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National Parks and Wildlife Service

The Monitoring and Assessment of four EU Habitats Directive Annex I Woodland Habitats

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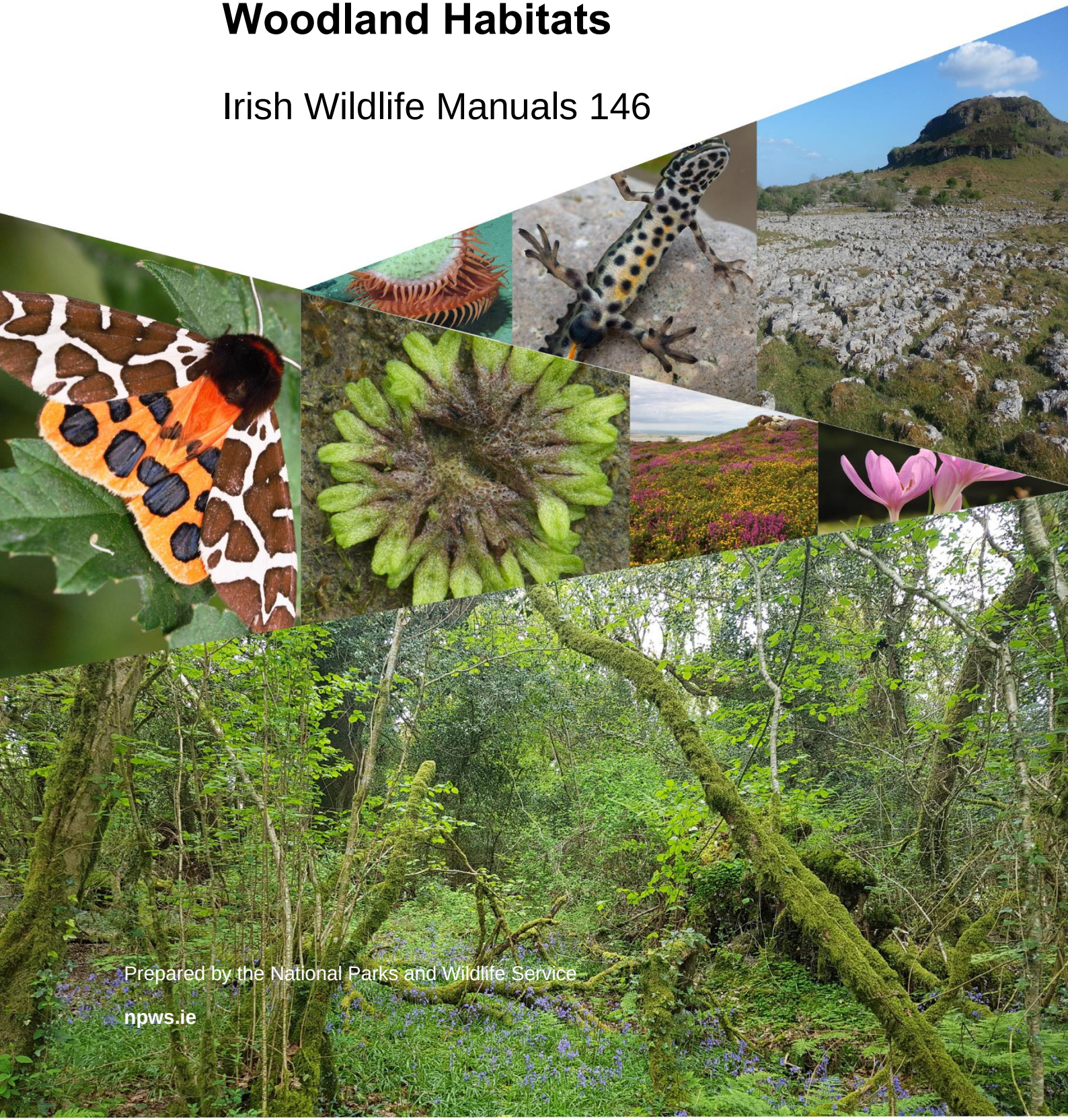

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Front cover, small photographs from top row:

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 wood, Garadice Lough, Co. Leitrim, Orla Daly

The monitoring and assessment of four EU Habitats Directive Annex I woodland habitats

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Executive Summary

This document reports on the Woodland Monitoring Survey 2017-2018, which assessed the Area, Structure and Functions and Future Prospects of four woodland types listed in Annex I of the EU Habitats Directive: 91A0 Old sessile oak woods, 91E0 Alluvial forests, 91D0 Bog woodland and 91J0 Yew woods. A total of 123 polygons – 63 of 91A0, 40 of 91E0, 14 of 91D0 and 6 of 91J0 – were monitored between 2017 and 2018. In each site, the polygon was examined for any area loss; four monitoring plots were then used to gather data on Structure and Functions, including indicator species, cover of individual woodland layers, canopy height, presence of non-native species, stand structure and dead wood estimates. Future Prospects were assessed by noting the pressures, threats and impacts, both positive and negative, occurring throughout the Annex I woodland area. Sites were scored green (Favourable), amber (Unfavourable – Inadequate) or red (Unfavourable – Bad) depending on the outcome of the assessments.

For the 63 91A0 Old sessile oak woods: All sites were assessed as green for Area as no habitat loss was recorded. For the Structure and Functions assessment, 23 sites (36.5%) were green, 14 (22.2%) were amber and 26 (41.3%) were red. The most frequent criteria to fail the Structure and Functions assessment at the individual-plot level were negative species regeneration, negative species cover (*i.e.* above the 10% threshold), grazing pressure and native shrub layer cover. At the four-plot level, the most frequent criteria to fail were lack of *Quercus* saplings and lack of small *Quercus* trees. For Future Prospects, 18 sites (28.6%) were assessed as green, 19 (30.2%) were amber and 26 (41.3%) were red. The main pressures/threats were invasive non-native species and overgrazing. An overall condition assessment for each site was derived by combining the assessment results of Area, Structure and Functions and Future Prospects. Based on this, 18 sites (28.6%) were assessed as green, 19 (30.2%) were amber and 26 (41.3%) were red.

For the 40 91E0 Alluvial forests: Thirty-eight sites (95%) were assessed as green for Area and two (5%) were red due to woodland clearance. For the Structure and Functions assessment, 18 sites (45%) were green, 14 (35%) were amber and 8 (20%) were red. The most frequent criteria to fail the Structure and Functions assessment were negative species regeneration and negative species cover. For Future Prospects, 14 (35%) sites were assessed as green, 16 (40%) were amber and 10 (25%) were red. The main pressures/threats were invasive non-native species, Ash Dieback disease, forestry clearance and problematic native species. The overall condition assessment, derived by combining the assessment results of Area, Structure and Functions and Future Prospects, resulted in 14 (35%) green assessments, 16 (40%) amber and 10 (25%) red.

For the 14 91D0 Bog woodlands: All sites were assessed as green for Area as no habitat loss was recorded. For the Structure and Functions assessment, ten sites (71.4%) were green and four (28.6%) were amber. Pass rates were high for the individual-plot level assessments. The most frequent criteria to fail at the four-plot level were lack of trees in the largest size class and dead wood. For Future Prospects, eight sites (57.1%) were assessed as green and six (42.9%) were amber. The main pressures/threats were drainage, peat extraction, invasive non-native species, burning and overgrazing. The overall condition assessment, derived by combining the assessment results of Area, Structure and Functions and Future Prospects, resulted in eight sites (57.1%) with green assessments and six (42.9%) with amber.

For the six 91J0 Yew woods: All sites were assessed as green for Area as no habitat loss was recorded. For the Structure and Functions assessment, one site (16.7%) was green and five (83.3%) were red. The most frequent criteria to fail the Structure and Functions assessment at the individual-plot level were negative species regeneration, negative species cover, native shrub layer cover and native field layer cover and height. The most frequent criteria to fail at the four-plot level were *Taxus baccata* regeneration and *Taxus baccata* size class *i.e.* lack of diversity in tree girth. For Future Prospects, one site (16.7%) was assessed as green and five

(83.3%) were amber. The main pressures/threats were invasive non-native species and overgrazing. The overall condition assessment, derived by combining the assessment results of Area, Structure and Functions and Future Prospects, resulted in one site (16.7%) with a green assessment and five (83.3%) with red.

Detailed examination and analysis of the criteria are presented, suggestions for improving the condition assessment of woodlands are given and recommendations are made for the future monitoring of woodlands in Ireland. The results of the National Conservation Status Assessments for the Annex I habitats are presented and discussed.

Acknowledgements

We are grateful to everyone who contributed to the planning and execution of this survey.

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1 General Introduction

1.1 The Woodland Monitoring Survey 2017-2018

Ireland has four Annex I woodland habitats which the country is obliged to evaluate and report on every six years under Article 17 of the EU Habitats Directive. These comprise:

- 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles,
- 91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*),
- 91D0 *Bog woodland, and
- 91J0 **Taxus baccata* woods of the British Isles.

The asterisk '*' indicates a priority habitat, *i.e*. habitats which are considered to be in danger of disappearing within the EU territory.

The baseline 91A0 and 91E0 Woodland Monitoring Survey 2011-2012 were conducted by BEC Consultants on behalf of the National Parks and Wildlife Service (NPWS) (O'Neill & Barron, 2013). NPWS staff conducted the 91D0 and 91J0 Woodland Monitoring Surveys 2011-2012 (Cross & Lynn, 2013a, 2013b).

The Department of Housing, Local Government and Heritage (DHLGH) commissioned BEC Consultants Ltd. to carry out the monitoring and reassessment of the four Annex I woodland habitats from 2017-2018. The monitoring survey entailed assessing a total of 123 sites. Table 1 shows the number of sites of each habitat type surveyed. The site locations are shown in separate maps in the relevant sections of this report. Details of the results of the monitoring are also presented and these were used to inform Ireland's most recent Article 17 report, covering the period 2013-2018 (NPWS, 2019). This is the third round of reporting carried out under Article 17 where the conservation status of Annex I habitats is assessed.

Table 1 Number of sites of each habitat surveyed in 2017-2018

Annex I habitat	No. of sites
91A0 Old sessile oak woods	63
91E0 *Alluvial forests	40
91D0 *Bog woodland	14
91J0 *Yew woods	6
Total	123

1.2 Assessment of Annex I habitats

The National Conservation Status Assessment report requires information on four parameters: Range, Area, Structure and Functions, and Future Prospects, and also incorporates information relating to the pressures and threats operating on the habitats. Guidance on assessment is provided by the EU (DG Environment, 2017). Each parameter receives an assessment of Favourable (green), Unfavourable-Inadequate (amber) or Unfavourable-Bad (red), and the individual parameter assessment results are combined according to the matrix in Table 2 to obtain an overall assessment of conservation status for the habitat.

Table 2 General evaluation matrix for assessment of Conservation Status (CS) (adapted from DG Environment, 2017)

Parameter	**Conservation Status**			
	Favourable **('green')**	**Unfavourable - Inadequate** **('amber')**	**Unfavourable - Bad** **('red')**	***Unknown*** ***(insufficient information to make an assessment)***
Range	Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference range'	Any other combination	Large decrease: Equivalent to a loss of more than 1% per year OR More than 10% below 'favourable reference range'	*No or insufficient reliable information available*
Area covered by habitat type within range	Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference area' AND without significant changes in distribution pattern within range (if data available)	Any other combination	Large decrease in surface area: Equivalent to a loss of more than 1% per year OR With major losses in distribution pattern within range OR More than 10% below 'favourable reference area'	*No or insufficient reliable information available*
Specific Structure and Functions (including typical species)	Structures and functions (including typical species) in good condition and no significant deterioration / pressures	Any other combination	More than 25% of the area is unfavourable as regards its specific structures and functions (including typical species)	*No or insufficient reliable information available*
Future Prospects	The habitat's prospects for its future are excellent / good, no significant impact from threats expected; long-term viability assured	Any other combination	The habitat's prospects are bad, severe impact from threats expected; long-term viability not assured.	*No or insufficient reliable information available*
Overall assessment of CS	All 'green' OR three 'green' and one 'unknown'	One or more 'amber' but no 'red'	One or more 'red'	Two or more 'unknown' combined with green or all 'unknown'

Range of a habitat is defined as "the outer limits of the overall area in which a habitat is found at present" and it can be considered as an envelope within which areas actually occupied occur. The range is based on the actual distribution of the habitat and in general the surface

area of the range is provided in 10 km x 10 km resolution, with a minimum value of 100 km^2 (DG Environment, 2017). The Area parameter refers to the actual area of the habitat and the assessment process includes an examination of area changes between reporting periods.

The Structure and Functions parameter is assessed using criteria specifically chosen to represent key aspects of the habitat, such as structure or biodiversity. The Future Prospects assessment depends to some extent on the other parameters being assessed, as well as the pressures, threats and conservation measures operating in the habitat. The balance between positive management and negative impacts is weighed up and the prospects of the habitat at the site over the next two reporting periods (12 years) are evaluated. The Area, Structure and Functions and Future Prospects assessment results for each site are presented in this report.

1.3 Review of baseline methodologies

Prior to fieldwork commencement, and during the early stages of fieldwork in 2017, a full review was carried out of the survey and assessment methodologies used during the Woodland Monitoring Survey 2011-2012 (O'Neill & Barron, 2013; Cross & Lynn, 2013a, 2013b). The recommendations of those reports were also consulted with a view to determining what refinements to methodology, if any, were required. Amendments to methodology were proposed in the project initiation document (Daly & O'Neill, 2017) and their implementation was agreed by NPWS. Further refinements proposed following the first season of fieldwork (Daly, 2017) were agreed for the 2018 field season. All of the amendments implemented have been incorporated into the methodologies presented in this report.

