lack of natural regeneration.

2. Continue to remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Remove Chilean Myrtle from the site. It is most frequent in the oak woodland area.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

5. Convert the large area of conifer plantation to native broadleaved woodland. Purser *et al.* (2011) outlines several options by which this could be achieved. The area should be allowed to naturally regenerate. Follow-up actions will be required to remove regenerating conifers.

Old-growth forest status:

The main block of WN1 at this site is highly native and contains some large, old Sessile Oak trees resulting in a fairly high standing volume. A subjective sample of these trees (*n*=4) had a DBH range of 65-94 cm with a median of 82 cm. A Downy Birch with a DBH of 37 cm was also recorded. Three of these trees were towards the interior of the stand and two were near the edge. Four of these trees were classified as 'straight' and one as 'old/gnarly'. This block also has a reasonable abundance and diversity of deadwood including large-scale instances. Subjective samples of these instances by different species were as follows: Sessile Oak had diameter measurements of 34 and 52 cm, Downy Birch had a single diameter measurement of 39 cm and Grey Willow had a single DBH measurement of 52 cm. There are the remains of stone walls running through this block suggesting that it may have developed on an old field system, but given the size of the trees, this was many decades ago. There are no other significant signs of former human intervention.

Between them, the sample of large, old trees (*n*=5) supported 11 different TReMs, the most frequent being branch holes (5 trees), epiphytic bryophytes and lichens (4), epiphytic ferns (4), bark loss (4) and insect holes (3). In terms of structural complexity, the site frequently has a multi-layer structure where Holly forms a distinct understorey beneath Sessile Oak although horizontal structural diversity is rather low due to a chronic lack of natural regeneration. In terms of natural soil microrelief structures, there are occasional hollows. Lastly, the dominance of Sessile Oak is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the main block of WN1 at Derrynafulla fulfils the requirements for old-growth forest status. The areas of WN1 are to the south-west and the areas of WN6 are probably lacking in terms of large trees and standing volume.

3.3.44 Uragh Wood Nature Reserve (Site 4)

Description:

This site contains 64.0 ha of woodland occupies the lower, north-eastern slopes of Knockreagh Mountain, Co. Kerry and runs along the south-western shore of Lough Inchiquin (Figure 53). A series of low cliffs run obliquely through the wood and there are multiple streams and flushes which flow into the lough, making this a topographically complex site.

The general character of the site is that of a rocky, acidophilous oak woodland (WN1/91A0). In the western part of the wood, the canopy consists mainly of Sessile Oak (*Quercus petraea*) and Downy Birch (*Betula pubescens*) with an understorey of Holly (*Ilex aquifolium*) and some Rowan (*Sorbus aucuparia*). There is severe grazing by deer and trespassing sheep leading to

a relatively open field layer that includes typical species such as Wood-sorrel (*Oxalis acetosella*), Bilberry (*Vaccinium myrtillus*), Bramble (*Rubus fruticosus* agg.), Hard Fern (*Blechnum spicant*), Tormentil (*Potentilla erecta*), Irish Ivy (*Hedera hibernica*), Honeysuckle (*Lonicera periclymenum*), Irish Spurge (*Euphorbia hyberna*), Hay-scented Buckler-fern (*Dryopteris aemula*), Common Bent (*Agrostis capillaris*) and Great Wood-rush (*Luzula sylvatica*). Towards the eastern end of the site (WN1/not 91A0), Sessile Oak becomes increasingly scarce and Ash (*Fraxinus excelsior*) begins to accompany Downy Birch in the canopy. Similarly, Hazel (*Corylus avellana*) becomes more abundant at the expense of Holly.

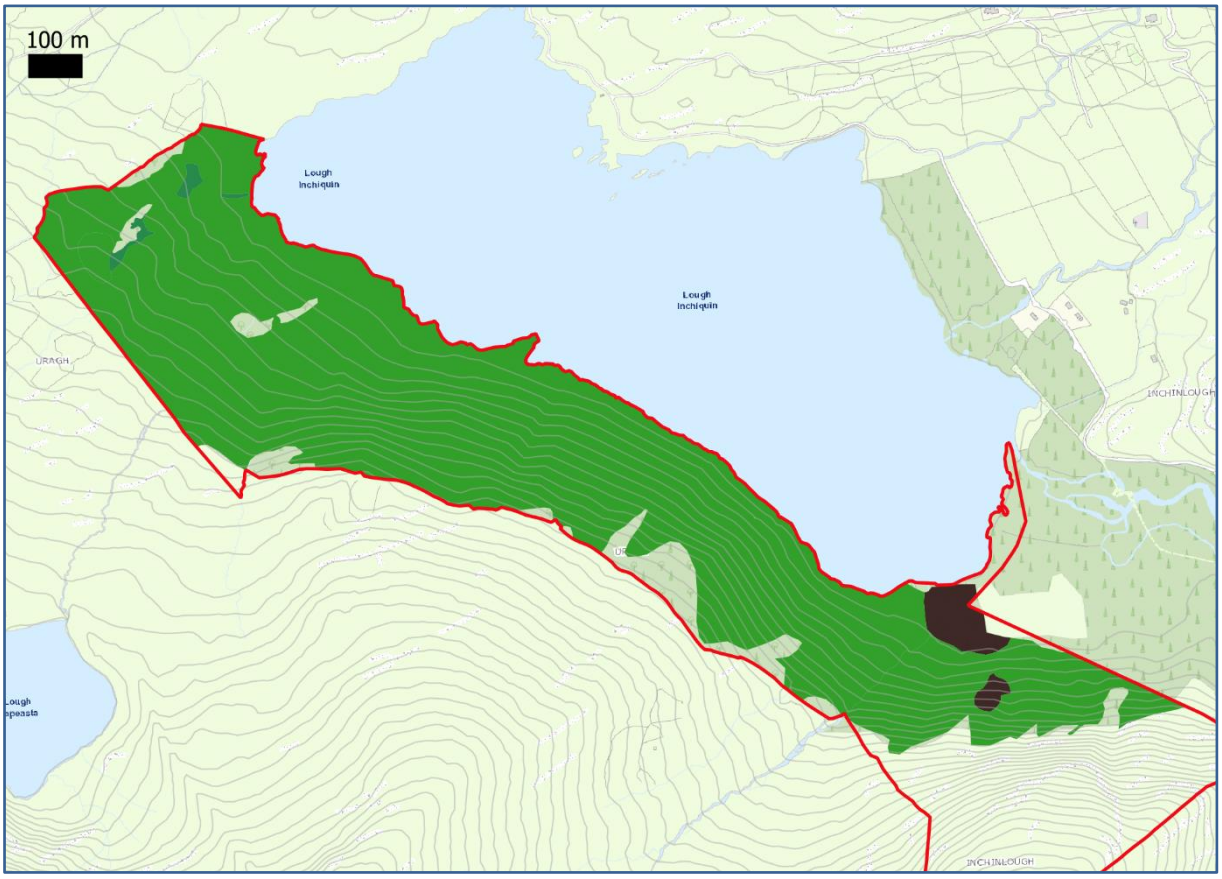

Figure 53 Site map for Uragh Wood Nature Reserve. ■ = WN1, ■ = WN7, ■ = WD4, / = property boundary.

Throughout the site in frequent flushes and on streamsides, additional species can be found like Primrose (*Primula vulgaris*), Soft Rush (*Juncus effusus*), Lesser Skullcap (*Scutellaria minor*) and Meadowsweet (*Filipendula ulmaria*). Purple Moor-grass (*Molinia caerulea*) is locally dominant and in some broad boggy flushes in the far west of the site, it forms the bulk of the field layer beneath a canopy of Downy Birch (WN7/91D0). In these stands can also be found Star Sedge (*Carex echinata*), Marsh Bedstraw (*Galium palustre*), Marsh Ragwort (*Jacobaea aquatica*), Marsh Violet (*Viola palustris*) and abundant Bog-moss (*Sphagnum* spp.)

In the west of the site, on the lower slopes close to the lough, are a series of stands of Aspen (*Populus tremula*). Several of the trees are producing suckers. The population is estimated to be more than 30 trees making it highly unusual in the context of native Irish woodland. This site also has sizeable populations of both St Patrick's Cabbage (*Saxifraga spathularis*) and Kidney Saxifrage (*Saxifraga hirsuta*), and their hybrid, False Londonpride (*Saxifraga* × *polita*). There is a high diversity of bryophytes including oceanic species like Greater Whipwort (*Bazzania trilobata*), Prickly Featherwort (*Plagiochila spinulosa*) and Western Earwort (*Scapania gracilis*). The site is remarkable for its very high native status but in the east of the site are two discrete stands of conifers (WD4), one close to the lake composed of Japanese Larch (*Larix kaempferi*) and Spruce (*Picea* spp.) and another higher up the slopes. Rhododendron (*Rhododendron ponticum*) occurs at a handful of locations but is never

abundant. A deer fence encompasses most of the site but has collapsed in multiple places and is non-functional.

Conservation measures:

1. Reduce deer and sheep numbers to a level such that woodland processes including tree regeneration can occur. There is chronic overgrazing throughout the site by deer and sheep and the lack of natural regeneration. The reduction can be achieved through a combination of culling (of deer) and exclusion (of sheep and deer). The existing fence should be repaired or, if necessary, replaced. Regular monitoring and maintenance of the fence is required. Once sufficient natural regeneration has been achieved, the fences should be opened to avoid the negative effects of long-term grazing exclusion.

2. Remove *Rhododendron* from the site and conduct regular monitoring to detect and remove regrowth or reinvasion.

3. Convert the areas of conifer plantation to native broadleaved woodland. This should entail the felling of the conifers and allowing the area to naturally regenerate. Drain blocking should be considered in the low-lying areas. Follow-up actions will be required to remove regenerating conifers.

4. Protect the stands from fire damage by taking all reasonable precautions to reduce wildfires.

5. Create native broadleaved woodland on the adjacent land to the east of the site managed by Coillte.

Old-growth forest status:

The WN1 and WN7 areas of this site are highly native and large, old trees are frequent resulting in a high standing volume. A subjective sample of Sessile Oaks (*n*=16) had a DBH range of 68-124 cm with a median of 88 cm. A Holly with a DBH of 57 cm, an Aspen with a DBH of 40 cm and a Downy Birch with a DBH of 71 cm were also recorded. These trees were all recorded from the interior of the woodland and were mostly classified as either ‘old/gnarly’ or ‘straight’. There is also an abundance and high diversity of deadwood within the site including large-scale instances. Subjective samples by different species were as follows: Sessile Oak (*n*=12) had a diameter range of 42-68 cm with median of 45 cm, Ash (*n*=12) had a diameter range of 33-89 cm with median of 58 cm, Downy Birch (*n*=7) had a diameter range of 34-55 cm with median of 47 cm, Holly had a single diameter measure of 52 cm, Aspen had a single diameter measure of 41 cm and one unidentified instance was measured with a diameter of 44 cm. Five of these instances were standing dead, eight were old/senescent and the remainder were fallen dead. Excluding the conservation action of erecting the fencing, there are no significant signs of former human intervention.

Between them, the sample of large trees (*n*=19) supported 15 different TReMs, the most frequent being bark loss (15 trees), branch holes (13), breakage (13), epiphytic bryophytes and lichens (12) and epiphytic ferns (12). In terms of structural complexity, the site consistently had a multi-layer structure with Holly or Hazel forming a distinct understorey beneath Sessile Oak or Ash. Horizontal structural diversity is high despite the lack of natural regeneration. In terms of natural soil microrelief structures, there are frequent root plates and abundant hollows in the rocky terrain as well as some burrows and soil slumping. Lastly, the abundance of Sessile Oak and Ash is indicative of a late-seral developmental phase for this terrain.

Based on these observations, the WN1 and WN7 areas within Uragh Wood Nature Reserve amply fulfil the requirements for old-growth forest status.