1.4 Scope and format of this report

1.4.1 Scope of this report

This report details the monitoring methodology and results for the four Annex I woodland habitats surveyed as part of the Woodland Monitoring Survey 2017-2018. For each habitat, the survey methodology, assessment results and discussion will be presented in full in separate sections, as follows:

- Section 2: 91A0 Old sessile oak woods
- Section 3: 91E0 *Alluvial forests
- Section 4: 91D0 *Bog woodland
- Section 5: 91J0 *Yew woods

This report describes the monitoring methodologies used in 2017-2018 and gives the assessment results for all 123 sites monitored, following detailed examination and analysis of the criteria, impacts and activities at each site. Suggestions for improving the condition assessment of woodlands are given and recommendations are made for the future monitoring of woodlands in Ireland. As noted in section 1.2, the results of the Area, Structure and Functions and Future Prospects parameter assessments for the monitoring sites are presented. The Range parameter assessment and a more comprehensive Area assessment were conducted separately for the National Conservation Status Assessment report (NPWS, 2019).

1.4.2 Conventions used throughout the report

The terms Range, Area, Structure and Functions, and Future Prospects are capitalised when they refer directly to the four parameters being assessed. The assessment outcomes of Favourable, Unfavourable-Inadequate and Unfavourable-Bad are also capitalised. The assessment outcomes are also referred to as 'green', 'amber' or 'red' as indicated in Table 2.

Within this report, the terms “polygon” and “site” are used interchangeably in reference to the monitored polygons. The site numbers used correspond to those used in the National Survey of Native Woodlands (NSNW) (Perrin *et al.*, 2008). Where new (*i.e*. non-NSNW) sites were selected, site numbers were allocated from number 2021 upwards.

1.4.3 Digital files accompanying this report

This report is accompanied by several digital files, as follows:

- ESRI-compatible shapefiles in ITM projection of monitoring stops and habitat polygons.
- Microsoft Access database containing all new and existing data relating to Woodlands Monitoring Surveys, including baseline survey data.
- Photographs (*.jpg) of woodland habitat, monitoring stops and impacts, and Image catalogue (Microsoft Excel spreadsheet) detailing the photographs taken during this survey.
- Microsoft Excel spreadsheet of other rare species data recorded during this survey for transfer to Recorder database.

2 91A0 Old sessile oak woods

2.1 Interpretation of 91A0 habitat for this survey

The acidophilous *Quercus petraea* woods that conform to Annex I habitat 91A0 in the interpretation manual of European Union habitats (CEC, 2013) primarily correspond to the WL1 *Quercus petraea – Luzula sylvatica* group described in the Irish Vegetation Classification (IVC) (Perrin, 2016). All vegetation communities in this group have an affinity to the Annex I habitat: WL1A *Quercus robur – Luzula sylvatica* woodland (78.7% affinity), WL1B *Quercus petraea – Luzula sylvatica* woodland (97.9% affinity), WL1C *Quercus petraea – Corylus avellana* woodland (66.3% affinity) and WL1D *Quercus petraea – Vaccinium myrtillus* woodland (98.7% affinity). The interpretation manual gives little information on the habitat beyond describing it as having "many ferns, mosses, lichens and evergreen bushes … including *Arbutus unedo*", and only lists three indicative taxa: *Quercus petraea, Ilex aquifolium* and *Blechnum* ssp. (*sic*). Due to frequent planting of other *Quercus* species into Irish sessile oak woods, a broader interpretation of the habitat has been taken for the assessment reported here to include woods with *Quercus* x *rosacea* (hybrid between *Q. petraea* and *Q. robur*) and, in a small number of cases, *Quercus robur*, provided the ground flora is acidic in nature; ideally, however, *Q. petraea* should also be present. Effectively, all three sub-associations of the Blechno-Quercetum petraeae association are regarded as the Annex I habitat: sub-association typicum, sub-association scapanietosum and sub-association coryletosum.

An old sessile oak wood is characterised by a number of diverse elements coming together in a fully functioning system. The soil is usually acidic, often a podzol, brown earth or grey-brown podzol, and generally well drained. This supports a characteristic flora. The woodland itself is typically multi-layered, with well-developed sessile oak woods having a canopy, understorey, shrub, dwarf shrub, field and ground layers. A good proportion of the canopy should be composed of *Quercus petraea* or the hybrid *Quercus* x *rosacea*, although other native species such as *Betula* spp. and *Sorbus aucuparia* also occur.

The understorey and shrub layers, if present, are generally made up of shorter and/or younger individuals of the above species, with *Ilex aquifolium* and *Corylus avellana* generally frequent in the shrub layer. A dwarf shrub layer of low woody species such as *Vaccinium myrtillus* and *Calluna vulgaris* often occurs. In Ireland, a field layer of ferns such as *Blechnum spicant*, *Polypodium* spp. and *Dryopteris* spp., and flowering plants such as *Luzula sylvatica* and *Oxalis acetosella* are typical. *Hyacinthoides non-scripta* may be present on more nutrient-rich soils. The ground (bryophyte) layer is usually well developed, consisting of a diverse range of mosses, including *Rhytidiadelphus* spp., *Dicranum* spp., *Polytrichum formosum, Hylocomium brevirostre, Mnium hornum, Plagiothecium undulatum, Pseudotaxiphyllum elegans*, and liverworts such as *Diplophyllum albicans, Saccogyna viticulosa* and *Scapania* spp. Other liverwort species, such as *Calypogeia* spp., *Frullania* spp., *Plagiochila* spp., *Lepidozia* spp. and *Bazzania trilobata*, may also occur, particularly in western sessile oak woodlands, where epiphytes are typically abundant. Lichens present may include *Lobaria* spp., *Pannaria* spp., *Thelotrema lepadinum* and *Normandina pulchella* (James *et al.,* 1977; JNCC, 2019).

An oak wood should be structurally diverse, that is, it should have a range of age classes, ideally including seedlings, saplings, poles, young, old and senescent trees. Conditions suitable for the regeneration of the main tree species should be present, including canopy gaps for oak regeneration. Structural diversity is also provided by the tree species themselves, which vary from smooth-barked species such as *Ilex aquifolium* to rough-barked species such as *Quercus petraea*; this diversity in substrate is important for epiphytic lichen and bryophyte species, and for invertebrates.

A well-functioning oak wood generally has a good quantity of dead wood and a range of dead wood types, including coarse and fine, standing and fallen, which provide a variety of niches for animals (both vertebrates and invertebrates), fungi and epiphytes. Oak woods also provide habitat for grazers and browsers, and the large amounts of seeds, berries and nuts are a

valuable source of food. An appropriate level of grazing is essential to maintain a proper species balance so that no single species becomes dominant. However, too much or too little grazing can disrupt the system and may have unwanted consequences such as a reduction in tree regeneration or proliferation of ground-covering species such as brambles or bracken. The general structure of this habitat is presented in Figure 1.

Figure 1 91A0 habitat at Eamonn's Wood, Co. Kerry. Photograph © NPWS. Taken by Orla Daly.

2.2 Review of baseline methodology

- O'Neill & Barron (2013) suggested imposing an upper limit on the cover and/or height of the field layer to capture over-vigorous growth within the plots. For this reason, data were collated on the cover and height of *Rubus fruticosus* during both the 2017 and 2018 field seasons.

- *Dicranum majus* was added as a 91A0 positive indicator species during the 2018 field season. This bryophyte was often present in plots where the original 91A0 indicator *Dicranum scoparium* was absent. For this reason, the updated methodology records the presence of *Dicranum scoparium/D. majus* (as a single positive indicator species).

- O'Neill & Barron (2013) noted that recent bark stripping was the only indicator of overgrazing recorded in some sites, which otherwise passed such criteria as target species regeneration. They recommended only recording severe bark stripping as an overgrazing indicator. Since severe bark stripping can leave a permanent scar on the trunks of trees, the updated methodology only records severe recent bark stripping.

2.3 Methodology

2.3.1 Polygon selection

For most sites, polygon selection had been carried out for the 2011-2012 monitoring survey, with the same polygons revisited and reassessed. The process whereby these polygons were selected and defined is detailed in O'Neill & Barron (2013). Based on recommendations from O'Neill & Barron (2013), two 91A0 sites were removed from the 2017-2018 monitoring programme as they did not conform to the Annex I woodland type (346 Deerpark and 1312 Cloghphilip Wood). Alternative sites were selected and substituted prior to the field season (414 Derrygorry Wood and 2026 Shanacloon Wood). In addition to this, two additional 91A0 sites in Killarney National Park were selected for assessment in 2017-2018 (1495 Camillan

Wood and 2027 Eamonn's Wood). Polygon selection for these new sites was carried out using the same process as in the previous monitoring survey, with indicative monitoring boundaries and plot locations marked on the field maps prior to the field survey (see O'Neill & Barron, 2013). The monitoring plots were repositioned as necessary by the surveyors in the field, bearing in mind the recommendations of O'Neill & Barron (2013) for plot placement.

2.3.2 Field survey and monitoring plots

Survey work was carried out between 12th May and 7th September in 2017 and between 1st May and 1st August in 2018. Locations of the surveyed 91A0 polygons are shown in Figure 2. One site could not be visited due to site access issues (780 Luggala Lodge). An alternative site was selected and substituted (783 Deputy's Pass).

On arrival at the monitoring polygon an initial assessment of the woodland was made as to whether it conformed to 91A0 woodland. One site was rejected at this stage, on the basis of a lack of target species in the canopy across a large proportion of the site (333 Stonepark). An alternative site was selected and substituted (1411 Slishwood).

For polygons deemed to contain sufficient 91A0 habitat, detailed assessments were then carried out at the four monitoring plots; each plot measured 20 m x 20 m and contained the target species. Monitoring plots were recorded in the same locations as the previous monitoring survey (or as close as local conditions allowed) using the original grid references in conjunction with other plot information provided, thus permitting a comparison to be made between monitoring periods. Slope and aspect were recorded and a photograph of the plot was taken.

2.3.3 Area assessment

The Area parameter was assessed in the field, taking note of any recent losses in the monitoring polygon evident during the survey. Any area losses were marked on the field maps and then mapped digitally in the office. Area loss was calculated as a percentage of the original (pre-loss) area as follows:

(Current area / (Current area + area lost)) x 100

This was divided by the number of years since the site was surveyed in the baseline monitoring survey to derive the equivalent annual percentage loss in area as required for assessing Conservation Status (Table 2).

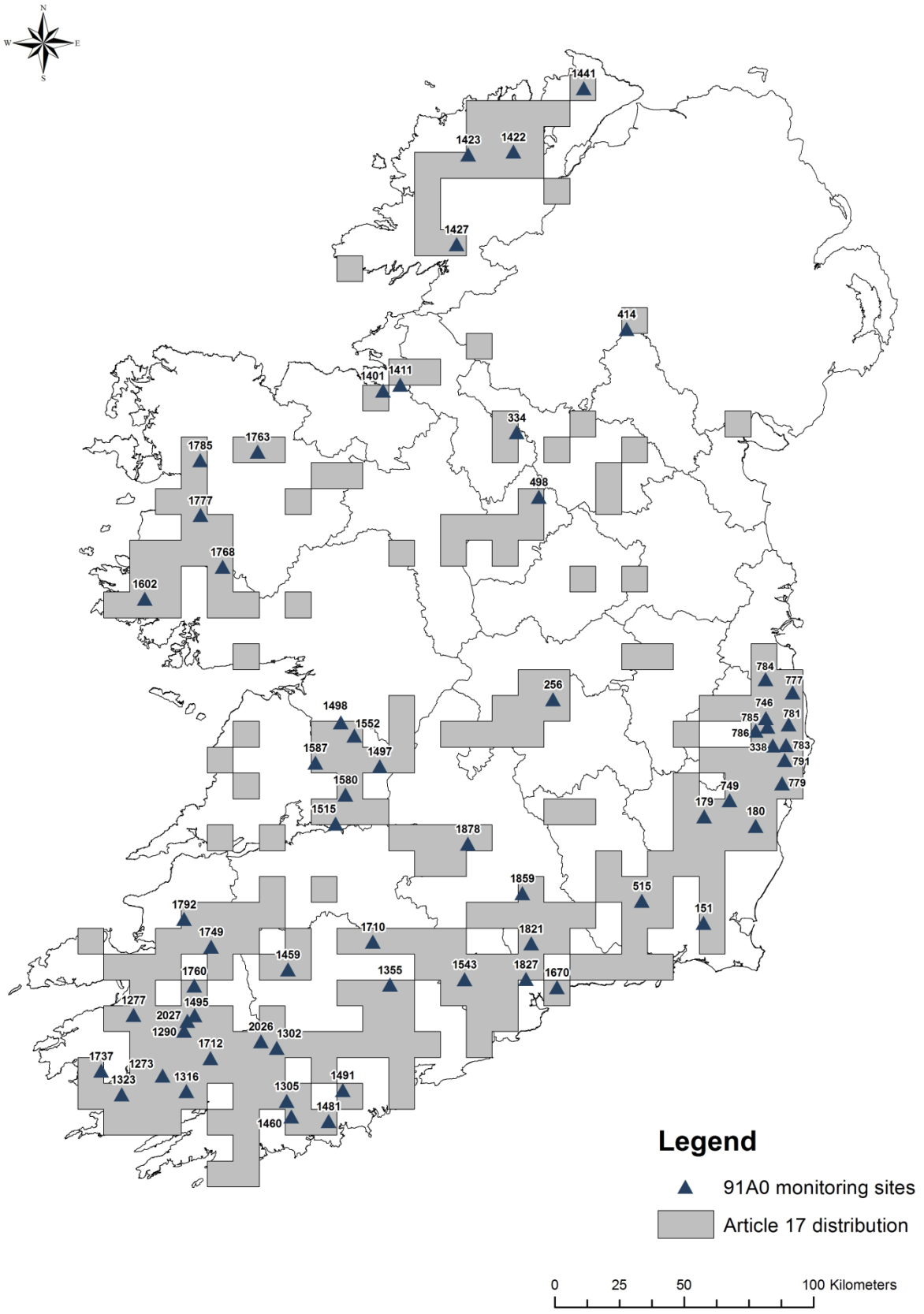

Figure 2 Location of the 63 91A0 monitoring sites. The 10 km distribution of 91A0 habitat in the Republic of Ireland (NPWS, 2019) is also displayed.