3.3.45 Knockomagh Wood Nature Reserve (Site 5)

Description:

This site contains 16.3 ha of woodland and occupies a steep hillside overlooking Lough Hyne in Co. Cork and has an easterly and south-easterly aspect (Figure 54). The majority of the site is composed of modified broadleaved woodland (WD1) dominated by a mixture of mature Beech (*Fagus sylvatica*), Sycamore (*Acer pseudoplatanus*) and Sessile Oak (*Quercus petraea*) with Sweet Chestnut (*Castanea sativa*) being locally frequent. Holly (*Ilex aquifolium*) is frequent to abundant in the understorey. Given that the wood is mostly a modified version of an acidophilous oakwood, the apparent complete absence of Birch (*Betula* spp.) is notable. Natural regeneration is sparse and composed mainly of the aforementioned non-native species although grazing pressure appears low. The field layer is dominated by expanses of either Bramble (*Rubus fruticosus* agg.), Great Wood-rush (*Luzula sylvatica*) or Irish Ivy (*Hedera hibernica*) with Bluebell (*Hyacinthoides non-scripta*) locally frequent. Ferns are prevalent and include Hard Fern (Blechnum spicant), Soft Shield-fern (*Polystichum setiferum*), Male-fern (*Dryopteris affinis*) and Bracken (*Pteridium aquilinum*). Bryophyte diversity is rather low, in part due to a general lack of rocky niches. Most of the floral diversity within the site occurs along a path that ascends through the site to the summit of Knockomagh. This path, which was formerly part of a nature trail, is heavily used by the public

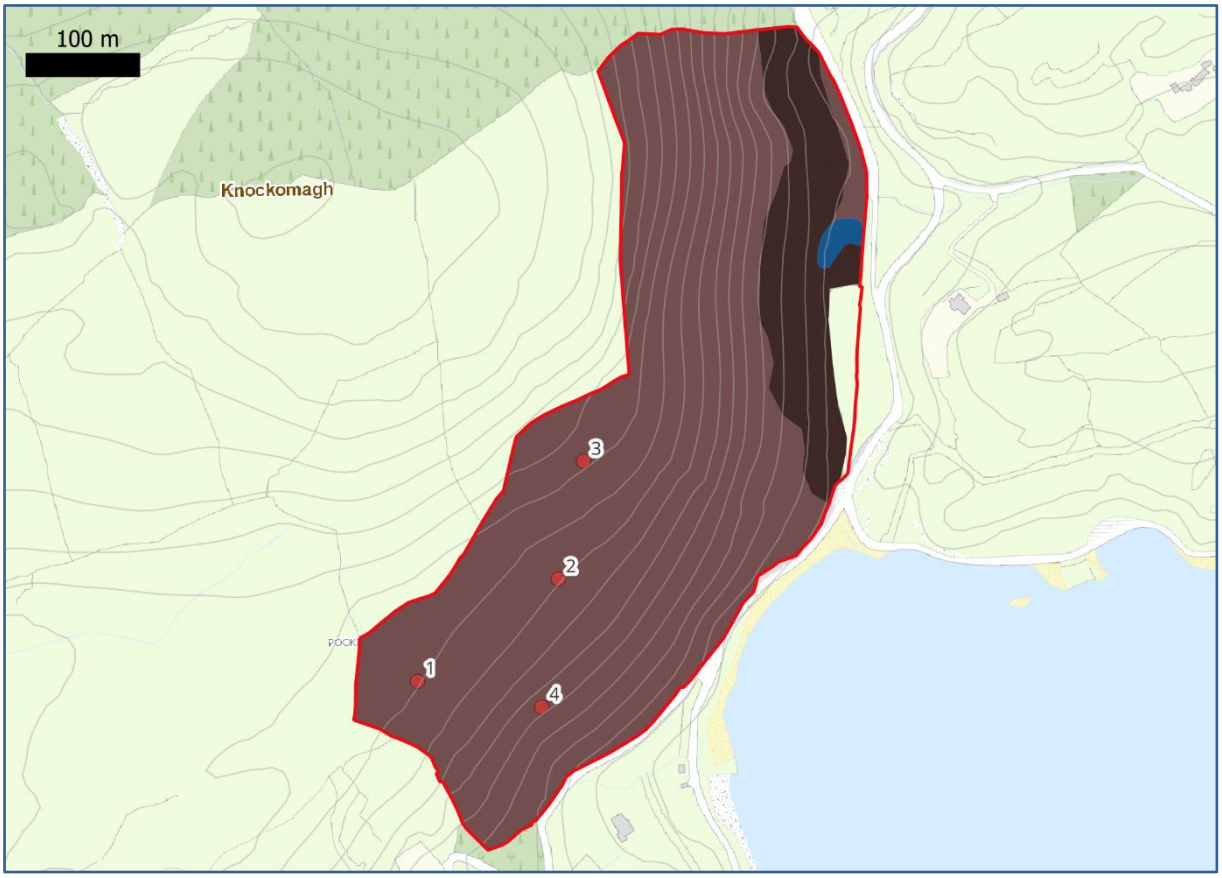

Figure 54 Site map for Knockomagh Wood Nature Reserve. ■ = WN6, ■ = WD1, ■ = WD4, ● = stops, / = property boundary.

At the bottom of the hill, adjacent to a narrow lane, is a small pocket of wet woodland (WN6/91E0) composed chiefly of Alder (*Alnus glutinosa*) but with Sitka Spruce (*Picea sitchensis*) planted through it. The field layer here contains a typical suite of herbaceous species: Wild Angelica (*Angelica sylvestris*), Meadowsweet (*Filipendula ulmaria*), Purple-loosestrife (*Lythrum salicaria*), Water Mint (*Mentha aquatica*), Yellow Iris (Iris pseudacorus) and Hemlock Water-dropwort (*Oenanthe crocata*). Above this pocket, the very steep lower slopes of the hill were previously planted up with conifers—Sitka Spruce and Grand Fir (*Abies*

grandis) according to Coillte records—but many of the trees here have either been felled or windthrown and scrub has formed in places. A loop of the old nature trail ran through the conifer plantation (WD4) and the wet woodland but is now closed and overgrown.

Conservation measures:

1. Remove Himalayan Honeysuckle (*Leycesteria formosa*), Cherry Laurel (*Prunus laurocerasus*) and Montbretia (*Crocosmia ×crocosmiiflora*) from the site. The first two these species have a localised presence in the lower parts of the wood. Montbretia occurs along the roadside margins of the wood.

2. Improve the native status of the area of wet woodland by removing Sitka Spruce and allowing natural regeneration to replace it.

3. Convert the area of modified broadleaved woodland to native broadleaved woodland. This should entail the gradual removal from the canopy of Beech, Sycamore and Sweet Chestnut. In their place, native species should be promoted through the planting of local provenance saplings or through natural regeneration. Extant regeneration of non-native species should also be removed.

4. Convert the area of conifer plantation to native broadleaved woodland. This should entail the felling of the remaining conifers and allowing the area to naturally regenerate. Follow-up actions will be required to remove regenerating conifers.

Old-growth forest status:

There is only a small area of native woodland (WN6) at this site and that area is largely devoid of large or old native trees. Nor is an abundance of dead wood apparent in that area. Furthermore, the area contains several non-native conifer trees that have either been planted or that have self-sown. Consequently, no part of Knockomagh Wood Nature Reserve area is deemed to fulfil the mandatory requirements for old-growth forest status.

3.3.46 St Gobnet's Wood (Site 6)

Description:

This site contains 23.2 ha of woodland and occupies the northern and eastern flanks of a steep hill overlooking the village of Ballyvourney, Co. Cork (Figure 55). The Sullane River flows along the foot of the hill. The wood is a popular amenity site with a system of paths which connect the car park with the churchyard to the south.

The majority of the wood has the overall character of acidophilous oak woodland (WN1/91A0). On the slopes of the hill in the north of the site the canopy is typically dominated by Oaks (*Quercus petraea*, *Quercus robur* and their hybrid *Quercus* × *rosacea*) but Beech (*Fagus sylvatica*) and Sycamore (*Acer pseudoplatanus*) are abundant and the wood approaches highly modified status (WD1) in places. Downy Birch (*Betula pubescens*) and Rowan (*Sorbus* aucuparia) are frequent and there is an understorey of Holly (*Ilex aquifolium*) and Hazel (*Corylus avellana*). The field layer includes Hard Fern (*Blechnum spicant*), Bramble (*Rubus fruticosus* agg.), Honeysuckle (*Lonicera periclymenum*), Wood-sorrel (*Oxalis acetosella*) and Bilberry (*Vaccinium myrtillus*). Common Polypody (*Polypodium vulgare*) is a frequent epiphyte on the oak. Great Wood-rush (*Luzula sylvatica*) is present on the northern slopes and towards the top of the hill it forms very dense carpets. Natural regeneration is scarce. The bryophyte layer contains typical species such as Little Shaggy-moss (*Rhytidiadelphus loreus*), Short-beaked Wood-moss (*Loeskeobryum brevirostre*) and Bank Haircap (*Polytrichum formosum*). In recent years, storms have felled many trees in this area creating large gaps in the canopy which have not been filled. On the slopes in the southern part of the site, Oaks are scarce or absent with Downy Birch dominating much of the canopy and Ash (*Fraxinus excelsior*) being more frequent (WN1/not 91A0). There are a series of flushes through the wood in this area supporting Opposite-leaved Golden-saxifrage (*Chrysosplenium oppositifolium*).

At the bottom of the hill, close to the river, is a stand of fairly young planted Oak with a carpet of Great Wood-rush. Just south of this stand are some small areas of wet woodland (WN6/91E0) with Grey Willow (*Salix cinerea*) and Alder (*Alnus glutinosa*). The field layer here includes Soft Rush (*Juncus effusus*), Marsh Bedstraw (*Galium palustre*), Common Valerian (*Valeriana officinalis*), Meadowsweet (*Filipendula ulmaria*), Marsh Ragwort (*Senecio aquatica*) and Creeping Buttercup (*Ranunculus repens*).

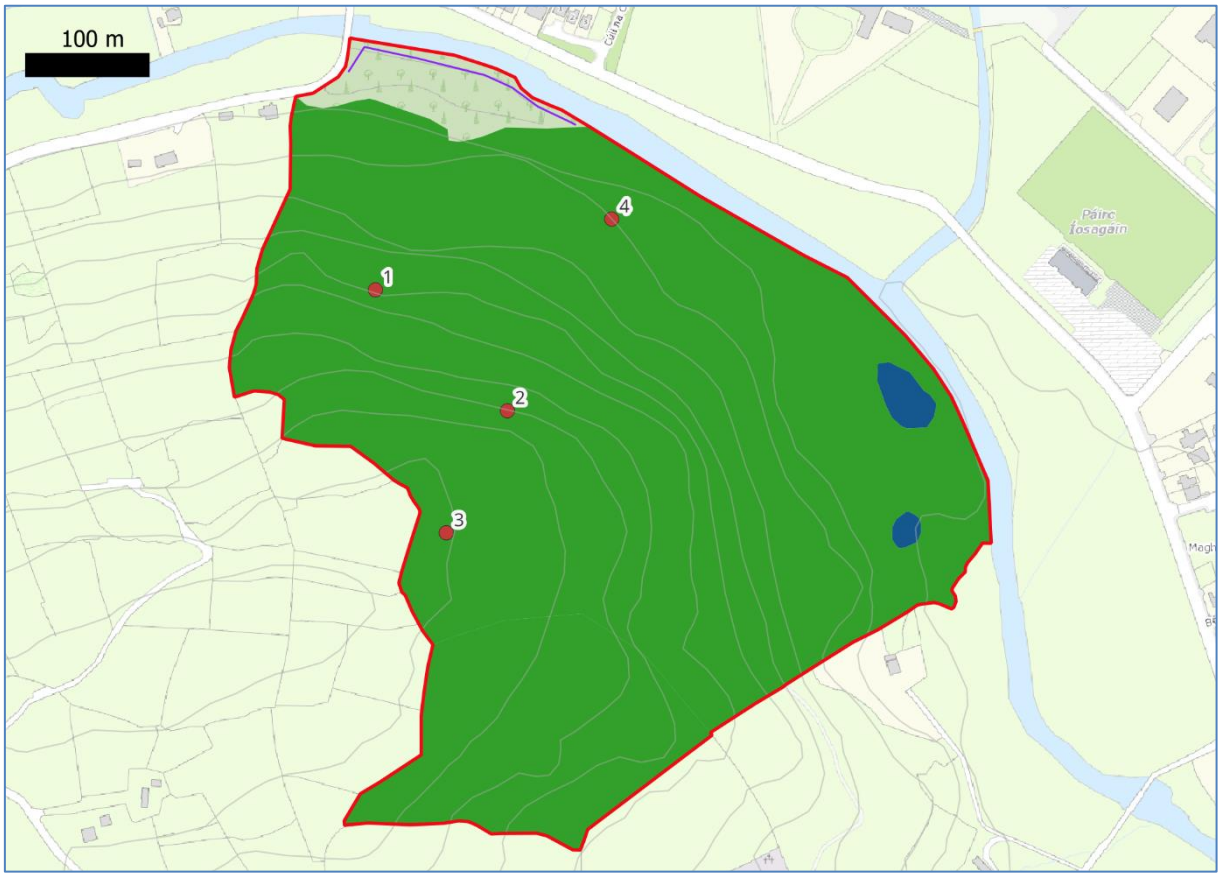

Figure 55 Site map for St Gobnet's Wood. ■ = WN1, ■ = WN6, ● = stops, / = WL2, / = property boundary.

There is a range of conifers on the site including Scots Pine (*Pinus sylvestris*) and European Larch (*Larix decidua*) but they are not plentiful. In addition, there are several invasive shrubs including Rhododendron (*Rhododendron ponticum*), Cherry Laurel (*Prunus laurocerasus*) and Darwin's Barberry (*Berberis darwinii*) which locally form dense thickets. There is evidence of deer grazing but levels do not appear to be very high.

Conservation measures:

1. Remove Rhododendron from the site and conduct regular monitoring to detect and remove regrowth or reinvasion. It is regenerating throughout the site.

2. Remove other non-native species including Cherry Laurel and Darwin's Barberry. Both these species are found close to the river.

3. Improve the native status of the oak woodland. This should entail the gradual removal from the canopy of Beech, Sycamore and non-native conifers. Extant regeneration of these species should also be removed.

4. Promote native tree species in the canopy gaps that have been created by storms or will be created by the removal of non-native species through the planting of local provenance saplings or through natural regeneration. Where there is a dense carpet of Great Wood-rush, shallow screefing should be used to reduce competition.

Old-growth forest status:

This site has only a moderate native status due to the abundance of Beech, Sycamore and non-native shrubs. Also, while the site in general has a high standing volume and several large, old Oaks this is not the case in three areas: the storm-felled areas, the southern part of the site and the area planted with Oak near the river. A subjective sample of large, old Oaks (*n*=6) had a DBH range of 51-85 cm with a median of 62 cm. The majority of these trees were recorded from the interior of the woodland and were classified as 'straight'. There was an abundance and high diversity of deadwood within the site including large-scale instances. A subjective sample (*n*=6) of instances of Oak deadwood had a diameter range of 39-51 cm with a median of 47 cm. Five of these were fallen trees with lifted root plates and therefore probably storm-felled. A fallen Downy Birch was recorded with a diameter of 39 cm. Excluding the conservation actions of Cherry Laurel clearance and oak planting, there are no significant signs of former human intervention.

Based on these observations, St Gobnet's Wood does not fulfil the mandatory requirements for old-growth forest status.

4 Recommendations

4.1 Strategic recommendations

Conservation measures have been recommended for each of the sites surveyed (see section 3.3). However, implementing these measures without the support of a broader strategy will greatly reduce their efficacy. Woodland management strategies akin to the one recently written for Glenveagh National Park (O'Neill *et al.*, 2022) are required for the Killarney National Park and each of the other sites, with Derrynafulla being fully embraced within the strategy for Glengarriff Woods Nature Reserve. Some of the key points that should be addressed within these strategies are as follows.

4.1.1 Vision statements

Woodland dynamics operate on temporal scales of decades to centuries (Fuentes-Montemayor *et al.*, 2022). Cathedral thinking is therefore required when managing woodlands, setting in place long-term plans that only future generations will see come to fruition. To guide this planning, a vision statement is needed for each site that describes in detail what sort of woodland habitats we want to have there in 200 years and, importantly, how those woodlands will fit into the broader landscape. It is useful for such vision statements to be graphically represented—see for example Exmoor National Park Authority (2020). Where there is potential, landscape visions should be developed by NPWS in collaboration with other state authorities, such as Coillte. Bold, transformative plans of this type are needed if national objectives for our woodlands are to be met, for example, achieving the favourable reference area for 91A0 woodland.

4.1.2 Spatial planning and recording

NPWS staff often have intimate knowledge of the sites within their purview, but this institutional knowledge is lost when staff members leave and projects on the temporal scales discussed above will inevitably see several turnovers in staff. Woodland management strategies therefore will require a meticulous record-keeping system which, due to the spatial complexity of sites, must be GIS-based (O'Neill *et al.*, 2022). This system must incorporate, at minimum, up-to-date habitat mapping, records of work done and a schedule for work yet to be conducted. It will be necessary to divide sites into practical compartments to facilitate this approach.

4.1.3 Continuity of management

The conservation status of woodlands surveyed by this project has been negatively impacted by discontinuities in management effort. Continual maintenance of woodlands is required for management actions to be effective. If areas of woodland are fenced, the fences must be checked regularly for damage and any breaches rectified in a timely fashion, otherwise the fencing will not protect natural regeneration. Similarly, where invasive species, such as Rhododendron or non-native conifers, have been cleared, regular and systematic follow-up surveys must be conducted to detect and remove regrowth or reinvasion, otherwise, much of the effort put into the initial clearance work will be wasted.

4.1.4 Recruitment

The sites surveyed by this project contain over 2,200 ha of woodland. Successful implementation of woodland management strategies across this large resource will require the appointment of additional staff. At a minimum, dedicated woodland teams are required based in both the Killarney National Park and Glengarriff Woods Nature Reserve and each must incorporate someone with GIS expertise. Estimating numbers for these teams is beyond the scope of this report, but O'Neill *et al.* (2022) recommended for Glenveagh National Park—a site with 212 ha of extant woodland—the appointment of 11 full-time staff members or Full-

Time Equivalents (FTEs) to fill a woodland management team, an invasive species management team and a deer management team.

4.1.5 Policy on Scots Pine

Scots Pine (*Pinus sylvestris*) was once an important species in Ireland but underwent major declines and was thought to have become extinct c. AD 400 before being reintroduced in the mid-17th century and subsequently widely planted (Roche et al., 2018). Recent research (McGeever & Mitchell, 2016; Roche et al., 2018) provides evidence that a native population may have persisted at Rockforest, Co. Clare.

Neither WN1 woodland as defined by Fossitt (2000), nor the analogous QL woodland defined by Cross *et al.* (2010) nor 91A0 woodland as defined by Daly *et al.* (2023) and European Commission (2013) contain a Scots Pine component. At the same time, the Native Woodland Scheme currently stipulates planting mixtures with 30% and 10% Scots Pine respectively for sites with podzols and brown podzolics, to be planted in small, pure groups (Department of Agriculture, Food & the Marine, 2023). Simultaneously, that scheme identifies QL woodland as the most appropriate forest type for those soils. In addition, recent management guidelines state that extant Scots Pine plantations should be thinned to encourage the development of native species alongside retained Pine (Cross & Collins, 2017) and Roche (2019) calls for the retention of reintroduced Scots Pine in woodlands managed for conservation. These policies would appear to create a potential conflict between WN1/91A0 on the one hand and Scots Pine-rich stands which do not conform to those categories on the other, as both would be competing for the same niches in the landscape. An example of this conflict occurs at Cahernaduv in the Killarney National Park. In Scotland, native pinewoods and oakwoods occupy quite different positions in the landscape with little to no mixing of Sessile Oaks and Scots Pines (Rodwell 1991). Clarity is needed on the policy of NPWS to Scots Pine within native woodland and stands being managed towards native woodland, particularly about what type of community the management aims to create. This policy should be folded into the landscape vision statements.

4.2 Other recommendations

4.2.1 National distribution of 91D0 Bog woodland

The Annex I habitat 91D0 Bog woodland was recorded during this survey at both Glengarriff Woods Nature Reserve and Uragh Wood Nature Reserve. In the maps prepared as part of the reporting required by Article 17 of the Habitat Directive by Cross and Lynn (2013a) and Daly *et al. (*2023), the distribution of this habitat does not extend further south than Co. Offaly despite Cross and Lynn (2013a) stating that it occurs in upland valleys of Kerry. The records from these two Nature Reserves therefore represent a significant addition to the national distribution. It is plausible that other stands of this habitat have been overlooked in the south of the country and further investigation is recommended. For example, data from the NSNW (Perrin *et al.* 2008) suggest that a stand may occur on Sheheree Bog Nature Reserve, an NPWS property close to Killarney. An extension to the current monitoring network should also be considered.

4.2.2 Old-growth forest status

The old-growth forest guidelines set out in European Commission (2023) state that:

‘*Member States should without delay strictly protect those forest areas for which there is a strong probability, on the basis of the currently available information, that they meet definitions and criteria set out in this document*.’

Many of the sites surveyed by this project were considered to fulfil these requirements for old-growth forest status. It is therefore recommended that the status of these sites is reviewed as

a matter of urgency to decide whether the requirements for strict protection (which should be accompanied by legal protection) are currently met and, if not, what steps must be taken. European Commission (2023) also state that buffer zones should be defined for old-growth forests with two objectives:

'(1) human activities and developments in the areas surrounding primary and old-growth forests do not affect the natural processes of these forests;

(2) natural processes within primary and old growth forests do not have a negative spill-over effect on the management objectives of the surrounding areas.'

It is therefore also recommended that further research is conducted into defining and regulating these buffer zones.

Regarding identification of old-growth forests stands, development of the methodology would probably benefit from further field-testing. The sample of sites covered by this project was skewed heavily towards acidophilous oakwoods. Testing the approach on more wet woodlands and limestone woodlands would be useful. Based on the limited number of predominantly wet woodlands surveyed in this project, indicator #7, the one concerned with late seral indicators, should not be considered for such sites.

4.2.3 Woodland continuity research

Since the publication of Perrin & Daly (2010), additional archival resources have become readily accessible, for example some Barony maps. It is recommended that the status of all NPWS woodland sites is reassessed in light of this new information.

As part of the woodland management strategies recommended in section 4.1, mapping of historical woodland should be completed as was done for Glenveagh National Park (O'Neill *et al.*, 2022). They created a GIS dataset of all woodland that was mapped as present on the first edition or third edition six-inch Ordnance Survey maps, or both, regardless of whether or not the woodland is still extant. Such a dataset can therefore provide the historical context of extant woodland, and can also be used to identify potential woodland establishment areas comprising locations that were formerly under woodland but which are no longer wooded.

4.2.4 Ash dieback research

Ash dieback was prolific amongst the Ash within the surveyed sites. Whilst Ash was not frequent overall due to the preponderance of acidophilous woodlands, it is likely that there will still be significant localised changes in canopy composition at the surveyed properties. Further research is needed to monitor this process and inform relevant management decisions. There is a danger that non-native species such as Beech (*Fagus sylvatica*) or Sycamore (*Acer pseudoplatanus*) may increase their presence within sites in response to the development of canopy gaps.

4.2.5 Rollout of the survey

It is strongly recommended that this pilot survey is rolled out to all remaining NPWS woodland properties. Possession of accurate habitat maps and up-to-date field survey data is a prerequisite for managing the NPWS estate towards favourable conservation status and is required to populate the spatial management system recommended in section 4.1.3. The aim should be to have a national-scale habitat map for the NPWS estate not dissimilar in scope to that used for many years by Coillte. Furthermore, the European Commission (2023) calls for the mapping of all publicly-owned old-growth forests by the middle of 2025.

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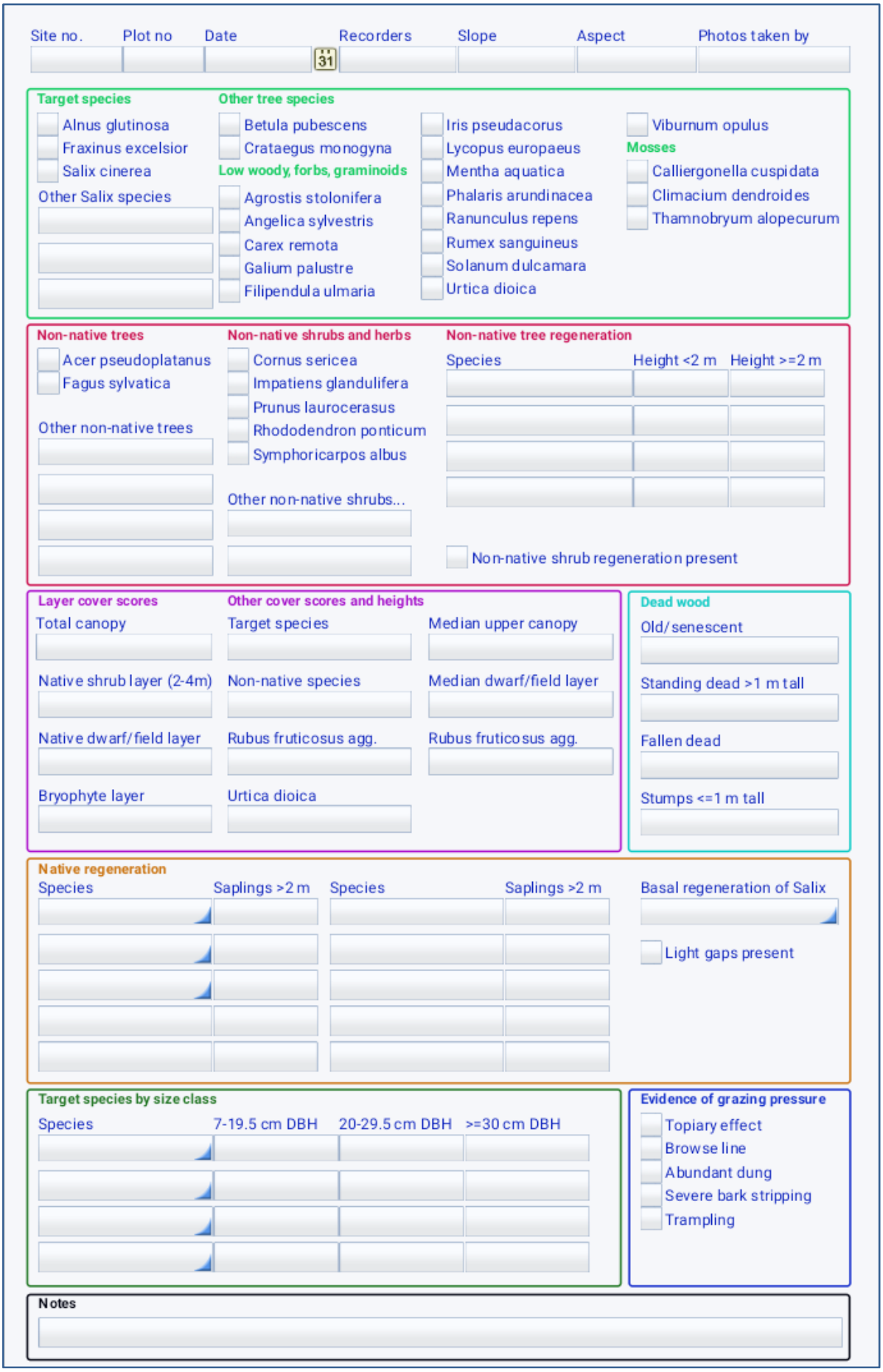
Appendix 1 Annex I woodland habitat recording forms

91A0 monitoring stop form



91E0 monitoring stop form

91J0 monitoring stop form

Appendix 2 Woodland continuity research

Some of the sites surveyed by this project were researched in terms of woodland continuity by Perrin & Daly (2010) and Daly & Perrin (2010). In this appendix, the database text from those previous studies is presented together with their provisional ALEW (Ancient and Long-Established Woodland). The status definitions used by those studies are as follows:

- Possible ancient woodland (PAW) stands have been continuously wooded since 1660.
- Long-established woodlands (LEW) have been continuously wooded since 1830. There are two sub-categories, LEW (I) stands for which no evidence of antiquity could be found in older documentation, and LEW (II) stands for which there is evidence that the site is not ancient.
- Recent Woodland (RW) stands that have originated since 1830.