2.3.4 Structure and Functions: data collected

The methodology employed for the monitoring and conservation assessment was based on that used in the previous monitoring survey (O'Neill & Barron, 2013), except that the changes noted in section 2.2 were implemented. Data sheets are reproduced in Appendix I. Within each plot, the following data were recorded for the Structure and Functions assessment.

Species

- Presence of positive indicator species. Table 3 lists the indicator species for 91A0 woodlands.
- Presence of negative indicator species (*i.e*. any non-native species, including herbaceous species such as *Crocosmia* x *crocosmiiflora*).
- Total cover of *Rubus fruticosus* as percentage of plot.
- Median height in centimetres of *R. fruticosus* in plot.

Woodland structure

- Median canopy height in metres. Tree height was measured using a clinometer.
- Total canopy cover as percentage of plot. Crown extent rather than area covered by leaves was estimated to allow more consistent recording, regardless of seasonal variation in canopy.
- Total cover of target species as percentage of plot (this was later converted to the percentage of target species in the canopy).
- Total cover of negative species as percentage of plot.
- Total native shrub layer cover as percentage of plot. Shrub layer was defined as shrub vegetation 2-4 metres in height.
- Total native dwarf shrub/field layer cover as percentage of plot.
- Median height, in centimetres, of native dwarf shrub/field layer.
- Total bryophyte layer cover as percentage of plot.

Cover scores were recorded as a percentage of the plot area to the nearest 5%, or to the nearest 1% if less than 5%. A cover score of <1% was also permitted.

Grazing pressure

Grazing pressure (*i.e.* overgrazing) was recorded based on the presence of the following four indicators: topiary effect on shrubs and young trees, browse line on mature trees, abundant dung, and severe recent bark stripping.

Free regeneration

Free regeneration refers to regeneration that appears to have originated from seed. When counting free regeneration, only separate regenerating units were counted, *i.e*. several shoots arising from a single root were regarded as a single regenerating unit.

- Number of saplings of each target species. *Quercus* spp. saplings were recorded to genus due to the difficulty in identifying young oaks to species level.
- Number of saplings of each non-target native tree species.

- Number of seedlings[1] of each negative tree species.
- Number of saplings[2] of each negative tree species.
- Presence of free regeneration of negative shrub species such as *Rhododendron ponticum,* or invasive herbaceous species, regardless of height.

Table 3 List of positive indicator species for 91A0 woodlands.

91A0
Target species:
Quercus petraea
Quercus x *rosacea*
Other woody species:
Betula pubescens
Corylus avellana
Ilex aquifolium
Lonicera periclymenum
Sorbus aucuparia
Vaccinium myrtillus
Herbs, Rushes & Ferns:
Blechnum spicant
Hyacinthoides non-scripta
Luzula sylvatica
Oxalis acetosella
Polypodium spp.
Mosses & Liverworts:
Dicranum scoparium/D. majus
Diplophyllum albicans
Hylocomium brevirostre
Mnium hornum
Plagiothecium undulatum
Polytrichum formosum
Pseudotaxiphyllum elegans
Rhytidiadelphus loreus
Saccogyna viticulosa
Scapania gracilis

[1] The term “seedling” is used in this report to refer to young regenerating tree species with a DBH (diameter at breast height, *i.e*. at 1.3 m) less than 7 cm and measuring less than 2 m in height.
[2] Unless specified otherwise, the term “sapling” is used in this report to refer to young regenerating tree species with a DBH less than 7 cm and measuring 2 m or more in height.

Basal regeneration

Basal shoots ≥2 m tall arising from a larger trunk with a DBH of ≥7 cm were not counted unless the tree was completely dead at breast height, *i.e.* 1.3 m above the ground, in which case the whole unit was counted as a single regenerating unit.

Tree girth (target tree species only)

DBH of target trees was tallied within three size classes as follows:

- Lowland 91A0 woods: size class 1 = 7-<20 cm; size class 2 = 20-<40 cm; size class 3 = ≥40 cm.
- Upland 91A0 woods: size class 1 = 7-<20 cm; size class 2 = 20-<30 cm; size class 3 = ≥30 cm.

For the purposes of this survey, an altitude of 150 m was taken to be the cut-off point between upland and lowland situations. Where one or more plots in a site were above this cut-off, all plots were treated as upland plots for data handling purposes.

- For multi-stemmed trees, only the largest trunk was counted and assigned to the appropriate DBH size class. The occurrence of large numbers of multi-stemmed trees, or trees with very numerous stems, was noted.
- Trees with forked trunks were measured below the fork if forking occurred more than 1 m up from the base.

Dead wood

Dead wood with a diameter of at least 20 cm was recorded in four categories: old senescent trees (dead limbs or other signs of damage present), standing dead, fallen dead (including large, fallen branches) and rotten stumps (cut/broken trunks of 1 m or less, excluding stumps with basal shoots). Dead wood was recorded regardless of whether the tree was a target, non-target native or non-native species.

2.3.5 Structure and Functions: assessment

Assessments were made at the individual-plot and four-plot levels, and these were combined to give an assessment at the polygon level. The criteria assessed for 91A0 woodland are shown in Table 4 (individual-plot level criteria) and Table 5 (four-plot level criteria). Of the ten criteria assessed at the individual-plot level, eight had to reach their target to achieve a pass. Of the four criteria assessed at the four-plot level, three had to reach their target to achieve a pass. For the overall polygon level assessment, a green (Favourable) assessment result could be achieved only if all plots passed at the individual-plot level and at the four-plot level (*i.e*. five passes achieved). One failure out of the five was allowed for a polygon to receive an amber (Unfavourable – Inadequate) assessment. More than one failure resulted in a red (Unfavourable – Bad) assessment. This process is summarised in Table 6.

The area (ha) of 91A0 habitat in ‘good’ and ‘not-good’ condition as required for Article 17 reporting was derived from the Structure and Functions results. Following NPWS guidance the following approach was applied: for each monitoring site, equal weight was applied to individual-plot assessment results (n = 4) and the four-plot level assessment result (n = 1), with a Pass equal to 20% and a Fail equal to 0%. For example: A site with three passes and one fail at the individual-plot level (20 + 20 + 20 + 0 = 60) and a pass at the four-plot level (20) had 80% (60 + 20 = 80) of its area in ‘good’ condition, with the remaining 20% in ‘not-good’ condition.

N.B. These criteria are to be used for conservation status assessment of 91A0 woodlands. They are not to be used to determine Annex I status. The Annex I habitat 91A0, as it occurs in the Irish context, is defined in Section 2.1.

Table 4 Assessment criteria at the individual-plot level for 91A0 woodlands.

	Assessment criterion	91A0 target for pass
1	Positive indicator species	At least 1 target species
		≥6 positive species, of which at least 2 must be bryophytes
2	Negative species cover	≤10% cover of plot
3	Negative species regeneration	Absent
4	Median canopy height	≥11 m
5	Total canopy cover	≥30% of plot
6	Proportion of target species in canopy	≥50% of canopy
7	Native shrub layer cover	10 – 75% of plot
8	Native dwarf shrub/field layer	≥20% of plot, height ≥20 cm
9	Bryophyte cover	≥4%
10	Grazing pressure	All 4 indicators absent

Table 5 Assessment criteria at the four-plot level for 91A0 woodlands.

	Criterion	Target for pass
1	Target species size class distribution	At least 1 of each size class present over all 4 plots
2	Target species regeneration	At least 1 sapling ≥2 m tall over all 4 plots
3	Other native tree regeneration	At least 1 sapling ≥2 m tall in 2 or more plots
4	Old trees and dead wood	At least 3 from any category (DBH ≥20 cm)

Table 6 Summary of conditions required for Structure and Functions (S&F) assessment results at the individual-plot, four-plot and polygon levels.

Level	No. of criteria assessed	Required for pass	Best result	Worst result
1-plot	10	Passes in ≥8 criteria	Four Passes	Four Fails
4-plot	4	Passes in ≥3 criteria	Pass	Fail
Polygon	Four 1-plot results + one 4-plot result	Various - see below	Green	Red

No. of 1-plot passes	4-plot result	Polygon S&F assessment result
4	Pass	Green
3	Pass	Amber
4	Fail	Amber
<3	Pass	Red
<4	Fail	Red

2.3.6 Pressures and threats: data collected

The Future Prospects assessment relates to the likely development and maintenance of the Annex I woodland habitat in Favourable condition for the foreseeable future. In order to assess Future Prospects, pressures, threats and impacts throughout the polygon were recorded according to the list given by Ssymank (2011). The following details were recorded for each impact: the intensity of the impact (high, medium or low), effect (positive, negative or neutral), percentage of the polygon affected, and source of the impact (from inside or outside the polygon). The data sheet for recording impacts is shown in Appendix II. Impacts in adjacent Annex I woodland were also noted to provide additional information on the Future Prospects of the Annex I habitat as a whole, particularly where these could impact negatively on the monitoring polygon in the future.

The surveyors' subjective assessment of the woodland polygon's Future Prospects was given according to the following guidelines:

- Green = excellent/good prospects; no significant impact from pressures/threats expected; long-term viability assured.
- Red = bad prospects; severe impact from pressures/threats expected; long-term viability not assured.
- Amber = between these two extremes.

These subjective assessments can be viewed in the Woodlands Monitoring Microsoft Access database that accompanies this report.

2.3.7 Future prospects: assessment

EU guidance states that the habitat's Future Prospects parameter "*should be evaluated by individually assessing the expected future trends and subsequently Future Prospects of each of the other three parameters* [Range, Area, and Structure and Functions], *taking primarily into account the current conservation status of the parameter, threats (related to the parameter assessed) and the conservation measures being taken or planned for the future. Once the*

Future Prospects of each of the other three parameters have been evaluated, they should be combined to give the overall assessment of Future Prospects" (DG Environment, 2017).

Future Prospects were assessed at the site level by evaluating the Future Prospects and future expected trend of Area and Structure and Functions at each site, and examining the current pressures, future threats and conservation measures operating on the habitat. Guidance provided by the EU (DG Environment 2017) was followed to determine the future trends and Future Prospects of each parameter. For the target Annex I woodland habitats to be assessed as having Favourable Future Prospects, their prospects had to be judged to be good, with no severe impacts expected from threats and the habitat expected to be stable or improving in the long term. For it to be assessed with Unfavourable-Bad Future Prospects, its prospects had to be judged to be bad, with severe impacts expected from threats and the habitat expected to decline or disappear in the long term. An assessment of Unfavourable-Inadequate Future Prospects was between these two extremes. To help evaluate Future Prospects according to the above guidance, the pressures, threats and positive activities occurring in each site were evaluated. The surveyors' subjective assessments of the Future Prospects of the habitat at the sites were also considered.

2.3.8 Overall condition assessment

The conservation condition assessment for the Annex I woodland habitat at each site was evaluated based on the results of all three parameters, according to the evaluation matrix in Table 2 and using the guidance provided by the EU (DG Environment, 2017). The criteria for all three parameters were combined and an overall conservation status for each site was evaluated.

2.4 Results

2.4.1 Area parameter

Table 7 gives a summary of the results of the Area assessment for the 63 91A0 polygons surveyed. All sites (100%) received a green assessment as no area loss was recorded.

Table 7 Summary of the Area assessment results for 91A0 polygons surveyed in 2017-2018.

Site no.	Site name	County	Area (ha) in 2018	Area lost since 2012	% Area loss per annum (6 years)	Area assessment
151	Bricketstown House	Wexford	8.8	0	0	Green
179	Clonogan Wood	Carlow	9.8	0	0	Green
180	Glandoran Upper/ Carthy's Wood	Wexford	6.8	0	0	Green
256	Coolnamony	Laois	5.1	0	0	Green
334	Garadice Lough	Leitrim	6.2	0	0	Green
338	Vale of Clara	Wicklow	7.8	0	0	Green
414	Derrygorry Wood	Monaghan	4.5	0	0	Green
498	Erne Head	Longford	10.0	0	0	Green
515	Kylecorragh	Kilkenny	6.2	0	0	Green
746	Baltynanima	Wicklow	9.6	0	0	Green
749	Tomnafinnoge	Wicklow	8.8	0	0	Green
777	Glen of the Downs	Wicklow	7.9	0	0	Green
779	Shelton North	Wicklow	5.1	0	0	Green
781	The Devil's Glen	Wicklow	8.9	0	0	Green
783	Deputy's Pass	Wicklow	7.0	0	0	Green
784	Oldboleys	Wicklow	10.2	0	0	Green
785	Castlekevin	Wicklow	5.8	0	0	Green
786	Giant's Cut	Wicklow	10.1	0	0	Green
791	Kilmacrea Wood	Wicklow	6.6	0	0	Green
1273	Uragh Wood	Kerry	9.8	0	0	Green
1277	Lyranes Lower Wood	Kerry	7.7	0	0	Green
1290	Derrycunihy Wood	Kerry	6.4	0	0	Green
1302	Prohus	Cork	9.6	0	0	Green
1305	Manch East	Cork	10.4	0	0	Green
1316	Glengarriff	Cork	6.3	0	0	Green
1323	Cleanderry Wood	Cork	10.4	0	0	Green
1355	Philip's Wood	Cork	8.1	0	0	Green
1401	Union Wood	Sligo	8.4	0	0	Green
1411	Slishwood	Sligo	6.5	0	0	Green
1422	Ballyarr Wood	Donegal	7.3	0	0	Green
1423	Mullangore Wood	Donegal	6.7	0	0	Green
1427	Ardnamona Wood	Donegal	5.3	0	0	Green
1441	Carndonagh	Donegal	5.2	0	0	Green
1459	Aghaneenagh	Cork	7.3	0	0	Green
1460	Kilmeen Wood	Cork	6.3	0	0	Green
1481	Ummera Wood	Cork	6.3	0	0	Green
1491	French Wood	Cork	9.2	0	0	Green
1495	Camillan Wood	Kerry	7.1	0	0	Green
1497	Bealkelly Woods	Clare	8.1	0	0	Green

Site no.	Site name	County	Area (ha) in 2018	Area lost since 2012	% Area loss per annum (6 years)	Area assessment
1498	Drummin Wood	Galway	8.6	0	0	Green
1515	Garannon Woods	Clare	7.4	0	0	Green
1543	Glenmore Wood	Waterford	9.5	0	0	Green
1552	Cahermurphy	Clare	9.4	0	0	Green
1580	Ballykelly Woods	Clare	6.9	0	0	Green
1587	Derrymore Wood	Clare	6.8	0	0	Green
1602	Ballynahinch	Galway	7.1	0	0	Green
1670	Stradbally Woods	Waterford	10.1	0	0	Green
1710	Ballintlea Wood	Limerick	7.0	0	0	Green
1712	Glanlough Woods	Kerry	7.1	0	0	Green
1737	Graigue's	Kerry	10.3	0	0	Green
1749	Dooneen Woods	Kerry	7.8	0	0	Green
1760	Brennan's Glen	Kerry	10.2	0	0	Green
1763	Pontoon Woods	Mayo	5.5	0	0	Green
1768	Barnarinia	Mayo	5.3	0	0	Green
1777	Brackloon Woods	Mayo	5.9	0	0	Green
1785	Treanlaur	Mayo	8.4	0	0	Green
1792	Glenbalyma	Kerry	5.1	0	0	Green
1821	Knocknaree	Waterford	8.0	0	0	Green
1827	Bohadoon South	Waterford	5.2	0	0	Green
1859	Grove Wood	Tipperary	7.6	0	0	Green
1878	Drum Wood	Tipperary	7.0	0	0	Green
2026	Shanacloon Wood	Cork	8.0	0	0	Green
2027	Eamonn's Wood	Kerry	6.8	0	0	Green

2.4.2 Structure and Functions

2.4.2.1 Polygon results

A summary of the results for Structure and Functions for the 63 91A0 polygons surveyed is given in Table 8. Twenty-three polygons (36.5%) received a green Structure and Functions assessment, fourteen (22.2%) received an amber assessment and 26 (41.3%) received a red assessment.

The above results take account of discretionary passes, which were allowed in a number of cases. One site, 1277 Lyranes Lower Wood, originally received an amber assessment at the polygon level due to the failure of one plot on three criteria, including the proportion of *Quercus* in the canopy criterion. However, as this criterion only marginally failed at 47% instead of ≥50%, a discretionary pass was allowed resulting in a green assessment. Similarly, site 1712 Glanlough Woods originally received a red assessment due to the failure of two plots. One of these plots failed on three criteria, including the proportion of *Quercus* in the canopy criterion. As this criterion only marginally failed at 47% instead of ≥50%, a discretionary pass was allowed resulting in an amber assessment at the polygon level.

Table 8 Summary of Structure and Functions (S&F) results at the individual-plot level, four-plot level and polygon level for the 63 91A0 polygons surveyed in 2017-2018.

			1-plot level	4-plot level	Polygon level S&F
Site no.	**Site name**	**County**	**No. of plots in site that passed**	**Result (Pass/Fail)**	**Green/Amber/Red**
151	Bricketstown House	Wexford	1	Pass	Red
179	Clonogan Wood	Carlow	3	Pass	Amber
180	Glandoran Upper/ Carthy's Wood	Wexford	3	Pass	Amber
256	Coolnamony	Laois	3	Pass	Amber
334	Garadice Lough	Leitrim	3	Pass	Amber
338	Vale of Clara	Wicklow	0	Fail	Red
414	Derrygorry Wood	Monaghan	1	Pass	Red
498	Erne Head	Longford	2	Fail	Red
515	Kylecorragh	Kilkenny	4	Pass	Green
746	Baltynanima	Wicklow	2	Pass	Red
749	Tomnafinnoge	Wicklow	2	Pass	Red
777	Glen of the Downs	Wicklow	3	Pass	Amber
779	Shelton North	Wicklow	0	Fail	Red
781	The Devil's Glen	Wicklow	3	Fail	Red
783	Deputy's Pass	Wicklow	4	Pass	Green
784	Oldboleys	Wicklow	3	Pass	Amber
785	Castlekevin	Wicklow	0	Fail	Red
786	Giant's Cut	Wicklow	3	Pass	Amber
791	Kilmacrea Wood	Wicklow	4	Pass	Green
1273	Uragh Wood	Kerry	4	Fail	Amber
1277	Lyranes Lower Wood	Kerry	4	Pass	Green
1290	Derrycunihy Wood	Kerry	2	Fail	Red
1302	Prohus	Cork	4	Pass	Green
1305	Manch East	Cork	1	Fail	Red
1316	Glengarriff	Cork	4	Pass	Green
1323	Cleanderry Wood	Cork	4	Pass	Green
1355	Philip's Wood	Cork	2	Pass	Red
1401	Union Wood	Sligo	2	Fail	Red
1411	Slishwood	Sligo	3	Pass	Amber
1422	Ballyarr Wood	Donegal	4	Pass	Green
1423	Mullangore Wood	Donegal	1	Pass	Red
1427	Ardnamona Wood	Donegal	4	Pass	Green
1441	Carndonagh	Donegal	2	Pass	Red
1459	Aghaneenagh	Cork	4	Pass	Green

			1-plot level	4-plot level	Polygon level S&F
Site no.	**Site name**	**County**	**No. of plots in site that passed**	**Result (Pass/Fail)**	**Green/Amber/Red**
1460	Kilmeen Wood	Cork	3	Pass	Amber
1481	Ummera Wood	Cork	2	Fail	Red
1491	French Wood	Cork	1	Fail	Red
1495	Camillan Wood	Kerry	4	Fail	Amber
1497	Bealkelly Woods	Clare	2	Pass	Red
1498	Drummin Wood	Galway	4	Pass	Green
1515	Garannon Woods	Clare	2	Fail	Red
1543	Glenmore Wood	Waterford	2	Fail	Red
1552	Cahermurphy	Clare	4	Pass	Green
1580	Ballykelly Woods	Clare	4	Pass	Green
1587	Derrymore Wood	Clare	4	Pass	Green
1602	Ballynahinch	Galway	4	Pass	Green
1670	Stradbally Woods	Waterford	0	Fail	Red
1710	Ballintlea Wood	Limerick	2	Pass	Red
1712	Glanlough Woods	Kerry	3	Pass	Amber
1737	Graigue's	Kerry	3	Pass	Amber
1749	Dooneen Woods	Kerry	4	Pass	Green
1760	Brennan's Glen	Kerry	4	Pass	Green
1763	Pontoon Woods	Mayo	4	Pass	Green
1768	Barnarinia	Mayo	4	Pass	Green
1777	Brackloon Woods	Mayo	4	Pass	Green
1785	Treanlaur	Mayo	0	Pass	Red
1792	Glenbalyma	Kerry	2	Pass	Red
1821	Knocknaree	Waterford	2	Pass	Red
1827	Bohadoon South	Waterford	4	Pass	Green
1859	Grove Wood	Tipperary	4	Fail	Amber
1878	Drum Wood	Tipperary	4	Pass	Green
2026	Shanacloon Wood	Cork	4	Pass	Green
2027	Eamonn's Wood	Kerry	3	Fail	Red

The Structure and Functions results from the previous and the current survey are compared in Table 9. Of the 57 91A0 sites monitored by both surveys, there was no change in the results at 30 sites (52.6%), there was an improvement in the results at 14 sites (24.6%), and a decline in the result at 13 sites (22.8%).

Table 9 Comparison of the Structure and Functions (S&F) results for the 2011-2012 and 2017-2018 91A0 woodland monitoring surveys. A dagger (†) after the SAC code indicates that 91A0 is a qualifying interest for the SAC.

Site no.	Site name	SAC code	S&F result 2011-12	S&F result 2017-18	Trend direction	Rationale
151	Bricketstown House		Red	Red	No change	
179	Clonogan Wood		Red	Amber	Improve	At individual-plot level, 3 plots passed in 2017-2018 compared to 2 in 2011-2012. Plot 4 failed 6 criteria in 2011-2012 and 1 in 2017-2018
180	Glandoran Upper/ Carthy's Wood	000781†	Red	Amber	Improve	Grazing pressure was recorded in 3 plots in 2011-2012 (not an issue in 2018)
256	Coolnamony	000412	Green	Amber	Decline	Mainly due to grazing pressure in all plots in 2017-2018, instead of 3 in 2011-2012
334	Garadice Lough		Red	Amber	Improve	Shrub layer cover and native field layer cover/height increased in some plots
338	Vale of Clara	000733†	Amber	Red	Decline	More plots contained negative sp. and had lower bryophyte cover
498	Erne Head		Red	Red	No change	
515	Kylecorragh	002162†	Red	Green	Improve	Fewer plots failed on bryophyte cover (low regardless in both monitoring periods) and negative sp.
746	Baltynanima	002122†	Amber	Red	Decline	At individual-plot level 1 extra plot failed in 2017-2018 due to negative sp. regeneration, low native shrub layer cover, and grazing pressure (only the latter was recorded from the plot in 2011-2012)
749	Tomnafinnoge	000781†	Red	Red	No change	
777	Glen of the Downs	000719†	Red	Amber	Improve	At individual-plot level, 3 plots passed in 2017-2018 compared to 2 in 2011-2012, *i.e.* plot 3 passed 8 criteria in 2017-2018 and 7 in 2011-2012
779	Shelton North		Amber	Red	Decline	More plots failed on bryophyte cover (marginal passes in 2011-2012), native shrub layer cover, dwarf shrub/field layer height and negative sp. regeneration
781	The Devil's Glen		Amber	Red	Decline	Failed at 4-plot level due to *Quercus* size class and *Quercus* regeneration. Only failed on the latter in 2011-

Site no.	Site name	SAC code	S&F result 2011-12	S&F result 2017-18	Trend direction	Rationale
						2012, resulting in a pass overall
784	Oldboleys		Green	Amber	Decline	One plot failed due to grazing pressure, negative sp. regeneration and shrub layer cover. Only the latter 2 criteria failed in 2011-2012, resulting in the plot passing overall
785	Castlekevin		Red	Red	No change	
786	Giant's Cut	002122†	Red	Amber	Improve	At individual-plot level, 3 plots passed in 2017-2018 compared to 2 in 2011-2012. Passed at 4-plot level in 2017-2018 as *Quercus* regeneration was recorded (absent in 2011-2012)
791	Kilmacrea Wood		Green	Green	No change	
1273	Uragh Wood	001342†	Green	Amber	Decline	Failed at 4-plot level on *Quercus* regeneration and native tree regeneration (these criteria passed in 2011-2012). A deer fence is present but grazing occurs in the wood
1277	Lyranes Lower Wood	000365†	Green	Green	No change	
1290	Derrycunihy Wood	000365†	Amber	Red	Decline	More plots had grazing pressure recorded in 2017-2018
1302	Prohus		Green	Green	No change	
1305	Manch East		Red	Red	No change	
1316	Glengarriff	000090†	Amber	Green	Improve	Passes at 4-plot level due to presence of *Quercus* regeneration (absent in 2011-2012)
1323	Cleanderry Wood	001043†	Green	Green	No change	
1355	Philip's Wood	002170†	Red	Red	No change	
1401	Union Wood	000638†	Green	Red	Decline	Increase in grazing pressure (not an issue in 2011-2012). Failed at 4-plot level in 2017-2018 due to *Quercus* size class and *Quercus* regeneration
1422	Ballyarr Wood	000116†	Green	Green	No change	

Site no.	Site name	SAC code	S&F result 2011-12	S&F result 2017-18	Trend direction	Rationale
1423	Mullangore Wood	002047†	Red	Red	No change	
1427	Ardnamona Wood	000163†	Green	Green	No change	
1441	Carndonagh		Amber	Red	Decline	Grazing (past and present) is impacting several criteria including the native shrub layer
1459	Aghaneenagh	002170†	Green	Green	No change	
1460	Kilmeen Wood		Amber	Amber	No change	
1481	Ummera Wood		Red	Red	No change	
1491	French Wood		Red	Red	No change	
1497	Bealkelly Woods		Green	Red	Decline	Grazing pressure in all plots (not recorded in 2011-2012). Two plots were moved in 2017-2018. This may explain some change in results. Native shrub layer cover was lower in the new plots but representative of the site overall
1498	Drummin Wood	002181†	Amber	Green	Improve	Plot 4 was moved to a more typical part of the site, resulting in 4 plots passing at individual-plot level
1515	Garannon Woods		Red	Red	No change	
1543	Glenmore Wood	002170†	Red	Red	No change	
1552	Cahermurphy		Red	Green	Improve	Less grazing pressure recorded and higher native shrub layer in plots
1580	Ballykelly Woods	000030†	Green	Green	No change	
1587	Derrymore Wood		Amber	Green	Improve	Passed all criteria at 4-plot level in 2017-2018. Failed on lack of small *Quercus* trees and *Quercus* regeneration in 2011-2012
1602	Ballynahinch		Red	Green	Improve	Plot locations differed in 2017-2018 as original grid reference was offset. This may explain some change in results. Negative sp. were an issue in 2017-2018 and 2011-2012
1670	Stradbally Woods		Red	Red	No change	