In addition, sites surveyed by the current project which had not been investigated by Perrin & Daly (2010) or Daly & Perrin (2010) were investigated further. The first edition Ordnance Survey (OS) maps (1830-1844) and third edition OS maps were examined for signs of woodland continuity. The Placenames Database of Ireland (www.logainm.ie) was then checked to see if the townlands with woodland present on both historical OS maps were referenced in the Civil Survey, the Down Survey or the Books of Survey and Distribution. These resources were then reviewed for any woodland references and a provisionally ALEW status was assigned for the associated sites. Details of this research are provided below. In should be noted that (i) ALEW areas were not digitised as part of this process and (ii) further review of other archive material could prove that some of the woodlands are older than indicated here.

Ash Valley (Site 1.01)

This site was not assessed by Perrin & Daly (2010). A small section of woodland at Esknamucky Glen in Gortroe townland is present on the first and third edition OS maps. The Placenames Database of Ireland was checked to see if Gortroe was referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references to this townland in the documents. The Down Survey Barony map for Magunihy was also reviewed. The barony map shows mountain symbols in this general area. Following the Perrin & Daly (2010) methodology, the woodland on both historical OS maps can be considered LEW (I). Further review of archive material would be needed to determine if the site were older. Other woodland stands can be considered RW.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie. The DS Barony map for Magunihy depicts mountain symbols in the general Gortroe area.
Books of Survey and Distribution (1680s):	No reference for the associated townland(s) on www.logainm.ie.
Status:	LEW (I), RW

Brickeen Island (Site 1.02)

This site was not assessed by Perrin & Daly (2010). The whole site is present on the first and third edition OS maps. The Placenames Database of Ireland was checked to see if the townland, Brickeen Island, was referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references to this townland in these documents. The Down Survey Barony map for Magunihy was also reviewed. While Brickeen Island does not appear to be accurately depicted on this map, there is

woodland depicted on the mainland opposite the Muckross peninsula, which largely coincides with the Glena townland area. The Muckross peninsula itself has the terms '*Arab*' [Arable] and '*Cours past*' [Coarse pasture] written on the map. Muckross also has an area of '*b*' delineated which presumably indicates bog. Following the Perrin & Daly (2010) methodology, this site can be considered LEW (I). Further review of archive material would be needed to determine if the nearby records of Ancient Woodland would apply to woodland at Brickeen.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie. Brickeen Island is not accurately depicted on the DS Barony map for Magunihy. This map shows woodland depicted on the mainland opposite the Muckross peninsula in a location which largely coincides with the Glena townland. The Muckross Peninsula itself has the terms '*Arab*' [Arable] and '*Cours past*' [Coarse pasture] written on the map. It also has an area of '*b*' delineated which presumably indicates bog.
Books of Survey and Distribution (1680s):	No reference for the associated townland(s) on www.logainm.ie.
Status:	LEW (I)

Cahernabane (Site 1.03)

The main area of native woodland at Cahernabane was classified by Perrin & Daly (2010) as LEW (I).

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	No evidence obtained.
Books of Survey and Distribution (1680s):	No evidence obtained.
Status:	LEW (I)

The smaller stands near the lake were not assessed by Perrin & Daly (2010) but some of these can also be considered LEW (I). The woodland depicted on both historic maps at Cahernabane considerably larger. There has been subsequent habitat fragmentation and woodland contraction. The area of conifer plantation in the southwest is largely indicated as open ground in both historic maps.

Cahernaduv (Site 1.04)

The main area of native woodland at Cahernaduv was classified by Perrin & Daly (2010) as LEW (I).

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	No evidence obtained.
Books of Survey and Distribution (1680s):	No evidence obtained.
Status:	LEW (I)

An exception is the area of conifer plantation and rhododendron infestation in the southwest which was only partially wooded in the historic maps. The woodland area depicted for the site

in both the first and third edition maps is larger than the extant wooded area. There has therefore been subsequent habitat fragmentation and woodland contraction.

Cahnicaun Wood (Site 1.05)

The most westerly section of Cahnicaun was classified by Perrin & Daly (2010) as AW. The data sources are the same as those identified for Glena and these sources are detailed below.

Much of the remainder of the site can be considered at least LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if the references above can be considered to extend to the remainder of Cahnicaun Wood. In general, there has been woodland contraction since compilation of the historical mapping with a few minor areas of expansion.

Camillan Wood (Site 1.06)

Camillan Wood is classified by Perrin & Daly (2010) as AW.

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	No evidence obtained.
Books of Survey and Distribution (1680s):	Possible woodland reference for Muckross. 'Muckenis (107 acres), 33.C [copps?] In ye Same (150 acres), 33.b Bogg [bog] in ye same (12 acres)'.
Additional research:	The woodland is referred to in the Munster plantation surveys, 1584 (Nicholls 2001; Bohan 1997). A 1720 map of the Muckross Peninsula depicts woodland in this position (NLI MS. 2770.2) (Bohan 1997). A painting of 'the lower lake' in 1770 by Jonathon Fisher shows Camillan as wooded (Bohan 1997). There is also palynological evidence that the woodland is ancient (Mitchell 1988). Large coppice stools are present on site (Bohan, 1997). Toponymical research indicates that Muckross translates into ‘wood of the hogs’ or ’peninsula of the pigs’.
Status:	AW

Carrigafreaghane (Site 1.07)

This site was not assessed by Perrin & Daly (2010). The whole site is present on the first and third edition OS maps. The Placenames Database of Ireland was checked to see if the townlands, Carrigafreaghane and Argagh, were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references to these townlands in the documents. The Down Survey Barony map for Magunihy was also reviewed. The Carrigafreaghane and Argagh townland names are not depicted on the map and there are tree symbols shown in their general location. Following the Perrin & Daly (2010) methodology, this site can be considered LEW (I). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie. On the DS Barony map for

	Magunihy the Carrigafreaghane and Argagh townland names are not depicted on the map and there are tree symbols shown in their general location.
Books of Survey and Distribution (1680s):	No reference for the associated townland(s) on www.logainm.ie.
Status:	LEW (I)

Cloghereen (Site 1.08)

This site was not assessed by Perrin & Daly (2010). There are sections of Cloghereen Wood to the east and south of Cloghereen Pool and an additional section in the south that are present on the first and third-edition OS maps. Between the first and third edition maps there is considerable woodland expansion and Cloghereen Pool has reduced in size. Woodland has developed on the in-filled lake and much of the current woodland area correlates with that depicted on the third edition map.

The Placenames Database of Ireland was checked to see if the townlands with woodland depicted on both historical OS maps, Cloghereen Lower and Killegy Lower, were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were specific references to the Cloghereen Lower townland in the Books of Survey and Distribution (*Cluhireene*) and the Down Survey Barony map (*Cluhireen*). This research indicated there were no specific references to the Killegy Lower in these documents. The Down Survey Barony map for Magunihy was reviewed. The Cloghereen Lower (*Cluhireen*) townland has tree symbols depicted in the north of the townland. This coincides with the exact location of the wood. Following the Perrin & Daly (2010) methodology, the section of woodland that is present on both OS maps within Cloghereen Lower can be considered PAW, the woodland within Killegy Lower that is present on both historical OS maps is LEW (I), with the remainder of the site RW.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for Killegy Lower on www.logainm.ie. The Cloghereen Lower (*Cluhireen*) townland has tree symbols depicted in the north of the townland on the DS Barony map for Magunihy.
Books of Survey and Distribution (1680s):	No reference for Killegy Lower on www.logainm.ie. Cloghereen Lower (*Cluhireene 301 acres*) is mentioned but no information on the type of land present is detailed.
Status:	PAW, LEW (I), RW

Cuckoo Wood (Site 1.09)

Cuckoo Wood was not assessed by Perrin & Daly (2010). The wood is present on both the first and third edition OS maps. There has been a notable contraction of woodland in the vicinity of Cuckoo Wood since the historical OS maps were compiled.

The Placenames Database of Ireland was checked to see if Glena townland was referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were specific references to the Glena townland in the Books of Survey and Distribution (*Glanna*). The Down Survey Barony map for Magunihy was also reviewed. While the townland

name Glena is not depicted on the map, the townland boundary is drawn with woodland depicted in the northern section, in an area that could possibly extend to the extant location of Cuckoo Wood. Following the Perrin & Daly (2010) methodology, this woodland can be considered 'PAW'. Some of the additional research as identified by Perrin & Daly (2010) for Glena (Site 1.20) would likely also apply here.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie. Woodland is depicted in the north of Glena townland on the DS Barony map for Magunihy.
Books of Survey and Distribution (1680s):	Glena (*Glanna 198 acres*) is mentioned but no information on the type of land is detailed.
Status:	PAW

Derrycunnihy (Site 1.10)

The main body of Derrycunnihy is classified by Perrin & Daly (2010) as AW.

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	No evidence obtained.
Books of Survey and Distribution (1680s):	No evidence obtained.
Additional research:	Derrycunnihy woodland is depicted on a set of Killarney Valley Maps, 1720 (NLI MS. 2770) (Bohan 1997). The woodlands are noted in the 1720s rent rolls of the Kenmare Estate & were subject to a legal dispute c. 1762 (Bohan 1997). There is also palynological evidence that the woodland is ancient (Mitchell 1988). Toponymical research indicates that Derrycunnihy translates into 'Conihy's oak-wood'
Status:	AW

There are a few discrepancies around the edges of the site between the area depicted as AW and the current site and woodland stands near the lakeshore do not closely align with extant woodland stands. Since compilation of the historic mapping there has been woodland fragmentation and contraction in the central west and northeast, while there has been expansion on the lower slopes of Cromaglan Mountain in the east.

Dinis (Site 1.11)

The western stand within this site is classified by Perrin & Daly (2010) as AW. This coincides with part of the Glena area considered by Perrin & Daly (2010), the sources are detailed below. Some of the stands around Dinis Cottage can be considered to be at least LEW(I) following Perrin & Daly (2010) and further review of archive material would be needed to determine if they are older. Woodland stands to the south are generally of recent origin.

Doogary Wood (Site 1.12)

This site was not assessed by Perrin & Daly (2010). Woodland on both the first and third edition OS maps is limited to the lakeshore and parts of the narrow fringe along the Doogary River to the north. The main body of wood is depicted as enclosed fields on the first edition map and

this has developed to woodland by the third edition map. This area can be considered Recent Wood. The extant woodland area largely coincides with the area depicted on the third edition map.

The Placenames Database of Ireland was checked to see if Doogary townland was referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references to this townland in the documents. The Down Survey Barony map of Dunkerrin was reviewed. No woodland was evident in this general location.

Woodland on both historical OS maps can be considered LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie. No woodland depicted in the general location of Doogary on the DS Barony map for Dunkerrin.
Books of Survey and Distribution (1680s):	No reference for the associated townland(s) on www.logainm.ie.
Status:	LEW (I), RW

Drumrougher (Site 1.13)

This site was not assessed by Perrin & Daly (2010). Woodland at Drumrougher depicted on both the first and third edition OS maps occurs around the shoreline of Dundag Point, north and east of Goleen Bay, the fringe west of the main road towards the Owengarriff River and areas east and west of Torc Cottage. The remaining areas are recent in origin.

The Placenames Database of Ireland was checked to see if the townlands associated with this site (Muckross, Torc and Rossnahowgarry) were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated specific references to Muckross townland in the Down Survey Barony maps (*Moscecus, irilagbeg*). There is a possible reference for Muckross in the Books of Survey and Distribution. '*Muckenis 107 acres, 33.C [copps?] In ye Same 150 acres, 33.b Bogg [bog] in ye same 12 acres*'. There were no specific references for Torc or Rossnahowgarry in these documents.

The Down Survey Barony map for Magunihy was reviewed. The Muckross peninsula has the terms '*Arab*' [Arable] and '*Cours past*' [Coarse pasture] written on the map. Both the Muckross peninsula and the townland labelled '*irilagbeg'* have areas of '*b*' delineated on the map, which presumably indicates bog. No woodland symbols or references are shown. Torc is listed as '*Protestant*' and since these lands were not up for confiscation, no descriptions are provided.

Woodland on both historical OS maps can be considered LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if they were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No woodland is shown in the modern-day location of the extant woodland on the Down Survey Barony map. There are no woodland references for Muckross (*Moscecus, irilagbeg*). Torc is listed as '*Protestant*', so not considered for confiscation, no descriptions are provided.

Books of Survey and Distribution (1680s):	Possible reference for Muckross. '*Muckenis 107 acres, 33.C [copps?] In ye Same 150 acres, 33.b Bogg [bog] in ye same 12 acres*'.
Status:	LEW (I), RW

Eagle's Nest (Site 1.14)

Woodland at Eagle's Nest has been classified by Perrin & Daly (2010) as AW. The source material references are the same as given above for Glena. There has been a general retraction in woodland extent to the north and also the southeast since the historic mapping.

Eamonn's Wood (Site 1.15)

The most easterly block of Eamonn's Wood is classified by Perrin & Daly (2010) as AW. The same reference sources as given for Glena were used. On the first edition map areas of current woodland to the west are depicted as open ground while woodland is indicated as having occurred along the stream to the north. Part of this streamside wood is depicted as open on the third edition maps and the area down the valley towards Eagles Nest is more heavily wooded. Most of the remainder of the site would therefore be classified as Recent Woodland following Perrin & Daly (2010).