Site no.	Site name	SAC code	S&F result 2011-12	S&F result 2017-18	Trend direction	Rationale
1710	Ballintlea Wood		Red	Red	No change	
1712	Glanlough Woods		Amber	Amber	No change	
1737	Graigue's	000365†	Green	Amber	Decline	Overgrazing was recorded
1749	Dooneen Woods		Green	Green	No change	
1760	Brennan's Glen	000343	Green	Green	No change	
1763	Pontoon Woods	002298†	Green	Green	No change	
1768	Barnarinia		Amber	Green	Improve	Plot locations differed in 2017-2018 as original grid reference was offset. This may explain some change in results. One plot failed at individual-plot level in 2011-2012, none failed in 2017-2018
1777	Brackloon Woods	000471†	Amber	Green	Improve	Fewer plots failed on native shrub layer cover and grazing pressure
1785	Treanlaur	000534	Red	Red	No change	
1792	Glenbalyma		Red	Red	No change	
1821	Knocknaree	000668†	Amber	Red	Decline	Increase in *Rhododendron ponticum*. In 1 plot, negative sp. cover rose from 3-15%. Low shrub layer cover was an issue in 2011-2012 and 2017-2018
1827	Bohadoon South		Green	Green	No change	
1859	Grove Wood		Red	Amber	Improve	All plots passed at individual-plot level in 2017-2018, compared to 1 in 2011-2012. Failed criteria in 2011-2012 include negative sp. cover and native shrub layer cover (these passed in 2017-2018)
1878	Drum Wood		Green	Green	No change	

2.4.2.2 Area in good condition

The area of 91A0 habitat in ‘good’ and ‘not-good’ condition for the 63 polygons surveyed is presented in Table 10. The overall area of 91A0 habitat surveyed in ‘good’ and ‘not-good’ condition is presented in Table 11. Of the 478.6 ha surveyed, 334.3 ha (69.8%) was assessed as ‘good’ condition and 144.4 ha (30.2%) was assessed as ‘not-good’ condition.

Table 10 Area of 91A0 habitat in 'good' and 'not-good' condition in 2017-2018.

Site no.	Site name	Total no. passes (max.= 5)	Total no. fails (max.= 5)	% no. passes	% no. fails	Total area (ha)	Area in good condition (ha)	Area in not-good condition (ha)
151	Bricketstown House	2	3	40	60	8.8	3.5	5.3
179	Clonogan Wood	4	1	80	20	9.8	7.9	2.0
180	Glandoran Upper/ Carthy's Wood	4	1	80	20	6.8	5.4	1.4
256	Coolnamony	4	1	80	20	5.1	4.0	1.0
334	Garadice Lough	4	1	80	20	6.2	5.0	1.2
338	Vale of Clara	0	5	0	100	7.8	0.0	7.8
414	Derrygorry Wood	2	3	40	60	4.5	1.8	2.7
498	Erne Head	2	3	40	60	10.0	4.0	6.0
515	Kylecorragh	5	0	100	0	6.2	6.2	0.0
746	Baltynanima	3	2	60	40	9.6	5.8	3.8
749	Tomnafinnoge	3	2	60	40	8.8	5.3	3.5
777	Glen of the Downs	4	1	80	20	7.9	6.3	1.6
779	Shelton North	0	5	0	100	5.1	0.0	5.1
781	The Devil's Glen	3	2	60	40	8.9	5.3	3.6
783	Deputy's Pass	5	0	100	0	7.0	7.0	0.0
784	Oldboleys	4	1	80	20	10.2	8.2	2.0
785	Castlekevin	0	5	0	100	5.8	0.0	5.8
786	Giant's Cut	4	1	80	20	10.1	8.1	2.0
791	Kilmacrea Wood	5	0	100	0	6.6	6.6	0.0
1273	Uragh Wood	4	1	80	20	9.8	7.8	2.0
1277	Lyranes Lower Wood	5	0	100	0	7.7	7.7	0.0
1290	Derrycunihy Wood	2	3	40	60	6.4	2.6	3.9
1302	Prohus	5	0	100	0	9.6	9.6	0.0
1305	Manch East	1	4	20	80	10.4	2.1	8.4
1316	Glengarriff	5	0	100	0	6.3	6.3	0.0
1323	Cleanderry Wood	5	0	100	0	10.4	10.4	0.0
1355	Philip's Wood	3	2	60	40	8.1	4.9	3.3

Site no.	Site name	Total no. passes (max.= 5)	Total no. fails (max.= 5)	% no. passes	% no. fails	Total area (ha)	Area in good condition (ha)	Area in not-good condition (ha)
1401	Union Wood	2	3	40	60	8.4	3.4	5.0
1411	Slishwood	4	1	80	20	6.5	5.2	1.3
1422	Ballyarr Wood	5	0	100	0	7.3	7.3	0.0
1423	Mullangore Wood	2	3	40	60	6.7	2.7	4.0
1427	Ardnamona Wood	5	0	100	0	5.3	5.3	0.0
1441	Carndonagh	3	2	60	40	5.2	3.1	2.1
1459	Aghaneenagh	5	0	100	0	7.3	7.3	0.0
1460	Kilmeen Wood	4	1	80	20	6.3	5.1	1.3
1481	Ummera Wood	2	3	40	60	6.3	2.5	3.8
1491	French Wood	1	4	20	80	9.2	1.8	7.3
1495	Camillan Wood	4	1	80	20	7.1	5.7	1.4
1497	Bealkelly Woods	3	2	60	40	8.1	4.9	3.2
1498	Drummin Wood	5	0	100	0	8.6	8.6	0.0
1515	Garannon Woods	2	3	40	60	7.4	3.0	4.4
1543	Glenmore Wood	2	3	40	60	9.5	3.8	5.7
1552	Cahermurphy	5	0	100	0	9.4	9.4	0.0
1580	Ballykelly Woods	5	0	100	0	6.9	6.9	0.0
1587	Derrymore Wood	5	0	100	0	6.8	6.8	0.0
1602	Ballynahinch	5	0	100	0	7.1	7.1	0.0
1670	Stradbally Woods	0	5	0	100	10.1	0.0	10.1
1710	Ballintlea Wood	3	2	60	40	7.0	4.2	2.8
1712	Glanlough Woods	4	1	80	20	7.1	5.7	1.4
1737	Graigue's	4	1	80	20	10.3	8.2	2.1
1749	Dooneen Woods	5	0	100	0	7.8	7.8	0.0
1760	Brennan's Glen	5	0	100	0	10.2	10.2	0.0
1763	Pontoon Woods	5	0	100	0	5.5	5.5	0.0
1768	Barnarinia	5	0	100	0	5.3	5.3	0.0
1777	Brackloon Woods	5	0	100	0	5.9	5.9	0.0

Site no.	Site name	Total no. passes (max.= 5)	Total no. fails (max.= 5)	% no. passes	% no. fails	Total area (ha)	Area in good condition (ha)	Area in not-good condition (ha)
1785	Treanlaur	1	4	20	80	8.4	1.7	6.7
1792	Glenbalyma	3	2	60	40	5.1	3.1	2.0
1821	Knocknaree	3	2	60	40	8.0	4.8	3.2
1827	Bohadoon South	5	0	100	0	5.2	5.2	0.0
1859	Grove Wood	4	1	80	20	7.6	6.1	1.5
1878	Drum Wood	5	0	100	0	7.0	7.0	0.0
2026	Shanacloon Wood	5	0	100	0	8.0	8.0	0.0
2027	Eamonn's Wood	3	2	60	40	6.8	4.1	2.7
	Total					**478.6**	**334.3**	**144.4**

Table 11 Total area of 91A0 habitat in 'good' and 'not-good' condition in 2017-2018.

Condition	Total area (ha)	Percentage (%) of area surveyed
'good'	334.3	69.8
'not-good'	144.4	30.2
Total	**478.6**	**100**

2.4.2.3 Criteria results

Table 12 summarises the pass rates for the individual monitoring criteria measured in 2017-2018 at the 63 91A0 sites.

Individual-plot structural criteria

The 63 sites had >95% pass rates for median canopy height and total canopy cover. Slightly lower pass rates (80-90%) were achieved for positive indicator species, proportion of target species in canopy, native dwarf shrub/field layer cover and height, and bryophyte cover criteria. Failure rates were high for negative species cover (29%), native shrub layer cover (27%) and grazing pressure (27%). The highest failure rate was for negative species regeneration, present in 54% of monitoring plots.

Four-plot structural criteria

At the four-plot level, high pass rates were achieved for other native tree regeneration (94%) and old trees and dead wood (98%). Almost a third of plots failed the *Quercus* size class distribution criterion (32% failure rate), most failures (17 of 20) being caused by a lack of trees in the smallest size class (7-<20 cm). The highest failure rate was for *Quercus* regeneration, absent in 56% of monitoring plots.

Table 12 Pass and failure rates for individual Structure and Functions monitoring criteria at the individual-plot and four-plot levels for the 63 91A0 sites surveyed in 2017-2018. The number of discretionary passes allowed is also presented.

Table 12 Pass and failure rates for individual Structure and Functions monitoring criteria at the individual-plot and four-plot levels for the 63 91A0 sites surveyed in 2017-2018. The number of discretionary passes allowed is also presented.

	% Pass	% Fail	No. of discretionary passes
Individual-plot level criteria			
Positive indicator species: ≥2 indicator bryophytes	89	11	-
Positive indicator species: overall	88	12	-
Negative species cover	71	29	-
Negative species regeneration	46	54	-
Median canopy height	98	2	-
Total canopy cover	100	0	-
Proportion of target species in canopy	87	13	2
Native shrub layer cover	73	27	-
Native dwarf shrub/field layer cover and height	89	11	-
Bryophyte cover	82	18	-
Grazing pressure absent	73	27	-
Overall pass (individual-plot level)	70	30	
Four-plot level criteria			
Target species size class distribution	68	32	-
Target species regeneration	44	56	-
Other native tree regeneration	94	6	-
Old trees and dead wood	98	2	-
Overall pass (four-plot level)	73	27	

Target tree species DBH data

The distribution of oak tree girths in three size classes at the 91A0 sites is presented in Figure 3. This shows polygons with high numbers of small *Quercus* trees (DBH 7-<20 cm) at the left of the graph, and those with low numbers of small *Quercus* trees at the right. From this graph it can be seen that there is an overall increase in the frequency of large oak trees (DBH ≥40 cm) as the frequency of smaller trees decreases. High numbers of smaller trees often signify younger stands, so this is not unexpected. However, this is not always the case, for example if coppicing has taken place, or if trees are stressed due to poor growing conditions. No or very low numbers of smaller trees can signify overgrazing.

In 32 of the sites (53%), more *Quercus* trees were recorded in the medium (DBH 20-<40 cm) size class than in either of the other two size classes. In 22 sites (36%), the highest frequency

of trees was in the large size class, and in seven sites (12%) the highest frequency of trees was in the small size class. This is displayed in Figure 4. This chart does not include the two instances where there were an equal numbers of medium and large trees.

Looking at the size distribution of the 2,499 *Quercus* trees measured across all 63 sites, the medium size class had the highest number of trees, with 1,158 trunks measured (46%); the large size class was next, with 737 trees (30%), and the lowest frequency was attained by the small size class at 604 trees (24%). This is displayed in Figure 5. Note that the same size class intervals were used for upland and lowland polygons for the chart and percentage calculations.

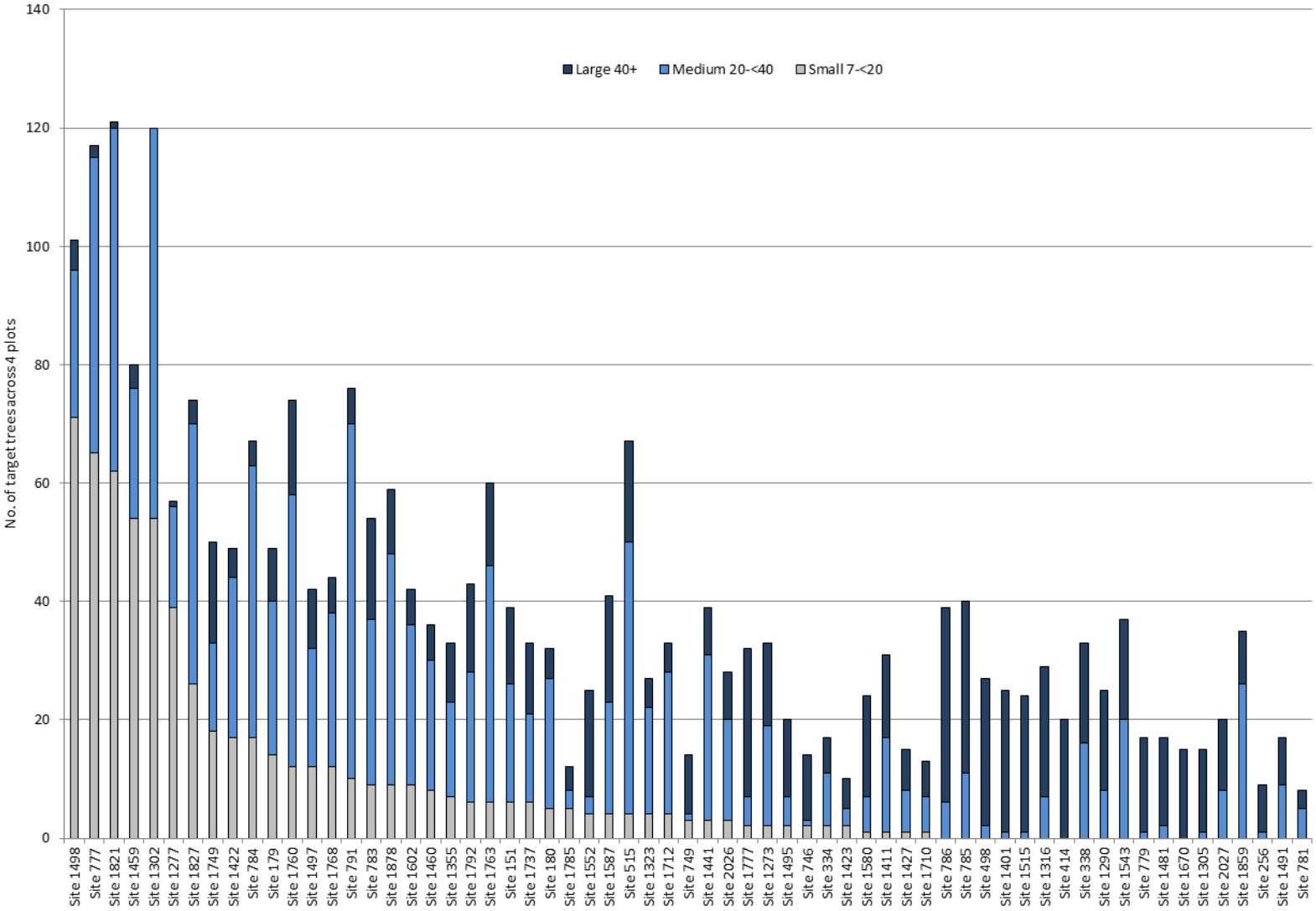

Figure 3 Distribution of *Quercus* tree DBH in three size classes at the 63 91A0 sites.