Gallavally (Site 1.16)

This site was not assessed by Perrin & Daly (2010). Woodland depicted on both the first and third edition six-inch maps occurs on the rocky knolls, the low-lying alder woodland in the west, a section of woodland south of the drain in the south and sections near Lord Brandon's Cottage. Some of the woodland is recent in origin. There was general retraction of woodland area between the first and third edition maps.

Placenames Database of Ireland was checked to see if the townlands, Gallavally and Gearhameen, were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references to these townlands in the documents. The Down Survey Barony map of Dunkerrin was reviewed but there was no evidence of woodland in the general location of these townlands. Woodland on both historical OS maps would be considered LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie. No woodland depicted in this general location on the DS Barony map for Dunkerrin.
Books of Survey and Distribution (1680s):	No reference for the associated townland(s) on www.logainm.ie.
Status:	LEW (I), RW

Game Wood (Site 1.17)

The main body of Game Wood is classified by Perrin & Daly (2010) as LEW (I).

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	No evidence obtained.
Books of Survey and Distribution (1680s):	No evidence obtained.

Status: LEW (I)

There are some minor discrepancies around the edge of the site and the northwestern block is depicted as open ground on the first edition map. In general, the area depicted as woodland appears quite consistent between the historic and current woodland extents.

Glaisin na Marbh (Site 1.18)

Glaisin na Marbh is depicted as open land on the third edition map. On the first edition map the lower slopes have scattered trees depicted. As such the site is considered mainly recent woodland. One narrow polygon in the east can be considered LEW (I) following Perrin & Daly (2010).

Glasha Wood (Site 1.19)

This site was not assessed by Perrin & Daly (2010). Extant woodland at Glasha Wood largely coincides with woodland depicted on the first and third edition six-inch maps. The majority of the small woodland stands west of the Doogary River and the western arm of the main woodland are of more recent origin. The woodland area is most extensive on the first edition map and there is considerable woodland contraction between the first and third edition maps.

The Placenames Database of Ireland was checked to see if Doogary townland was referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references to this townland in the documents. The Down Survey Barony map of Dunkerrin was reviewed but there was no evidence of woodland in the general location of this townland. This woodland can be considered LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s): No reference for the associated townland(s) on www.logainm.ie.

Down Survey (1650s): No reference for the associated townland(s) on www.logainm.ie. No woodland depicted in the general location of Doogary on the DS Barony map for Dunkerrin.

Books of Survey and Distribution (1680s): No reference for the associated townland(s) on www.logainm.ie.

Status: LEW (I), RW

Glena (Site 1.20)

Much of the large woodland expanse at Glena is classified by Perrin & Daly (2010) as Ancient Woodland.

Civil Survey (1650s): No evidence obtained.

Down Survey (1650s): No evidence obtained.

Books of Survey and Distribution (1680s): No evidence obtained.

Additional research: Palynological evidence of antiquity (O' Sullivan, 1991). The Kenmare manuscripts c. 1750 describes 'the glinns in and about the upper lake'. It contains the following description ‘on their sides are very large and beautiful woods as thriving as any in the Kingdom'. Another record c. 1756 describes the area around Eagles nest as 'full of

arbutus, yews, hollies and many other trees'. The 'Glena Woods' were also noted by Arthur Young c. 1780 in his travelogue (Little, 1994).

Status: AW

Gortderraree (Site 1.21)

This site was not assessed by Perrin & Daly (2010). Woodland at Gortaderraree is depicted on both the first and third edition six-inch maps for most of its length with some areas on the upper slopes being more recent.

The Placenames Database of Ireland was checked to see if the townlands Gortderraree and Gortracussane were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution but there were no specific references for these townlands. The Down Survey Barony map for Magunihy was reviewed. The map lists this area as 'Protestant' and since these lands were not up for confiscation, no descriptions are provided (e.g., no woodland symbols). This site can be considered LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s): No reference for the associated townland(s) on www.logainm.ie.

Down Survey (1650s): No reference for the associated townland(s) on www.logainm.ie. On Down Survey Barony map, this area is depicted as '*Protestant'* and since these lands were not up for confiscation, no descriptions are provided.

Books of Survey and Distribution (1680s): No reference for the associated townland(s) on www.logainm.ie.

Status: LEW (I), RW

Gortracussane Lower (Site 1.22)

This site was not assessed by Perrin & Daly (2010). Woodland at Gortracussane Lower is depicted on both the first and third edition six-inch maps.

The Placenames Database of Ireland was checked to see if the townlands Gortracussane and Torc were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references for these townlands. The Down Survey Barony map for Magunihy was reviewed. The Barony map lists this area as '*Protestant*' so no descriptions are provided (e.g., no woodland symbols). This site can be considered LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s): No reference for the associated townland(s) on www.logainm.ie.

Down Survey (1650s): No reference for the associated townland(s) on www.logainm.ie. On Down Survey Barony map, this area is depicted as '*Protestant'* and since these lands were not up for confiscation, no descriptions are provided.

Books of Survey and Distribution (1680s): No reference for the associated townland(s) on www.logainm.ie.

Status: LEW (I)

Gortracussane Upper (Site 1.23)

This site was not assessed by Perrin & Daly (2010). The main woodland block extending northeast from Five Mile Bridge is depicted on both the first and third edition six-inch maps, as does the stand directly to the south and the western arm of the northern stand. The remainder are of recent origin. Some woodland retraction of the main woodland stand is apparent since the third edition map, while there has also been some expansion at the northern stand.

The Placenames Database of Ireland was checked to see if the townlands Gortderraree and Gortracussane were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references for these townlands in these documents. The Down Survey Barony map for Magunihy was reviewed. The barony map lists this area as 'Protestant' so no descriptions are provided (e.g., no woodland symbols). This site can be considered LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie. On Down Survey Barony map, this area is depicted as '*Protestant'* and since these lands were not up for confiscation, no descriptions are provided.
Books of Survey and Distribution (1680s):	No reference for the associated townland(s) on www.logainm.ie.
Status:	LEW (I), RW

Gortroe Woods (Site 1.24)

This site was not assessed by Perrin & Daly (2010). Gortroe Woods is depicted on both the first and third edition six-inch maps. Small areas in the east, towards Cromaglan Mountain and also a small section near the lake depicted as open land are of more recent origin. There appears to have been a general retraction and fragmentation of woodland in the vicinity since the historical mapping was created.

The Placenames Database of Ireland was checked to see if Gortroe townland was referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references to this townland in the documents. The Down Survey Barony map for Magunihy was also reviewed. The barony map shows mountain symbols in this general area. Following the Perrin & Daly (2010) methodology, the woodland on both historical OS maps can be considered LEW (I). Further review of other archive material would be needed to determine if it were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie. The DS Barony map for Magunihy depict mountain symbols in the general Gortroe townland area.
Books of Survey and Distribution (1680s):	No reference for the associated townland(s) on www.logainm.ie.
Status:	LEW (I), RW

Kingsboro Wood (Site 1.25)

This site was not assessed by Perrin & Daly (2010). Kingsboro Wood on the first edition map extends from the lakeshore to the northern most woodland stand in this site. Some fragmentation of this is evident in the third edition map and also some expansion in the north and east. The majority of the site is depicted on both the first and third edition six-inch maps. Some sections, including the small stands to the west are recent in origin.

The Placenames Database of Ireland was checked to see if Doogary was referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references to this townland in the documents. The Down Survey Barony map of Dunkerrin was reviewed but there was no evidence of woodland in the general location of this townland. The Placenames Database of Ireland was checked to see if Glena townland were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were specific references to the Glena in the Books of Survey and Distribution (*Glanna*). The Down Survey Barony map for Magunihy was also reviewed. While the townland name Glena is not depicted on the map, the townland boundary is drawn with woodland depicted in the northern section. No trees are depicted on the shores of the Upper Lake (*Lough Ballenasa*) on this map. Following the Perrin & Daly (2010) methodology, woodland on both historical OS maps can be considered LEW (I). Further review of other archive material would be needed to determine if it were older (e.g., the Kenmare manuscripts).

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	DS barony map for Dunkerrin: No woodland shown in the general location of Doogary. DS Barony map for Magunihy: While the Glena townland name is not depicted on the map, the townland boundary is drawn with woodland depicted in the northern section. No trees are depicted on the shores of the Upper Lake (*Lough Ballenasa*) on this map.
Books of Survey and Distribution (1680s):	No reference for Doogary on www.logainm.ie. Glena (*Glanna 198 acres*) is mentioned but no topographical detail is provided.
Status:	LEW (I), RW

Knockreer (Site 1.26)

This site was not assessed by Perrin & Daly (2010). Strips of woodland at Knockreer appear on both the first and third edition maps. One strip extends from the woodland at Bellview, along the road to the gateway opposite the Cathedral. Further strips extend along the track north of Knockreer House, and also to the south of the house. Another occurs along the Deenagh River. Woodland expansion is evident between the first and third edition maps, this being of recent origin.

The Placenames Database of Ireland was checked to see if the townlands with woodland on both OS maps (Knockreer and Demesne) were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated that Knockreer was mentioned in the Down Survey barony map (*Knockreene*) and Books of Survey and Distribution (*Knockeere 129 acres*). There were no specific references for Demesne in these documents.

The Down Survey Barony map for Magunihy was reviewed. The barony map shows the boundary of Knockreer (*Knockreene*) but no woodland references are given. Demesne appears to be depicted as '*Unfortified lands'*. This site can be considered LEW (I) following

Perrin & Daly (2010). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	The DS barony map for Magunihy shows the boundary of Knockreer (*Knockreene*) but no woodland references are given. Demesne appears to be depicted as '*Unfortified lands'*.
Books of Survey and Distribution (1680s):	Entry for Knockreer (*Knockeere 129 acres*) but no details of the topography are given. No reference for Demesne townland on www.logainm.ie.
Status:	LEW (I), RW

Looscaunagh (Site 1.27)

This site was not assessed by Perrin & Daly (2010). Woodland on both the first and third edition OS maps is limited to the northeastern section of the site within Derrynablunnaga townland.

The Placenames Database of Ireland was checked to see if this townland was referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references to this townland in these documents. This townland could not be located on the Down Survey Barony maps.

Following the Perrin & Daly (2010) methodology, the woodland on both historical OS maps can be considered LEW (I). Further review of archive material would be needed to determine if it were older. The remainder of the site is depicted as open land on the historical OS maps and is considered of recent origin.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Books of Survey and Distribution (1680s):	No reference for the associated townland(s) on www.logainm.ie.
Status:	LEW (I), RW

Lower Lake Islands (Site 1.28)

This site was not assessed by Perrin & Daly (2010). Each of the identified islands has woodland on both the first and third edition OS maps apart from Innisfallen. Parts of Innisfallen are wooded on both maps, with other areas recent in origin. Woodland at the mouth of the River Flesk is also recent.

Innisfallen is referenced in the Books of Survey and Distribution (*Inishfallon 13 acres*); however, no topographical information is presented. The Down Survey Barony map for Magunihy shows no tree symbols on the islands.

Following the Perrin & Daly (2010) methodology, woodland on both historical OS maps can be considered LEW (I). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	DS Barony map for Magunihy: No woodland shown on the islands.
Books of Survey and Distribution (1680s):	Reference for Innisfallen (*Inishfallon 13 acres*), however, no topographical information is presented. No other evidence obtained for the other islands.
Status:	LEW (I), RW

Muckross Abbey (Site 1.29)

This site was not assessed by Perrin & Daly (2010). Woodland to the north and southwest of Muckross Abbey and the woodland in the north behind the Front Gate Lodge can be considered of recent origin. The remaining woodland is on both the first and third edition OS maps.

The Placenames Database of Ireland was checked to see if the townlands, Carrigafreaghane and Muckross, were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. There were no specific references to Carrigafreaghane in these documents. The research indicated there were specific references to Muckross townland (*Moscecus, irilagbeg*) in the Down Survey Barony maps. There is a possible reference for Muckross in the Books of Survey and Distribution. '*Muckenis 107 acres, 33.C [copps?] In ye Same 150 acres, 33.b Bogg [bog] in ye same 12 acres*'. The Down Survey Barony map for Magunihy was also reviewed. The Carrigafreaghane townland name is not depicted on the map and there are no tree symbols shown in this general location. The Muckross peninsula has the terms '*Arab*' [Arable] and '*Cours past*' [Coarse pasture] written on the map. Both the Muckross peninsula and the townland labelled '*irilagbeg'* have areas of '*b*' delineated on the map, which presumably indicates bog.

Following the Perrin & Daly (2010) methodology, this site can be considered LEW (I). Further review of archive material would be needed to determine if the site were older (e.g., some of the information given in reference to Reenadinna may also apply to this site).

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	The Muckross peninsula has the terms '*Arab*' [Arable] and '*Cours past*' [Coarse pasture] written on the DS barony map. Both the Muckross peninsula and the adjacent townland labelled '*irilagbeg'* have areas of '*b*' delineated on the map, which presumably indicates bog. The Carrigafreaghane townland name is not depicted on the map and there are no tree symbols are shown in this general location.
Books of Survey and Distribution (1680s):	Possible woodland reference for Muckross: '*Muckenis 107 acres, 33.C [copps?] In ye Same 150 acres, 33.b Bogg [bog] in ye same 12 acres*'. No reference for Carrigafreaghane.
Status:	LEW (I), RW

Muckross Forest (Site 1.30)

This site was not assessed by Perrin & Daly (2010). A large proportion of Muckross Forest is depicted with woodland on both the first and third edition OS maps. However, some blocks are more recent in origin.

The Placenames Database of Ireland was checked to see if the townlands with woodland depicted on both historical OS maps (Cloghereen - Lower and Upper, Killegy - Lower and Upper and Dromyrourk) were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were specific references to Cloghereen and Dromyrourk in the Books of Survey and Distribution (*Cluhireene, Drumruerke*) and the Down Survey Barony map (*Cluhireen, Dromrourk*). This research indicated there were no specific references to Killegy in these documents.

The Down Survey Barony map for Magunihy was reviewed. Cloghereen (*Cluhireen*) townland has tree symbols depicted in the extreme north of the townland coinciding with the northern section of Cloghereen Lower; however, these symbols do coincide with the exact location of the extant wood. Dromyrourk (Dromrourk) townland is displayed but there are no references to woodland. A parcel which appears to correspond to Killegy is depicted but no woodland symbols are depicted. Following the Perrin & Daly (2010) methodology, woodland present on both historical OS map is LEW (I). Further review of archive material would be needed to determine if the site were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for Killegy on www.logainm.ie. On the DS Barony map for Magunihy, Cloghereen Lower (*Cluhireen*) has tree symbols depicted in the north of the townland but these symbols do not appear to coincide with the location of the extant wood. Dromyrourk (*Dromrourk*) townland is displayed but there is no reference to woodland. A parcel which appears to correspond to Killegy is depicted but no woodland symbols are depicted.
Books of Survey and Distribution (1680s):	Cloghereen (*Cluhireene 301 acres*) and Dromyrourk (*Drumruerke 172 acres, b The Same A Bogg 4 acres*) are mentioned but there is no reference to woodland.
Status:	LEW (I), RW

Muckross House (Site 1.31)

This site was not assessed by Perrin & Daly (2010). The woodlands at Muckross House are mostly present on first and third edition OS maps. However, there are pockets of woodland that are more recent in origin.

The Placenames Database of Ireland was checked to see if the townlands, Muckross and Dromyrourk, were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. The research indicated there were specific references to Muckross in the Down Survey Barony maps (*Moscecus, irilagbeg*). There is also a possible reference for Muckross in the Books of Survey and Distribution (*Muckenis 107 acres, 33.C [copps?] In ye Same 150 acres, 33.b Bogg [bog] in ye same 12 acres*). This are references to Dromyrourk townland in the Books of Survey and Distribution (*Drumruerke 172 acres, b The Same A Bogg 4 acres*) and the Down Survey Barony map (*Dromrourk).*

The Down Survey Barony map for Magunihy was reviewed. The Muckross peninsula has the terms '*Arab*' [Arable] and '*Cours past*' [Coarse pasture] written on the map. Both Muckross peninsula and the townland labelled '*irilagbeg'* have areas of '*b*' delineated, which presumably indicates bog. Dromyrourk (*Dromrourk*) townland is displayed on the Barony map but there are no woodland references. Following the Perrin & Daly (2010) methodology, this site can be considered LEW (I). Further review of archive material would be needed to determine if it were older (e.g., some of the information given in reference to Reenadinna may also apply to this site).

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	The Muckross peninsula has the terms '*Arab*' [Arable] and '*Cours past*' [Coarse pasture] written on the DS barony map. Both the Muckross peninsula and the adjacent townland labelled '*irilagbeg'* also have areas of '*b*' delineated, which presumably indicates bog. No woodland references for Dromyrourk (*Dromrourk*).
Books of Survey and Distribution (1680s):	Possible woodland reference for Muckross. '*Muckenis 107 acres, 33.C [copps?] In ye Same 150 acres, 33.b Bogg [bog] in ye same 12 acres*'. Dromyrourk is mentioned but there is no reference to woodland. '*Drumruerke 172 acres, b The Same A Bogg 4 acres*'.
Status:	LEW (I), RW

North Face Torc (Site 1.32)

This site was not assessed by Perrin & Daly (2010). Woodland on the North Face of Torc coincides with woodland depicted on the first and third edition OS maps. There are some pockets west of the Owengarriff River which are unwooded on the first edition map. Symbology on both maps indicates broadleaf trees for the majority of the woodland, with conifers nearer the eastern boundary.

The Placenames Database of Ireland was checked to see if the townlands associated with this site (Gortracussane, Torc and Crinnagh) were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references for Gortracussane and Torc in these documents. The townland Crinnagh is listed as being mentioned in the Books of Survey and Distribution (*Cranagh*) and the Down Survey barony map (*Crannagh*). The Down Survey Barony map for Magunihy was reviewed. The barony map lists the areas occupied by the townlands Gortracussane and Torc as 'Protestant' and since these lands were not up for confiscation, no descriptions are provided (e.g., no woodland symbols). Crinnagh (*Crannagh*) townland is depicted on the map with the words '*Co:pa' [Coarse: pasture].*

The woodland on both historical OS maps can be considered LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	Crinnagh (*Crannagh*) is depicted on the DS barony map with the words '*Co:pa' [Coarse: pasture].* Gortracussane and Torc identified as '*Protestant Lands*' with no topographical details given.

Books of Survey and Distribution (1680s):	Entry for Crinnagh (*Cranagh 713 acres, 34B The Same unprofitable mountaine 300 acres)*. No reference for Gortracussane and Torc.
Status:	LEW (I), RW

Oak Island (Site 1.33)

This site was not assessed by Perrin & Daly (2010). The main woodland block in the northeast largely coincides with woodland depicted on the first and third edition OS maps. This woodland block has contracted since the third edition map. There are woodland areas indicated through the remainder of the site on the first edition maps but these do not closely align with extant woodland stands. There are also some areas that classify as recent.

The Placenames Database of Ireland was checked to see if Gortroe townland was referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references to this townland in the documents. The Down Survey Barony map for Magunihy was also reviewed. The barony map shows mountain symbols in this general area. Following the Perrin & Daly (2010) methodology, the woodland on both historical OS maps can be considered LEW (I).

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie. The DS Barony map for Magunihy depicts mountain symbols in the Gortroe townland area.
Books of Survey and Distribution (1680s):	No reference for the associated townland(s) on www.logainm.ie.
Status:	LEW (I), RW

Reen Wood (Site 1.34)

This site was not assessed by Perrin & Daly (2010). Much of Reen Wood appears on both the first and third OS edition maps. Small blocks of recent woodland are present in the north and south.

The Placenames Database of Ireland was checked to see if the townlands Reen and Demesne were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated that Reen was mentioned in the Down Survey Barony map (*Ruyne*) and Books of Survey and Distribution (*Ruyne*). On further inspection of the Books of Survey of Distribution, the reference to *Ruyne* could not be located. There were no specific references for Demesne townland in these documents.

The Down Survey Barony map for Magunihy was reviewed. The barony map shows the boundary of Reen (*Ruyne*) but no woodland references are given. Demesne appears to be depicted as '*Unfortified lands'*. This site can be considered LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	The DS barony map for Magunihy shows the boundary of Reen (*Ruyne*) but woodland references are absent. Demesne townland is depicted as '*Unfortified lands'*.

Books of Survey and Distribution (1680s):	No reference for Demesne townland on www.logainm.ie. An entry for Reen (*Ruyne*) could not be located.
Status:	LEW (I), RW

Reenadinna Wood (Site 1.35)

Reenadinna Wood is classified by Perrin & Daly (2010) as Ancient Woodland.

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	No evidence obtained.
Books of Survey and Distribution (1680s):	Possible woodland reference for Muckross. 'Muckenis (107 acres), 33.C [copps?] In ye Same (150 acres), 33.b Bogg [bog] in ye same (12 acres)'.
Additional research:	The woodland is referred to in the Munster Plantation Surveys, 1584 (Nicholls 2001; Bohan 1997). A 1720 map of the Muckross Peninsula indicates the presence of woodland in Reenadinna. However, only a few tree symbols are depicted (NLI MS. 2770.2) (Bohan 1997). There is also palynological evidence that the woodland is ancient (Mitchell 1990). Toponymical research indicates Muckross translates into 'wood of the hogs' or 'peninsula of the pigs'.
Status:	AW

Ross Island (Site 1.36)

Ross Island is classified by Perrin & Daly (2010) as Ancient Woodland.

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	No evidence obtained.
Books of Survey and Distribution (1680s):	No evidence obtained.
Additional research:	Three maps depict woodland on Ross Island including Jobson's map of Munster (1592), an estate map (1720) & Fishers map (1763). The Munster plantation survey, 1584 contains the following descriptions of the woods of Ross Island 'and on the lands and islands aforesaid grow diverse woods and underwoods, of various ages' (Bohan 1997).
Status:	AW

Tomies Wood (Site 1.37)

Tomies wood is classified by Perrin & Daly (2010) as Ancient Woodland. There are sections in the northwest, south and the scattered stands to the west which would be classified as being of more recent origin following Perrin & Daly (2010).

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	No evidence obtained.
Books of Survey and Distribution (1680s):	No evidence obtained.
Additional research:	Woodland depicted in this position on Jobson's Map of Munster, 1592 (NLI MS. 16.B. 13) (Bohan 1997). These woods are referred to in the Munster Plantation surveys, 1584 & in Sir George Carew's manuscripts, 1603-24 (Nicholls 2001; Bohan 1997).
Status:	AW

Tower Bog (Site 1.38)

This site was not assessed by Perrin & Daly (2010). Most of the scattered woodland fragments of Tower Bog would be considered of recent origin following Perrin & Daly (2010). However, one of the blocks towards the north is on both the first and third edition OS maps.

The Placenames Database of Ireland was checked to see if the townland associated with this site (Gortderraree) was referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references for this townland in these documents. The Down Survey Barony map for Magunihy was reviewed. The barony map lists this area as 'Protestant' and since these lands were not up for confiscation, no descriptions are provided (e.g., no woodland symbols). This site can be considered LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie. On Down Survey Barony map, this area is depicted as '*Protestant'* and since these lands were not up for confiscation, no descriptions are provided.
Books of Survey and Distribution (1680s):	No reference for the associated townland(s) on www.logainm.ie.
Status:	LEW (I), RW

Tower Wood (Site 1.39)

This site was not assessed by Perrin & Daly (2010). Much of Tower Wood is on the first and third edition six-inch maps, with some areas more recent in origin.

The Placenames Database of Ireland was checked to see if the townlands associated with this site (Gortderraree, Cloghfune Gortroe, and Crinnagh) were referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicated there were no specific references for Gortderraree, Cloghfune and Gortroe these in these documents. The townland Crinnagh is mentioned in the Books of Survey and Distribution (*Cranagh*) and the Down Survey barony map (*Crannagh*). The Down Survey Barony map for Magunihy was reviewed. The barony map shows the area occupied by the townlands Gortderraree, Cloghfune and Gortroe depicted as '*Protestant Land*' and mountains symbols. Since Protestant lands were not up for confiscation, no descriptions of the land are provided (e.g.,

no woodland symbols). Crinnagh (*Crannagh*) townland is depicted on the map with the words '*Co:pa' [Coarse: pasture].*

Woodland on both historical OS maps at this site can be considered LEW (I) following Perrin & Daly (2010). Further review of archive material would be needed to determine if it were older.

Civil Survey (1650s):	No reference for the associated townland(s) on www.logainm.ie.
Down Survey (1650s):	Crinnagh (*Crannagh*) is depicted on the DS barony map with the words '*Co:pa' [Coarse: pasture].* Gortderraree, Cloghfune and Gortroe depicted as '*Protestant Land*' and mountains symbols.
Books of Survey and Distribution (1680s):	Entry for Crinnagh (*34. The Same Cranagh 713 acres, 34B The Same unprofitable mountaine 300 acres)*. No reference for Gortderraree, Cloghfune and Gortroe in this document.
Status:	LEW (I), RW

Ullauns (Site 1.40)

Woodland in the main block at Ullauns and sections of the eastern arm along the Galway's River was classified as LEW (I) by Perrin & Daly (2010). There has been woodland retraction along the western side of the main body of woodland but some gains on the upper slopes to the east. Losses are evident in the south between the first and third editions.

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	No evidence obtained.
Books of Survey and Distribution (1680s):	No evidence obtained.
Additional research:	No evidence obtained.
Status:	LEW (I)

Upper Lake Islands (Site 1.41)

This site was not assessed by Perrin & Daly (2010). Each of the identified islands on the Upper Lake is depicted with woodland on both the first and third edition six-inch maps apart from Stag Island and Duck Island. These are open ground on the third edition map, though they too small to host a map symbol.

The Placenames Database of Ireland was checked to see if the Upper Lake was referenced in the Civil Survey, Down Survey and Books of Survey and Distribution. This research indicates the Upper Lake was called '*Lough Ballenasa*' on the Down Survey Barony maps. The Down Survey Barony map for Magunihy was reviewed but no islands are depicted on the lake. Further review of archive material would be needed to determine if islands with woodlands present on the historical OS maps are older in origin.

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	The Upper Lake (*Lough Ballenasa*) has no islands depicted on the DS Barony map for Magunihy.
Books of Survey and Distribution (1680s):	No evidence obtained.

Status:	LEW (I), RW

Glengarriff Woods Nature Reserve (Site 2)

Much of the woodland at Glengarriff was classified by Perrin & Daly (2010) as Ancient Woodland.