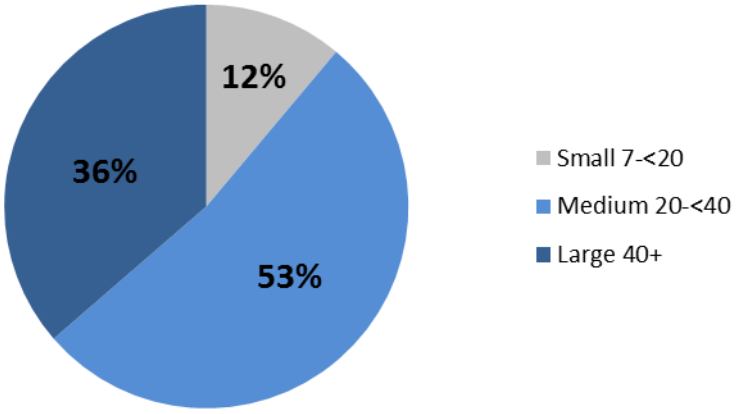

Figure 4 Proportion of the 91A0 sites with the highest number of *Quercus* trees in various size classes.

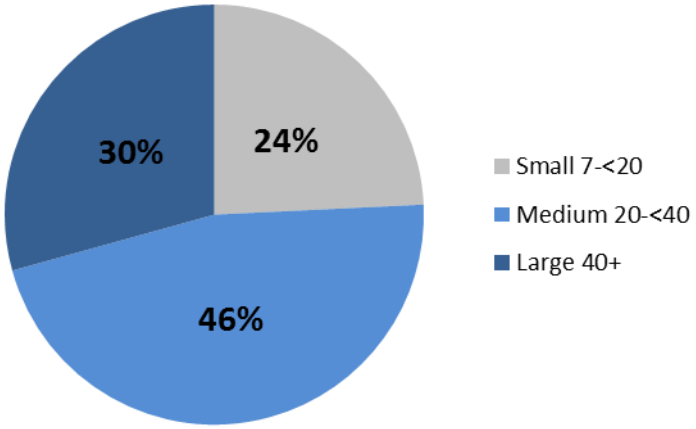

Figure 5 Proportion of *Quercus* trees measured in three size classes across all 63 91A0 sites.

Negative species: Most frequent negative taxa

The most commonly recorded negative taxa recorded in the plots are shown in Table 13. In total, ten taxa of trees and eight taxa of shrubs/herbs were recorded. *Fagus sylvatica* and *Acer pseudoplatanus* were the most frequently recorded non-native species present at 55.6% and 42.9% of sites respectively. *Abies* spp. (*A. alba* and *A. procera*) was the third most common non-native taxon (19% of sites), followed by *Picea* spp. (*P. abies* and *P. sitchensis*) (17.5% of sites). Non-native shrubs in 91A0 were mostly represented by *Rhododendron ponticum* (30.2% of sites) and *Prunus laurocerasus* (6.3% of sites).

Table 13 Negative taxa recorded in the plots at the 91A0 sites surveyed in 2017-2018.

Trees	Frequency in 91A0 sites (*n*=63)	Shrubs	Frequency in 91A0 sites (*n*=63)
Fagus sylvatica	35	*Rhododendron ponticum*	19
Acer pseudoplatanus	27	*Prunus laurocerasus*	4
Abies spp.	12	*Gaultheria mucronata*	1
Picea spp.	11	*Lonicera nitida*	1
Pseudotsuga menziesii	5	*Griselinia littoralis*	1
Tsuga sp.	3	*Camellia* sp.	1
Chamaecyparis lawsoniana	2	*Fallopia japonica*	1
Castanea sativa	2	*Ribes nigrum*	1
Larix spp.	2		
Aesculus hippocastanum	1		

Negative species: Cover and regeneration

As noted in Table 12, failure rates were high for negative species cover (*i.e*. over the 10% threshold) and negative species regeneration, with 29% and 54% of 91A0 plots failing respectively. Of the 136 plots that failed based on the presence of negative species regeneration, 74 (54%) only contained negative tree regeneration (with no negative shrub regeneration), 36 (27%) only contained negative shrub regeneration (with no negative tree regeneration), with 26 (19%) containing both negative tree and negative shrub regeneration.

Table 14 shows total regeneration statistics for negative tree species within the 91A0 plots. Only species of which more than one sapling (*i.e*. regeneration measuring 2 m or more in height) was recorded within the dataset are listed. The total number of regenerating units, *i.e.* seedlings and saplings, was highest for *Fagus sylvatica* with 365 young plants recorded. *Fagus sylvatica* regeneration was also recorded in more sites, with seedlings and saplings of that species recorded in 19.0% and 16.3% of 91A0 plots, respectively. Negative tree seedling numbers were sometimes extremely high within individual plots, with 200 *Abies alba* seedlings found in a single plot at site 1602 Ballynahinch. Of more concern, though, is the survival rate of seedlings to saplings. In site 1481 Ummera Wood, 48 saplings of *Acer pseudoplatanus* were recorded in a single plot, while 26 *Fagus sylvatica* saplings were recorded from a plot in 414 Derrygorry Wood.

Table 14 Negative tree species regeneration recorded in two height classes in 91A0 plots.

	Abies spp.		*Acer pseudo-platanus*		*Castanea sativa*		*Fagus sylvatica*		*Picea* spp.		*Pseudotsuga menziesii*		*Tsuga* spp.	
Height	<2 m	≥2 m	<2 m	≥2 m	<2 m	≥2 m	<2 m	≥2 m	<2 m	≥2 m	<2 m	≥2 m	<2 m	≥2 m
Total no.	285	11	154	117	1	3	256	109	30	6	7	11	2	1
No. of plots	18	4	29	15	1	2	48	41	14	3	4	4	2	1
Median	3	3	2	4	1	1.5	2	1	2	1	2	3	1	1
Max. in 1 plot	200	4	22	48	1	2	26	26	6	4	2	4	1	1
Frequency (*n*=252 plots)	7.1	1.6	11.5	6.0	0.4	0.8	19.0	16.3	5.6	1.2	1.6	1.6	0.8	0.4

Rubus fruticosus: Cover and height

Table 15 summarises *Rubus fruticosus* cover and height data for the 247 plots that had this parameter recorded. The majority of the plots had 1-<20% cover. However, higher covers were achieved with eleven plots containing 60-<80% cover and seven plots containing 80-100% cover. The maximum median height was often high *i.e*. 150 cm. This is less of a concern in plots with a lower cover score, as tall patches of *R. fruticosus* frequently occur in natural light gaps on the woodland floor. However, high covers of tall *R. fruticosus* across a site indicates an imbalance in the ecosystem that can be attributed to factors such as grazing levels and/or altered light levels. For example, the field layer at site 1515 Garannon Woods was dominated by *R. fruticosus,* with one plot achieving 95% cover and a median height of 120 cm. The prolific growth of this species at the site can be attributed to undergrazing. However, elevated light levels are also contributing, as structurally the site is dominated by widely-spaced old *Quercus* trees with a relatively sparse understory. The dominance of *R. fruticosus* at this site is impacting on the presence of positive 91A0 indicator species and the cover of bryophytes.

Table 15 Summary of *Rubus fruticosus* cover and heights within plots.

Cover range	No. of plots	Max. median height in one plot (cm)	Min. median height in one plot (cm)
0%	41	0	0
1-<20%	148	130	1
20-<40%	33	150	30
40-<60%	7	80	70
60-<80%	11	120	50
80-100%	7	150	60
Total	**247**	**150**	**0**

2.4.3 Pressures, threats and other activities

Prior to evaluating the Future Prospects parameter, the negative and positive impacts recorded for the 91A0 sites were examined. These are shown in Tables 16 and 17 respectively, together with the intensity (high, medium or low), percentage of the habitat affected, and frequency for each of the activities. Neutral impacts are shown in Table 18. Neutral impacts were not considered when assessing the Future Prospects parameter.

2.4.3.1 Negative impacts

Negative impacts were recorded from all 63 91A0 sites. I01 Invasive non-native species was the most frequently recorded negative impact, occurring at 59 of the 63 sites (94%). It was recorded as high intensity at 14 sites and affected >75% of the habitat at 14 sites.

B06 Grazing in forests/woodland was the second most frequently recorded negative impact, occurring at 30 of the 63 sites (48%). It was recorded as high intensity at 12 sites and affected >75% of the habitat at 29 sites. The primary grazer responsible for overgrazing was deer but overgrazing by livestock was also recorded, with sheep at three sites, cattle at two sites, and a horse at one site.

H05.01 Garbage and solid waste was recorded at 15 sites (24%). It was recorded as low intensity at all sites and only ever affected ≤1% of the habitat.

I02 Problematic native species were recorded at eight sites (13%). It was primarily recorded as a medium-intensity impact. It affected >75% of the habitat at two sites. The main problematic native species was *Rubus fruticosus*, with *Pteridium aquilinum* also recorded.

D01.01 Paths, tracks, cycling tracks negatively impacted five sites (8%). The negative influence of this impact was mainly related to the creation of new paths within woodlands and/or the widening of existing tracks.

L07 Storm, cyclone negatively impacted five sites (8%). It is likely this impact was under-recorded, as the Southern region – the region hit hardest by the severe storms of 2017-2018 including Hurricane Ophelia – was mostly surveyed prior to these storms. One exception was 2026 Shanacloon Wood in Co. Cork, which was surveyed in 2018 and was highly impacted by recent storms, with several trees down within and along the edge of the woodland. This had opened up a significant portion of the canopy.

Other negative impacts comprise B02.02 Forestry clearance (three sites), B02.03 Removal of forest undergrowth (two sites), G01.02 Walking, horse riding and non-motorised vehicles (two sites), G01.03.02 Off-road motorized driving (two sites), J01.01 Burning down *i.e*. signs of fire (two sites), A10.01 Removal of hedges and copses or scrub (two sites), B02.04 Removal of dead and dying trees (one site), D01.02 Roads, motorways (one site) and K04.03 Introduction of disease (microbial pathogens) *i.e*. the suspected presence of Ash Dieback disease (one site).

Table 16 Summary of the negative impacts recorded in the 63 91A0 sites surveyed in 2017-2018.

		Intensity			**% habitat affected**			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
I01	Invasive non-native species	14	23	22	36	9	14	59
B06	Grazing in forests/ woodland	12	13	5		1	29	30
H05.01	Garbage and solid waste			15	15			15
I02	Problematic native species	1	5	2	4	2	2	8
D01.01	Paths, tracks, cycling tracks	2	1	2	5			5
L07	Storm, cyclone	2	2	1	5			5
B02.02	Forestry clearance	1		2	3			3
B02.03	Removal of forest undergrowth			2	1	1		2
G01.02	Walking, horse riding and non-motorised vehicles		2		2			2
G01.03.02	Off-road motorized driving		1	1	2			2
J01.01	Burning down		1	1	2			2
A10.01	Removal of hedges and copses or scrub		1	1	2			2
B02.04	Removal of dead and dying trees			1	1			1
D01.02	Roads, motorways	1			1			1
K04.03	Introduction of disease (microbial pathogens)			1	1			1
	Totals	**33**	**49**	**56**	**80**	**13**	**45**	

2.4.3.2 Positive impacts

Positive impacts were recorded from 27 91A0 sites (43%). The most frequently recorded positive impact, at nine sites, was G05.09 Fences to exclude grazers. This includes both deer fences (four sites) and agricultural fences to exclude livestock (five sites). B06 Grazing in forests/woodland was positively impacting six sites. The majority of these sites were extensively grazed by deer, with one site extensively grazed by a horse. Positive impacts relating to the control of non-native invasive species at the sites comprise: B02.03 Removal of forest undergrowth (five sites), B04 Use of biocides, hormones and chemicals (forestry) (three sites), B02.06 Thinning of tree layer (two sites) and F03.01 Hunting (one site). Native tree planting within or adjacent to the sites was recorded under the impact codes B02.01.01 Forest replanting (native trees) (five sites) and B01.01 Forest planting on open ground (native trees) (one site).