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	Woodland symbols shown in the Kilcaskan and Kilmocomoge parishes. The parish text for Kilcaskan states 'the Soyle [soil] is Exceeding Could [cold] and moist very Mountaynous [mountainous] and Rocky with some woods. In Glangarve [Glengarriff] is some Timber Wood'. Woodland reference for Glengarriff. 'Glangarruffe [Glengarriff], Coarse Grazing (3796 acres), Mountain pasture (945 acres), Woody pasture (75 acres), arable pasture (149 acres), Woody grazing (80 acres, 240 acres), arable (31 acres), grazing (5 acres), arable (1.1 acres), Woody grazing (720 acres), coarse pasture (23 acres)'. Note: on the Down Survey map, Glangarruffe [Glengarriff] appears to be bigger than the modern-day townland & appears to encompass the surrounding townlands. The parish text for Kilmacomoge states 'the Soyle very Course Could wet Mountainous and Rocky with some woods'.
Books of Survey and Distribution (1680s):	No evidence obtained for many of the townlands in the BSD, except Dromdour [Dromdoneene] where the letters 'gw' are present beside the townlands name, possibly representing grazable wood.
Additional research:	This appears to be a heavily disturbed ancient woodland; it was owned by the Earl of Cork who was an iron master in the 17th century (Bohan 1997). This woodland is depicted on Jobson's Map of Munster, 1592 (NLI MS. 16.B.13) and is mentioned in Sir George Carew's manuscripts, c. 1603-24, as one of the great woods of Munster.
Status:	AW

Derrynafulla (Site 3)

This site was not assessed by Perrin & Daly (2010). Woodland is not depicted at Derrynafulla on the historic maps so it can be considered Recent Woodland. www.logainm.ie indicates Derrynafulla translates as Doire na fola, 'oak wood of the blood'.

Uragh Wood Nature Reserve (Site 4)

Woodland at Uragh was classified by Perrin & Daly (2010) as Ancient Woodland.

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	No evidence obtained.
Books of Survey and Distribution (1680s):	Woodland reference for Uragh. 'Derrylogh [Derrylough] & Uragh (958 acres), Mountain pasture (47 acres), Timberwood (233 acres) & Arable (34 acres)'.
Additional research:	This woodland is depicted on Jobson's Map of Munster (NLI MS. 16.B.13). There is palynological evidence that the woodland is ancient (Little et al. 1996). Large coppice stools also present on site (Bohan 1997). Toponymical research indicates Uragh mean 'Yew-land'.
Status:	AW

Knockomagh Wood Nature Reserve (Site 5)

Woodland at Knockomagh was classified by Perrin & Daly (2010) as part LEW (I) and part LEW(II).

Civil Survey (1650s):	No evidence obtained.
Down Survey (1650s):	No woodland reference in the Tullagh and Creagh parish text. Pookeen is not mentioned under the Tullagh parish. No woodland reference for Highfield. 'Gortiard [Highfield] 'arable and pasture (302 acres).
Books of Survey and Distribution (1680s):	No evidence obtained.
Additional research:	None
Status:	LEW (I) – Pookeen LEW (II) – Highfield

St Gobnet's Wood (Site 6)

Daly and Perrin (2010) identified the central portion of the woodland as Potentially Ancient Woodland. The remainder is Recent Woodland.

Civil Survey (1650s):	Woodland reference for Gortnatubrid (100 acres), 'Timberwood fit for building (5 acres), Shrubby wood (15 acres)'.
Down Survey (1650s):	The parish text for Ballyvourney states 'the Quality of the Soyle [Soil] is generally heathy Rocky and Mountainous pasture very little Arable except some few Spots also in the said Parish is good Store of Timber Trees &Shrubby wood especially towards the Southeast part of the Parish. It contains the Denominations Knockmire, Cullincurragh (etc...) some of which would not be distinguished Instrumentally by Reason of the Thickness of the Woods'. No woodland reference for Gortnatubrid. 'Gortnatubbrid (420 acres), arable & course pasture (420 acres)'.
Books of Survey and Distribution (1680s):	No evidence obtained.

Additional research:	None
Status:	PAW

Appendix 3 Habitat areas (ha) for each site (Fossitt)

Site	WN1	WN2	WN3	WN4	WN6	WN7	WD1	WD2	WD3	WD4	WD5	WS1	WS2	WS3	WS5	Total
1.01	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6
1.02	7.3	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	8.1
1.03	47.4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	21.6	0.0	0.0	0.0	0.0	0.0	69.0
1.04	41.0	0.0	0.0	1.1	0.1	0.8	0.0	9.0	0.0	8.1	0.0	0.2	0.0	2.4	0.0	62.8
1.05	19.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.6
1.06	46.0	0.3	4.5	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.5
1.07	0.0	1.8	0.0	0.0	0.0	0.0	9.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.4
1.08	1.9	0.0	0.0	0.0	1.1	3.7	8.1	8.6	5.7	11.8	0.0	0.0	0.0	0.0	0.0	40.7
1.09	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
1.10	146.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	146.9
1.11	5.9	0.0	0.0	0.0	0.0	0.6	5.7	0.0	0.2	0.0	0.0	0.2	0.0	1.8	0.0	14.5
1.12	12.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8
1.13	0.4	0.0	1.0	0.0	1.5	1.2	25.8	5.4	0.0	1.8	0.0	0.0	0.0	0.0	0.0	36.9
1.14	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.2
1.15	23.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.6
1.16	9.2	0.0	0.0	0.5	0.2	0.1	0.3	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	10.4
1.17	0.0	0.0	0.0	0.0	29.3	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.9
1.18	23.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	23.7
1.19	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9
1.20	0.0	0.0	0.0	0.0	0.0	0.0	113.5	2.0	0.0	0.0	0.0	0.0	0.0	76.1	0.0	191.5
1.21	13.0	0.0	0.0	0.0	0.0	0.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	21.9
1.22	14.5	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.3	0.0	0.0	0.2	0.0	3.2	0.0	24.5
1.23	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3
1.24	31.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.1
1.25	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9
1.26	1.1	0.0	0.0	0.0	7.1	0.0	47.3	0.5	0.0	0.0	9.7	0.2	1.9	0.0	0.0	67.7
1.27	3.2	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	19.1	0.0	0.0	0.0	0.0	0.0	23.6
1.28	2.5	1.6	0.5	0.0	11.2	0.0	11.8	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.0	28.1
1.29	0.0	0.9	7.4	0.0	2.3	0.0	29.8	0.0	0.2	0.0	7.8	0.1	0.0	0.0	0.0	48.5
1.30	1.1	0.0	0.0	0.0	0.0	0.0	15.5	29.5	12.4	207.4	0.0	4.2	0.0	4.9	0.0	275.0
1.31	0.0	3.4	0.1	0.0	1.6	0.0	25.5	8.7	4.5	1.9	14.3	0.3	0.0	0.6	0.0	61.1
1.32	0.4	0.0	0.0	0.0	0.0	0.0	10.6	54.2	0.0	28.1	0.0	0.0	0.0	42.4	0.0	135.6
1.33	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4
1.34	0.0	0.0	0.0	0.0	45.7	18.3	12.7	16.2	0.0	0.6	0.5	0.9	0.0	0.0	0.0	94.9
1.35	1.3	0.9	57.3	0.0	10.0	0.8	5.2	5.8	0.0	0.7	0.0	0.4	0.0	0.0	0.0	82.3
1.36	4.0	0.0	0.0	0.0	23.4	0.0	39.9	0.5	0.0	0.0	0.3	0.0	0.0	0.0	0.0	68.0
1.37	160.3	0.0	0.0	0.0	1.3	0.0	7.9	17.3	0.0	44.1	0.0	6.3	0.0	11.8	0.0	249.0
1.38	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.9
1.39	94.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94.8
1.40	51.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.2
1.41	2.3	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5
2	130.1	0.0	0.0	0.0	4.3	11.2	22.4	86.6	0.0	18.3	0.0	0.2	0.0	2.5	1.4	276.9
3	3.6	0.0	0.0	0.0	0.7	0.0	1.3	0.0	0.0	48.7	0.0	0.0	0.0	1.1	0.0	55.3
4	62.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	64.0
5	0.0	0.0	0.0	0.0	0.1	0.0	14.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	16.3
6	23.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.2
Total	1029.7	9.0	70.7	1.6	144.5	37.1	418.3	253.1	23.3	416.1	32.8	13.6	1.9	149.4	1.4	2602.3

Appendix 4 Habitat lengths (m) for each site (Fossitt)

Site	WL1	WL2	Total
1.04	0.0	235.9	235.9
1.07	173.9	971.2	1145.2
1.08	527.2	465.1	992.3
1.13	120.6	162.8	283.5
1.16	0.0	2033.5	2033.5
1.21	255.4	74.5	330.0
1.22	0.0	978.6	978.6
1.23	0.0	778.6	778.6
1.26	0.0	1214.5	1214.5
1.31	3001.9	1509.4	4511.3
1.34	0.0	341.4	341.4
1.38	0.0	873.8	873.8
1.39	0.0	185.3	185.3
2	0.0	629.4	629.4
6	0.0	209.2	209.2
Total	4079.1	10663.4	14742.5

Appendix 5 Habitat areas (ha) for each site (Annex I)

Site	91A0	91D0	91E0	91J0	NA	Total
1.01	3.1	0.0	0.0	0.0	0.5	3.6
1.02	7.3	0.0	0.6	0.0	0.1	8.1
1.03	46.4	0.0	0.0	0.0	22.7	69.0
1.04	40.8	0.0	0.1	0.0	21.9	62.8
1.05	19.6	0.0	0.0	0.0	0.0	19.6
1.06	46.0	0.0	3.6	4.5	0.3	54.5
1.07	0.0	0.0	0.0	0.0	11.4	11.4
1.08	1.9	0.0	1.1	0.0	37.8	40.7
1.09	1.1	0.0	0.0	0.0	0.0	1.1
1.1	146.5	0.0	0.0	0.0	0.4	146.9
1.11	5.4	0.0	0.0	0.0	9.2	14.5
1.12	12.8	0.0	0.0	0.0	0.0	12.8
1.13	0.4	0.0	1.5	1.0	34.0	36.9
1.14	7.2	0.0	0.0	0.0	0.0	7.2
1.15	23.6	0.0	0.0	0.0	0.0	23.6
1.16	5.6	0.0	0.2	0.0	4.7	10.4
1.17	0.0	0.0	29.3	0.0	4.7	33.9
1.18	22.7	0.0	0.0	0.0	1.1	23.7
1.19	10.8	0.0	0.0	0.0	0.0	10.9
1.2	0.0	0.0	0.0	0.0	191.5	191.5
1.21	13.0	0.0	0.0	0.0	8.9	21.9
1.22	14.5	0.0	0.0	0.0	10.0	24.5
1.23	6.3	0.0	0.0	0.0	0.0	6.3
1.24	31.1	0.0	0.0	0.0	0.0	31.1
1.25	8.9	0.0	0.0	0.0	0.1	8.9
1.26	0.0	0.0	7.1	0.0	60.6	67.7
1.27	3.2	0.0	0.0	0.0	20.4	23.6
1.28	2.5	0.0	11.2	0.5	13.8	28.1
1.29	0.0	0.0	2.3	7.4	38.8	48.5
1.3	0.5	0.0	0.0	0.0	274.5	275.0
1.31	0.0	0.0	1.6	0.1	59.4	61.1
1.32	0.4	0.0	0.0	0.0	135.3	135.6
1.33	5.5	0.0	0.0	0.0	0.9	6.4
1.34	0.0	0.0	45.7	0.0	49.2	94.9
1.35	1.3	0.0	10.0	57.3	13.7	82.3
1.36	3.2	0.0	23.4	0.0	41.4	68.0
1.37	146.2	0.0	1.3	0.0	101.4	249.0
1.38	0.7	0.0	0.0	0.0	0.2	0.9
1.39	92.2	0.0	0.0	0.0	2.6	94.8
1.4	49.0	0.0	0.0	0.0	3.1	52.2
1.41	2.1	0.0	0.2	0.0	0.1	2.5
2	68.6	8.7	4.3	0.0	195.3	276.9
3	3.6	0.0	0.7	0.0	51.1	55.3
4	53.8	0.4	0.0	0.0	9.8	64.0
5	0.0	0.0	0.1	0.0	16.2	16.3
6	19.5	0.0	0.2	0.0	3.4	23.2
Total	927.2	9.1	144.5	70.7	1450.8	2602.3

Appendix 6 Species list totals for each site

Site number	Site name	Native vascular taxa	Non-native vascular taxa	Native bryophyte taxa	Non-native bryophyte taxa	Total taxa
1.01	Ash Valley	62	3	34	1	100
1.02	Brickeen Island	58	2	12	0	72
1.03	Cahernabane	71	3	54	0	128
1.04	Cahernaduv	65	4	48	0	117
1.05	Cahnicaun Wood	69	3	33	1	106
1.06	Camillan Wood	102	3	63	1	169
1.07	Carrigafreaghane	33	5	1	0	39
1.08	Cloghereen	55	3	38	0	96
1.09	Cuckoo Wood	28	1	33	1	63
1.10	Derrycunnihy	105	7	55	1	168
1.11	Dinis	55	6	28	1	90
1.12	Doogary Wood	66	2	28	1	97
1.13	Drumrougher	96	10	30	1	137
1.14	Eagles Nest	36	1	37	0	74
1.15	Eamonn's Wood	54	2	58	1	115
1.16	Gallavally	73	7	30	0	110
1.17	Game Wood	90	7	32	0	129
1.18	Glaisín na Marbh	69	2	42	0	113
1.19	Glasha Wood	63	2	49	1	115
1.20	Glena	28	2	26	0	56
1.21	Gortderraree	47	1	10	0	58
1.22	Gortracussane Lower	61	4	24	1	90
1.23	Gortracussane Upper	58	1	16	0	75
1.24	Gortroe Woods	65	2	64	1	132
1.25	Kingsboro Wood	64	2	32	1	99
1.26	Knockreer	47	18	4	0	69
1.27	Looscaunagh	45	5	26	0	76
1.28	Lower Lake Islands	79	10	10	0	99
1.29	Muckross Abbey	94	15	6	0	115
1.30	Muckross Forest	98	8	37	0	143
1.31	Muckross House	60	10	29	0	99
1.32	North Face Torc	38	5	21	0	64
1.33	Oak Island	42	1	35	1	79
1.34	Reen Wood	74	9	28	0	111
1.35	Reenadinna Wood	135	13	38	0	186
1.36	Ross Island	81	14	26	0	121
1.37	Tomies Wood	56	3	30	0	89
1.38	Tower Bog	60	1	19	1	81
1.39	Tower Wood	86	2	32	1	121
1.40	Ullauns	64	1	43	0	108
1.41	Upper Lake Islands	74	3	7	0	84
2	Glengarriff Woods Nature Reserve	92	18	41	0	151
3	Derrynafulla	74	8	50	0	132
4	Uragh Wood Nature Reserve	88	3	60	0	151
5	Knockomagh Wood Nature Reserve	54	9	20	0	83
6	St Gobnet's Wood	78	9	29	0	116

Appendix 7 Conservation scores (criteria)

Site	Area	Vascular richness	Bryophyte richness	Notable species	Native regen.	Horizontal diversity	Native basal area	Dead-wood	Annex I habitats	Fossitt habitats	Petrifying springs	Hydro. features	Adjacent habitats	Woodland continuity	Total score
1.01	1	2	3	0	0	1	3	1	1	1	0	1	1	2	17
1.02	3	2	2	1	1	0	2	1	2	2	0	1	1	2	20
1.03	4	3	3	2	0	0	1	1	1	2	0	1	1	2	21
1.04	5	3	3	1	0	0	2	1	2	3	0	1	1	2	24
1.05	4	3	3	3	0	2	3	1	1	1	0	1	1	2	25
1.06	5	4	3	1	1	1	3	1	2	3	0	1	1	5	31
1.07	3	1	1	0	1	2	0	1	0	1	0	1	0	2	13
1.08	4	2	3	0	2	0	2	1	2	3	0	1	1	4	25
1.09	0	1	3	2	0	0	3	1	1	1	0	1	1	4	18
1.10	5	4	3	3	1	2	3	1	1	1	0	1	1	5	31
1.11	3	2	3	2	0	1	2	1	1	2	0	1	1	5	24
1.12	3	3	3	0	1	1	3	1	1	1	0	1	1	2	21
1.13	4	4	3	1	1	1	0	1	2	3	0	1	1	2	24
1.14	3	1	3	1	1	1	2	1	1	1	0	1	1	5	22
1.15	4	2	3	1	0	0	3	1	1	1	0	1	1	5	23
1.16	3	3	3	1	0	0	3	1	2	3	0	1	1	2	23
1.17	4	4	3	0	1	0	1	1	1	1	0	1	1	2	20
1.18	4	3	3	1	0	1	2	1	1	1	0	1	1	2	21
1.19	3	2	3	0	0	0	3	1	1	1	0	1	1	2	18
1.20	5	1	3	1	0	0	0	1	0	0	0	1	1	5	18
1.21	4	1	1	3	1	1	1	1	1	1	0	1	1	2	19
1.22	4	2	3	3	1	1	2	1	1	1	0	1	1	2	23
1.23	2	2	2	2	1	1	3	1	1	1	0	1	1	2	20
1.24	4	3	3	3	0	1	3	1	1	1	0	1	1	2	24
1.25	3	3	3	2	0	0	3	1	1	1	0	1	1	2	21
1.26	5	2	1	0	2	0	0	0	1	2	0	1	1	2	17
1.27	2	1	3	0	1	0	0	1	1	1	0	1	1	2	14
1.28	4	4	1	3	2	2	3	1	2	3	0	1	0	2	28
1.29	4	4	1	1	1	1	3	1	2	3	0	1	1	2	25
1.30	4	4	3	1	1	1	0	1	1	1	0	1	1	2	21
1.31	4	3	3	0	2	1	0	0	2	3	0	1	1	2	22
1.32	5	1	2	1	2	0	0	0	1	1	0	1	1	2	17
1.33	2	1	3	2	0	0	3	1	1	1	0	1	1	2	18
1.34	5	4	3	1	1	2	2	1	1	2	0	1	1	2	26
1.35	5	4	3	3	2	1	1	1	2	3	0	1	1	5	32
1.36	5	4	3	3	1	0	1	1	2	2	0	1	1	5	29
1.37	5	2	3	1	0	0	3	1	2	2	0	1	1	5	26
1.38	0	2	2	0	0	0	3	0	1	1	0	1	1	0	11
1.39	5	4	3	2	1	1	3	1	1	1	0	1	1	2	26
1.40	5	2	3	1	0	0	3	1	1	1	0	1	1	2	21
1.41	1	3	1	2	2	2	3	1	2	2	0	1	0	2	22
2	5	4	3	1	0	0	2	1	2	3	0	1	1	5	28
3	2	4	3	1	0	0	0	1	2	2	0	1	1	0	17
4	5	4	3	0	0	2	3	1	2	2	0	1	1	5	29
5	4	2	2	0	0	0	0	1	1	1	0	1	1	2	15
6	4	4	3	1	0	1	1	1	2	2	0	1	1	4	25

Appendix 8 Conservation scores (rankings)

Site number	Site name	Total score	% score	Quality class	Ranking
1.01	Ash Valley	17	47.2	Moderate	39
1.02	Brickeen Island	20	55.6	Moderate	31
1.03	Cahernabane	21	58.3	Moderate	25
1.04	Cahernaduv	24	66.7	Very Good	15
1.05	Cahnicaun Wood	25	69.4	Very Good	11
1.06	Camillan Wood	31	86.1	Excellent	2
1.07	Carrigafreaghane	13	36.1	Poor	45
1.08	Cloghereen	25	69.4	Very Good	11
1.09	Cuckoo Wood	18	50.0	Moderate	35
1.10	Derrycunnihy	31	86.1	Excellent	2
1.11	Dinis	24	66.7	Very Good	15
1.12	Doogary Wood	21	58.3	Moderate	25
1.13	Drumrougher	24	66.7	Very Good	15
1.14	Eagles Nest	22	61.1	Very Good	22
1.15	Eamonn's Wood	23	63.9	Very Good	19
1.16	Gallavally	23	63.9	Very Good	19
1.17	Game Wood	20	55.6	Moderate	31
1.18	Glaisín na Marbh	21	58.3	Moderate	25
1.19	Glasha Wood	18	50.0	Moderate	35
1.20	Glena	18	50.0	Moderate	35
1.21	Gortderraree	19	52.8	Moderate	34
1.22	Gortracussane Lower	23	63.9	Very Good	19
1.23	Gortracussane Upper	20	55.6	Moderate	31
1.24	Gortroe Woods	24	66.7	Very Good	15
1.25	Kingsboro Wood	21	58.3	Moderate	25
1.26	Knockreer	17	47.2	Moderate	39
1.27	Looscaunagh	14	38.9	Poor	44
1.28	Lower Lake Islands	28	77.8	Very Good	6
1.29	Muckross Abbey	25	69.4	Very Good	11
1.30	Muckross Forest	21	58.3	Moderate	25
1.31	Muckross House	22	61.1	Very Good	22
1.32	North Face Torc	17	47.2	Moderate	39
1.33	Oak Island	18	50.0	Moderate	35
1.34	Reen Wood	26	72.2	Very Good	8
1.35	Reenadinna Wood	32	88.9	Excellent	1
1.36	Ross Island	29	80.6	Excellent	4
1.37	Tomies Wood	26	72.2	Very Good	8
1.38	Tower Bog	11	30.6	Poor	46
1.39	Tower Wood	26	72.2	Very Good	8
1.40	Ullauns	21	58.3	Moderate	25
1.41	Upper Lake Islands	22	61.1	Very Good	22
2	Glengarriff Woods Nature Reserve	28	77.8	Very Good	6
3	Derrynafulla	17	47.2	Moderate	39
4	Uragh Wood Nature Reserve	29	80.6	Excellent	4
5	Knockomagh Wood Nature Reserve	15	41.7	Moderate	43
6	St Gobnet's Wood	25	69.4	Very Good	11

Appendix 9 Threat scores (criteria)

Site	Alien shrub infestation	Grazing intensity	Non-native regeneration	Damaging activities	Non-native canopy	Abundant dead or damaged	Risk of wildfire	Total score
1.01	2	3	0	0	0	1	2	8
1.02	2	2	0	0	0	1	0	5
1.03	2	3	0	1	1	1	2	10
1.04	2	3	0	0	0	1	2	8
1.05	2	3	0	0	0	1	2	8
1.06	2	0	0	1	0	0	0	3
1.07	2	0	0	1	1	0	0	4
1.08	2	0	1	1	1	0	0	5
1.09	2	3	0	2	0	0	2	9
1.10	2	3	0	2	0	0	2	9
1.11	2	3	0	0	0	0	2	7
1.12	1	3	0	0	0	0	2	6
1.13	2	0	1	0	1	0	0	4
1.14	2	3	0	1	0	0	2	8
1.15	2	3	0	0	0	1	2	8
1.16	2	3	0	0	0	0	0	5
1.17	2	2	0	0	0	0	0	4
1.18	2	3	0	0	0	0	2	7
1.19	2	3	0	0	0	1	2	8
1.20	2	3	0	1	0	0	2	8
1.21	2	3	0	1	0	0	2	8
1.22	2	2	0	0	0	1	2	7
1.23	2	3	0	0	0	1	2	8
1.24	1	2	0	0	0	0	2	5
1.25	1	3	0	0	0	0	2	6
1.26	2	3	0	1	1	0	0	7
1.27	2	2	1	0	1	0	2	8
1.28	1	0	0	0	0	0	0	1
1.29	2	0	1	0	0	0	2	5
1.30	2	2	1	0	1	0	0	6
1.31	2	0	0	0	1	0	0	3
1.32	2	0	0	0	1	0	2	5
1.33	1	3	0	1	0	1	2	8
1.34	1	3	0	0	0	0	0	4
1.35	2	2	1	0	0	0	0	5
1.36	2	2	0	1	1	0	0	6
1.37	2	3	0	0	0	0	2	7
1.38	1	2	0	0	0	0	2	5
1.39	2	3	0	0	0	0	2	7
1.40	2	3	0	0	0	1	2	8
1.41	2	0	0	0	0	0	0	2
2	2	0	2	0	0	0	2	6
3	2	2	0	1	1	0	2	8
4	1	3	0	0	0	0	2	6
5	2	0	0	0	1	0	0	3
6	1	0	0	0	0	0	0	1

Appendix 10 Threat scores (rankings)

Site number	Site name	Total score	% score	Threat level	Ranking
1.01	Ash Valley	8	61.5	Severe	4
1.02	Brickeen Island	5	38.5	Moderate	29
1.03	Cahernabane	10	76.9	Severe	1
1.04	Cahernaduv	8	61.5	Severe	4
1.05	Cahnicaun Wood	8	61.5	Severe	4
1.06	Camillan Wood	3	23.1	Moderate	41
1.07	Carrigafreaghane	4	30.8	Moderate	37
1.08	Cloghereen	5	38.5	Moderate	29
1.09	Cuckoo Wood	9	69.2	Severe	2
1.10	Derrycunnihy	9	69.2	Severe	2
1.11	Dinis	7	53.8	High	17
1.12	Doogary Wood	6	46.2	High	23
1.13	Drumrougher	4	30.8	Moderate	37
1.14	Eagles Nest	8	61.5	Severe	4
1.15	Eamonn's Wood	8	61.5	Severe	4
1.16	Gallavally	5	38.5	Moderate	29
1.17	Game Wood	4	30.8	Moderate	37
1.18	Glaisín na Marbh	7	53.8	High	17
1.19	Glasha Wood	8	61.5	Severe	4
1.20	Glena	8	61.5	Severe	4
1.21	Gortderraree	8	61.5	Severe	4
1.22	Gortracussane Lower	7	53.8	High	17
1.23	Gortracussane Upper	8	61.5	Severe	4
1.24	Gortroe Woods	5	38.5	Moderate	29
1.25	Kingsboro Wood	6	46.2	High	23
1.26	Knockreer	7	53.8	High	17
1.27	Looscaunagh	8	61.5	Severe	4
1.28	Lower Lake Islands	1	7.7	Low	45
1.29	Muckross Abbey	5	38.5	Moderate	29
1.30	Muckross Forest	6	46.2	High	23
1.31	Muckross House	3	23.1	Moderate	41
1.32	North Face Torc	5	38.5	Moderate	29
1.33	Oak Island	8	61.5	Severe	4
1.34	Reen Wood	4	30.8	Moderate	37
1.35	Reenadinna Wood	5	38.5	Moderate	29
1.36	Ross Island	6	46.2	High	23
1.37	Tomies Wood	7	53.8	High	17
1.38	Tower Bog	5	38.5	Moderate	29
1.39	Tower Wood	7	53.8	High	17
1.40	Ullauns	8	61.5	Severe	4
1.41	Upper Lake Islands	2	15.4	Low	44
2	Glengarriff Woods Nature Reserve	6	46.2	High	23
3	Derrynafulla	8	61.5	Severe	4
4	Uragh Wood Nature Reserve	6	46.2	High	23
5	Knockomagh Wood Nature Reserve	3	23.1	Moderate	41
6	St Gobnet's Wood	1	7.7	Low	45

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