Table 17 Summary of the positive impacts recorded in the 63 91A0 sites surveyed in 2017-2018.

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
G05.09	Fences	1	3	5	8	1		9
B06	Grazing in forests/ woodland		2	4	1		5	6
B02.03	Removal of forest undergrowth		1	4	5			5
B02.01.01	Forest replanting (native trees)	1	1	3	5			5
B04	Use of biocides, hormones and chemicals (forestry)			3	3			3
B02.06	Thinning of tree layer	1		1	1	1		2
B01.01	Forest planting on open ground (native trees)		1		1			1
F03.01	Hunting			1			1	1
	Totals	**3**	**8**	**21**	**24**	**2**	**6**	

2.4.3.3 Neutral impacts

Neutral impacts were recorded from 50 91A0 sites (79%). The most frequent neutral impact was D01.01 paths, tracks, cycling tracks recorded at 35 sites. Other common neutral impacts comprise B06 Grazing in forests/ woodland (ten sites), G05.09 Fences (eight sites), D01.02 Roads, motorways (five sites) and F03.01 Hunting (five sites).

Table 18 Summary of the neutral impacts recorded in the 63 91A0 sites surveyed in 2017-2018.

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25%**	**26-75%**	**>75%**	**No. of sites**
D01.01	Paths, tracks, cycling tracks	1	5	29	35			35
B06	Grazing in forests/ woodland		2	8	1		9	10
G05.09	Fences		1	7	7		1	8
D01.02	Roads, motorways		1	4	5			5
F03.01	Hunting		1	4	1		4	5
B02.03	Removal of forest undergrowth		1	2	2	1		3
B02.06	Thinning of tree layer			3	3			3
G01.02	Walking, horse riding and non-motorised vehicles	1		2	3			3
H05.01	Garbage and solid waste			3	3			3
J02.07	Water abstractions from groundwater		1	2	3			3
L07	Storm, cyclone		2	1	3			3
F06.01	Game/ bird breeding station			3	3			3
G01.08	Other outdoor sports and leisure activities		1	1	1		1	2
I01	Invasive non-native species			2	2			2
B02.02	Forestry clearance	1			1			1
D01.03	Car parks and parking areas			1	1			1
D01.06	Tunnel	1			1			1
D02.01.01	Suspended electricity and phone lines			1	1			1
G01	Outdoor sports and leisure activities, recreational activities			1	1			1
G01.03.02	Off-road motorized driving			1	1			1
I02	Problematic native species			1	1			1
L05	Collapse of terrain, landslide	1			1			1
	Totals	**5**	**15**	**76**	**80**	**1**	**15**	

2.4.4 Future Prospects

The Future Prospects assessments for the 63 91A0 sites surveyed are shown in Table 19. The effects of negative and positive activities were considered in the context of each site's Area and Structure and Functions assessment to make an overall Future Prospects assessment for each site. Future Prospects over the next 12 years (two reporting periods) were assessed. A total of 18 sites (28.6%) received a green Future Prospects assessment, 19 sites (30.2%) received an amber assessment and 26 sites (41.3%) received a red assessment.

Table 19 Summary of the Future Prospects (FP) of the 63 91A0 sites surveyed in 2017-2018.

Site no.	Site name	FP of Area	FP of S&F	FP of habitat	Rationale
151	Bricketstown House	Green	Red	Red	Negative impacts of invasive non-native trees and shrubs
179	Clonogan Wood	Green	Amber	Amber	Negative impacts of invasive non-native shrubs and deer grazing
180	Glandoran Upper/ Carthy's Wood	Green	Amber	Amber	Negative impacts of invasive non-native trees and shrubs
256	Coolnamony	Green	Amber	Amber	Negative impact of overgrazing by deer
334	Garadice Lough	Green	Amber	Amber	Negative impacts of invasive non-native trees
338	Vale of Clara	Green	Red	Red	Negative impacts of invasive non-native trees and overgrazing by deer
414	Derrygorry Wood	Green	Red	Red	Negative impacts of the invasive non-native *Fagus sylvatica* and overgrazing by deer, planting of native woodland adjacent
498	Erne Head	Green	Red	Red	Negative impacts of invasive non-natives (*Fagus sylvatica*, *Prunus laurocerasus*) and problematic native spp.
515	Kylecorragh	Green	Green	Green	No significant negative impacts recorded
746	Baltynanima	Green	Red	Red	Negative impacts of invasive non-native trees and shrubs
749	Tomnafinnoge	Green	Red	Red	Negative impacts of overgrazing by deer and invasive non-natives *(Fagus sylvatica, Rhododendron ponticum)*
777	Glen of the Downs	Green	Amber	Amber	Negative impacts of invasive non-native trees and shrubs
779	Shelton North	Green	Red	Red	Negative impacts of overgrazing by deer and invasive non-native trees and shrubs
781	The Devil's Glen	Green	Red	Red	Negative impacts of overgrazing by deer and invasive non-native trees and shrubs
783	Deputy's Pass	Green	Green	Green	No significant negative impacts recorded
784	Oldboleys	Green	Amber	Amber	Negative impact of overgrazing by deer, some *Quercus* planting has occurred within woodland and some deer control measures are in place
785	Castlekevin	Green	Red	Red	Negative impacts of overgrazing by deer and invasive non-native trees and shrubs

Site no.	Site name	FP of Area	FP of S&F	FP of habitat	Rationale
786	Giant's Cut	Green	Amber	Amber	Negative impact of overgrazing by deer
791	Kilmacrea Wood	Green	Green	Green	No significant negative impacts recorded
1273	Uragh Wood	Green	Amber	Amber	Negative impact of overgrazing by deer and *Pteridium aquilinum*
1277	Lyranes Lower Wood	Green	Green	Green	No significant negative impacts recorded, past *Rhododendron ponticum* control
1290	Derrycunihy Wood	Green	Red	Red	Negative impacts of overgrazing by deer, control of invasive non-native shrubs recorded
1302	Prohus	Green	Green	Green	No significant negative impacts recorded
1305	Manch East	Green	Red	Red	Negative impacts of invasive non-native trees and shrubs and problematic native spp.
1316	Glengarriff	Green	Green	Green	Invasive non-natives were regenerating freely, continued control needed in this state-owned Nature Reserve
1323	Cleanderry Wood	Green	Green	Green	No significant negative impacts recorded
1355	Philip's Wood	Green	Red	Red	Negative impacts of invasive non-native trees and the shrub *Rhododendron ponticum*
1401	Union Wood	Green	Red	Red	Negative impacts of overgrazing by deer, invasive non-native trees, and problematic native spp. A fence is present but grazing noted inside
1411	Slishwood	Green	Amber	Amber	Negative impact of overgrazing by deer and invasive non-native shrub *Rhododendron ponticum,* deer fence around small area in the south
1422	Ballyarr Wood	Green	Green	Green	No significant negative impacts recorded
1423	Mullangore Wood	Green	Red	Red	Negative impacts of overgrazing by deer and invasive non-native shrubs
1427	Ardnamona Wood	Green	Green	Green	No significant negative impacts recorded
1441	Carndonagh	Green	Red	Red	Negative impacts of overgrazing
1459	Aghaneenagh	Green	Green	Green	No significant negative impacts recorded
1460	Kilmeen Wood	Green	Amber	Amber	Negative impact of invasive non-native trees

Site no.	Site name	FP of Area	FP of S&F	FP of habitat	Rationale
1481	Ummera Wood	Green	Red	Red	Negative impacts of invasive non-native trees and shrubs, planting of *Quercus* trees
1491	French Wood	Green	Red	Red	Negative impacts of invasive non-native trees and shrubs, some conifers felled
1495	Camillan Wood	Green	Amber	Amber	Negative impact of overgrazing by deer, control of *Rhododendron ponticum* taking place
1497	Bealkelly Woods	Green	Red	Red	Negative impact of overgrazing by deer and horses
1498	Drummin Wood	Green	Green	Green	No significant negative impacts recorded
1515	Garannon Woods	Green	Red	Red	Negative impacts of invasive non-native trees and problematic native spp.
1543	Glenmore Wood	Green	Red	Red	Negative impacts of invasive non-native trees and shrubs
1552	Cahermurphy	Green	Amber	Amber	Negative impact of overgrazing by deer
1580	Ballykelly Woods	Green	Green	Green	No significant negative impacts recorded
1587	Derrymore Wood	Green	Green	Green	No significant negative impacts recorded
1602	Ballynahinch	Green	Amber	Amber	Negative impacts of invasive non-native shrubs and trees, presence of Ash Dieback
1670	Stradbally Woods	Green	Red	Red	Negative impacts of invasive non-native trees and shrubs, fence excludes deer from wood
1710	Ballintlea Wood	Green	Red	Red	Negative impacts of invasive non-native trees and shrubs
1712	Glanlough Woods	Green	Amber	Amber	Negative impacts of invasive non-native trees and shrubs
1737	Graigue's	Green	Amber	Amber	Negative impact of overgrazing by deer
1749	Dooneen Woods	Green	Green	Green	No significant negative impacts recorded
1760	Brennan's Glen	Green	Green	Green	No significant negative impacts recorded
1763	Pontoon Woods	Green	Amber	Amber	Negative impacts of invasive non-native shrub *Rhododendron ponticum*
1768	Barnarinia	Green	Amber	Amber	Negative impact of overgrazing by sheep
1777	Brackloon Woods	Green	Amber	Amber	Negative impacts of invasive non-native shrub *Rhododendron*

Site no.	Site name	FP of Area	FP of S&F	FP of habitat	Rationale
					ponticum, extensive regrowth despite past clearance
1785	Treanlaur	Green	Red	Red	Negative impacts of invasive non-native shrub *Rhododendron ponticum*
1792	Glenbalyma	Green	Red	Red	Negative impacts of invasive non-native trees
1821	Knocknaree	Green	Red	Red	Negative impacts of invasive non-native shrub *Rhododendron ponticum*
1827	Bohadoon South	Green	Green	Green	No significant negative impacts recorded
1859	Grove Wood	Green	Amber	Amber	Negative impact of overgrazing by deer, invasive non-native trees and shrubs, and problematic native spp.
1878	Drum Wood	Green	Green	Green	No significant negative impacts recorded
2026	Shanacloon Wood	Green	Green	Green	No significant negative impacts recorded
2027	Eamonn's Wood	Green	Red	Red	Negative impact of overgrazing by deer, invasive non-native shrub control recorded

2.4.5 Overall condition assessment

2.4.5.1 Polygon result

Table 20 shows the overall condition assessments for the 63 91A0 sites surveyed in 2017-2018, derived by combining the assessment results of Area, Structure and Functions and Future Prospects for each polygon. A total of 18 sites (28.6%) achieved a green assessment (Favourable), 19 (30.2%) received an amber assessment (Unfavourable – Inadequate) and 26 (41.3%) received a red assessment (Unfavourable – Bad) (Figure 6).

Table 20 Overall condition assessments for the 63 91A0 sites surveyed in 2017-2018. A dagger (†) after the SAC code indicates that 91A0 is a qualifying interest for the SAC.

Site no.	Site name	Area	S&F	FP	Overall Conservation Status	SAC
151	Bricketstown House	Green	Red	Red	Red	
179	Clonogan Wood	Green	Amber	Amber	Amber	
180	Glandoran Upper/ Carthy's Wood	Green	Amber	Amber	Amber	000781†
256	Coolnamony	Green	Amber	Amber	Amber	000412
334	Garadice Lough	Green	Amber	Amber	Amber	
338	Vale of Clara	Green	Red	Red	Red	000733†
414	Derrygorry Wood	Green	Red	Red	Red	
498	Erne Head	Green	Red	Red	Red	
515	Kylecorragh	Green	Green	Green	Green	002162†
746	Baltynanima	Green	Red	Red	Red	002122†
749	Tomnafinnoge	Green	Red	Red	Red	000781†
777	Glen of the Downs	Green	Amber	Amber	Amber	000719†
779	Shelton North	Green	Red	Red	Red	
781	The Devil's Glen	Green	Red	Red	Red	
783	Deputy's Pass	Green	Green	Green	Green	000717†
784	Oldboleys	Green	Amber	Amber	Amber	
785	Castlekevin	Green	Red	Red	Red	
786	Giant's Cut	Green	Amber	Amber	Amber	002122†
791	Kilmacrea Wood	Green	Green	Green	Green	
1273	Uragh Wood	Green	Amber	Amber	Amber	001342†
1277	Lyranes Lower Wood	Green	Green	Green	Green	000365†
1290	Derrycunihy Wood	Green	Red	Red	Red	000365†
1302	Prohus	Green	Green	Green	Green	
1305	Manch East	Green	Red	Red	Red	
1316	Glengarriff	Green	Green	Green	Green	000090†
1323	Cleanderry Wood	Green	Green	Green	Green	001043†
1355	Philip's Wood	Green	Red	Red	Red	002170†
1401	Union Wood	Green	Red	Red	Red	000638†
1411	Slishwood	Green	Amber	Amber	Amber	001976†
1422	Ballyarr Wood	Green	Green	Green	Green	000116†
1423	Mullangore Wood	Green	Red	Red	Red	002047†
1427	Ardnamona Wood	Green	Green	Green	Green	000163†
1441	Carndonagh	Green	Red	Red	Red	
1459	Aghaneenagh	Green	Green	Green	Green	002170†
1460	Kilmeen Wood	Green	Amber	Amber	Amber	
1481	Ummera Wood	Green	Red	Red	Red	
1491	French Wood	Green	Red	Red	Red	
1495	Camillan Wood	Green	Amber	Amber	Amber	000365†
1497	Bealkelly Woods	Green	Red	Red	Red	
1498	Drummin Wood	Green	Green	Green	Green	002181†

Site no.	Site name	Area	S&F	FP	Overall Conservation Status	SAC
1515	Garannon Woods	Green	Red	Red	Red	
1543	Glenmore Wood	Green	Red	Red	Red	002170†
1552	Cahermurphy	Green	Green	Amber	Amber	
1580	Ballykelly Woods	Green	Green	Green	Green	000030†
1587	Derrymore Wood	Green	Green	Green	Green	
1602	Ballynahinch	Green	Green	Amber	Amber	
1670	Stradbally Woods	Green	Red	Red	Red	
1710	Ballintlea Wood	Green	Red	Red	Red	
1712	Glanlough Woods	Green	Amber	Amber	Amber	
1737	Graigue's	Green	Amber	Amber	Amber	000365†
1749	Dooneen Woods	Green	Green	Green	Green	
1760	Brennan's Glen	Green	Green	Green	Green	000343
1763	Pontoon Woods	Green	Green	Amber	Amber	002298†
1768	Barnarinia	Green	Green	Amber	Amber	
1777	Brackloon Woods	Green	Green	Amber	Amber	000471†
1785	Treanlaur	Green	Red	Red	Red	000534
1792	Glenbalyma	Green	Red	Red	Red	
1821	Knocknaree	Green	Red	Red	Red	000668†
1827	Bohadoon South	Green	Green	Green	Green	
1859	Grove Wood	Green	Amber	Amber	Amber	
1878	Drum Wood	Green	Green	Green	Green	
2026	Shanacloon Wood	Green	Green	Green	Green	
2027	Eamonn's Wood	Green	Red	Red	Red	000365†

Overall condition assessment results were examined in the context of whether or not the sites were within an SAC. Of the 18 sites that achieved a green assessment, 11 (61.1%) are within an SAC. Habitat 91A0 is a qualifying interest in 10 of these. Of the 19 sites that received an amber assessment, 10 (52.6%) are within an SAC. Habitat 91A0 is a qualifying interest in nine of these. Of the 26 sites that received a red assessment, 11 (42.3%) are within an SAC, and 91A0 is a qualifying interest in 10 of these.

Figure 7 and Figure 8 respectively display the proportion of polygons within the SAC network and the proportion of polygons outside the SAC network that received overall conservation assessments of green, amber and red. Of the 32 sites within SACs, 34.4% received a green assessment, 31.3% received an amber assessment and 34.4% received a red assessment. Of the 31 sites outside the SAC network, 22.6% received a green assessment, 29.0% received an amber assessment and 48.4% received a red assessment.

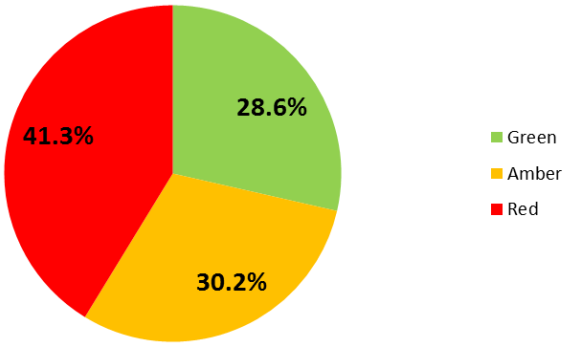

Figure 6 Proportion of polygons with overall assessments of green, amber and red for 63 91A0 woodlands surveyed in 2017-2018.

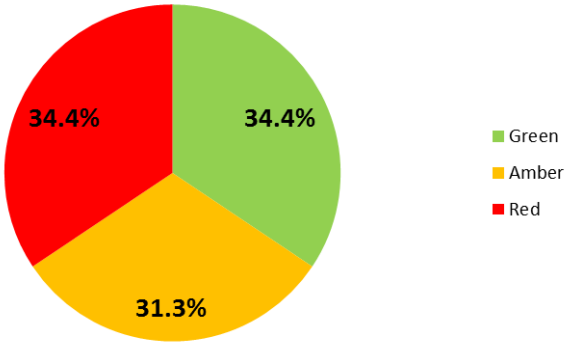

Figure 7 Proportion of polygons with overall assessments of green, amber and red for the 32 91A0 woodlands that are within the SAC network.

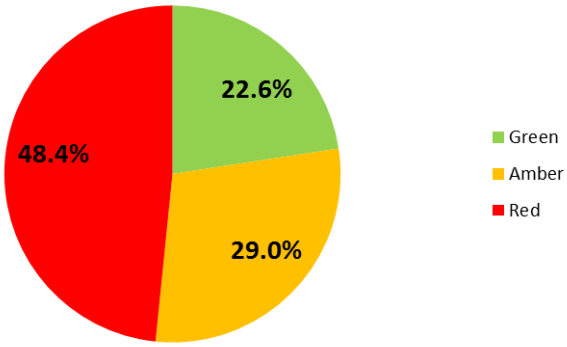

Figure 8 Proportion of polygons with overall assessments of green, amber and red for the 31 91A0 woodlands that are outside the SAC network.

2.4.5.2 National result

Using the results of the monitoring survey and external sources listed in the National Conservation Assessment (NCA) (NPWS, 2019), the Annex I woodland 91A0 received an overall national assessment of Unfavourable-Bad based on the information provided in Table 21.

Table 21 National Conservation Assessment (NCA) for the Annex I habitat 91A0. Adapted from NPWS (2019).

Parameter	Justification for assessment	National Assessment
Range	Stable, no loss recorded; equal to Favourable Reference Range.	**Favourable**
Area	Decreasing, anthropogenic loss of 4.2 ha detected during the 2007-2012 reporting period using Devaney *et al.* (2017); current area is more than 10% below the Favourable Reference Area.	**Unfavourable-Bad**
Structure & Functions	Stable, no evidence of decline in condition since the last monitoring survey; more than 25% of habitat is in Unfavourable condition.	**Unfavourable-Bad**
Future Prospects	Pressures and threats including non-native invasive species and overgrazing are causing deterioration in habitat quality.	**Unfavourable-Bad**
Overall NCA	Combining individual parameter results according to the evaluation matrix in Table 2.	**Unfavourable-Bad**
Trend	Overall trend in Conservation Status	**Deteriorating**

2.5 Discussion

The National Conservation Assessment (NCA) of Unfavourable-Bad for the Annex I woodland 91A0 (NPWS, 2019) remains unchanged since the previous Article 17 report (NPWS, 2013).

Within this NCA, the Area parameter is Unfavourable-Bad with a decreasing trend. This is attributed to anthropogenic loss of this habitat, including losses from within the Natura 2000 network, as outlined in the NCA report (NPWS, 2019). Anthropogenic activities that resulted in the loss of this Annex I habitat include road widening, quarrying, agricultural grassland conversion, golf course development and construction (NPWS, 2019). Any loss of this Annex I habitat and its associated ecosystem function is detrimental, given that this resource is already highly fragmented, with the current area already considered insufficient to ensure long-term viability of the habitat (*i.e*. more than 10% below the Favourable Reference Area). Planting initiatives such as the People's Millennium Forest and the Native Woodland Establishment Scheme (DAFM, 2015a) are vital in the conservation of this habitat. Once planted, these sites take 100+ years to develop the typical character and functionality of this Annex I habitat (Anon, 2016). Therefore, while newly established sessile oak woods cannot yet be classed as gains in Annex I habitat area, they represent future gains if managed appropriately. This reinforces the need to protect the existing resource from further habitat loss and degradation.

The Structure and Functions parameter was assessed as Unfavourable-Bad with a stable trend. The most frequent criteria to fail the assessment at the individual-plot level were negative species regeneration, negative species cover (*i.e*. above the 10% threshold), grazing pressure and native shrub layer cover. At the four-plot level, the most frequent criteria to fail were lack of *Quercus* saplings and lack of small *Quercus* trees. For most criteria, the pass and failure rates were broadly similar to those reported by the Woodland Monitoring Survey 2011-2012. One exception was the *Quercus* regeneration criterion, with 39% of sites failing this criterion in 2011-2012 compared to 54% failing during the current survey. Since there was no corresponding increase in the number of sites failing on other native tree regeneration and/or a simultaneous increase in plots failing on grazing pressure since 2011-2012, this increased failure rate cannot be attributed to overgrazing. This fluctuation is most likely linked to a mast year event and subsequent sapling mortality.

Nineteen sites failed the target size class distribution criterion due to lack of small *Quercus* trees. More worryingly, several sites that lacked small *Quercus* also had low frequencies of medium *Quercus* trees, with two sites, 414 Derrygorry Wood and 1670 Stradbally Woods, only containing mature *Quercus*. The main reasons for these failures are overgrazing and/or

competition with non-natives. Over time, the reproductive viability of an ageing stand also decreases. The future viability of woodlands that fail to reproduce *Quercus* is not assured unless underlying pressures are addressed. There is no evidence of problems with the regeneration of other native species within 91A0, with non-target native trees appearing to regenerate well, even in the absence of *Quercus* regeneration. Only four sites failed this criterion, 785 Castlekevin in Co Wicklow, and 1273 Uragh Wood, 1290 Derrycunihy Wood and 1495 Camillan Wood in Co Kerry, all of which are subject to heavy deer grazing. Pass rates for dead wood were high, with only one site, 1323 Cleanderry Wood, failing this criterion.

At the site level, an improvement or deterioration in the Structure and Functions assessments since the Woodland Monitoring Survey 2011-2012 could often be attributed to a single positive or negative impact. For example, a reduction in grazing at Site 180 Glandoran Upper/Carthy's Wood resulted in an improved Structure and Functions assessment in 2017-2018 (*e.g*. fewer plots failing native dwarf shrub/field layer cover and height, and grazing pressure). Conversely, heavy grazing resulted in a decline in the assessment result at sites 256 Coolnamony, 1401 Union Wood, 1441 Carndonagh, 1497 Bealkelly Woods and 1737 Graigue's. Notable increases in the invasive non-native shrub *Rhododendron ponticum* were recorded from sites 1821 Knocknaree and 785 Castlekevin. This resulted in a decline in the assessment for 1821 Knocknaree; there was no change in the assessment of site 785 Castlekevin, as the previous assessment was already red. This is a reminder that without effective management strategies, the Structure and Functions of compromised Annex I habitats will continue to decline. Conversely, effective management of negative impacts can improve the Structure and Functions assessment result, even within one monitoring cycle. However, structural criteria such as native shrub layer and *Quercus* size class distribution can take several monitoring cycles to ameliorate.

The Future Prospects parameter was assessed as Unfavourable-Bad, primarily due to the negative impacts of invasive non-native species (94% of sites) and overgrazing (48% of sites). The most frequent non-natives are *Fagus sylvatica, Acer pseudoplatanus, Rhododendron ponticum* and conifers (*Abies* spp., *Picea* spp.). Although grazing is a natural feature of this habitat, heavy grazing limits regeneration, resulting in a low native shrub layer cover. Chronic overgrazing produces a uniform stand of large old trees. This can be seen in Killarney National Park at sites 1290 Derrycunihy Wood and 2027 Eamonn's Wood.

Climate change presents an additional threat to this Annex I habitat. The Met Éireann Climate Model for 2021-2060 predicts a 15% increase in the frequency of intense cyclones over the north Atlantic in the vicinity of Ireland (McGrath *et al.,* 2005). Severe storms can cause extensive tree fall, as recorded at 2026 Shanacloon Wood in 2018, and has the potential to exacerbate existing negative impacts such as invasive non-native species (replacing fallen canopy trees), problematic native species and woodland clearance events. During the current survey, a fire negatively impacted the habitat at site 1411 Slishwood. The threat of fire has the potential to increase, especially for sites surrounded by commercial forestry.

Improving the conservation status of this Annex I habitat is highly dependent on active conservation measures by public and private landowners. Conservation measures were recorded from 22 91A0 monitoring sites (excluding the five sites extensively grazed by deer). Of these, seven were NPWS-managed, four were within Coillte Biodiversity Areas and eleven were privately owned. Conservation measures recorded include the presence of fences to exclude grazers, including both deer fences and agricultural fences to exclude livestock (nine sites), invasive species control (seven sites), native tree planting (six sites), selective conifer removal (two sites), extensive horse grazing (one site), and sika deer control (one site). No conservation measures were recorded from 41 sites (65.1% of the monitoring sites).

Positive restoration initiatives include the Charter of Commitment to the People’s Millennium Forests. This is a pledge by Coillte to continue to maintain and conserve the 12 People’s Millennium Forest sites in its ownership, the majority of which support 91A0 woodland and/or young sessile oak woods (Coillte, 2018). In 2019, Coillte commenced writing management plans for their biodiversity areas, with the aim of enhancing the natural habitat types on their

estate. Additionally, under the Forestry Programme 2014-2022, there was an ambitious target to restore 1,950 ha of native woodland through the Native Woodland Conservation Scheme and to plant 2,700 ha of new native woodland through the Native Woodland Establishment Scheme (DAFM, 2015a, 2015b). Conservation measures supported under these Native Woodland Schemes include native tree planting within existing woodland, woodland establishment on former clear-fell and/or greenfield sites, deer control and invasive non-native species control. These schemes are available to both the public and private sectors.

Another relevant initiative was the launch of The Irish Deer Management Forum in 2015. This group set out a series of management actions in the document *Deer Management in Ireland: A Framework for Action*. The aim of this Framework was to manage deer responsibly in order to minimise their impact on agriculture, woodlands and other conservation habitats (Annett, 2015). Its aim was to use a cross-sectoral approach to deliver a deer management structure that suited spatial requirements, conformed to best practice and complied with existing policy.

2.6 Conclusions and recommendations

- The total mapped area for 91A0 habitat as reported in the National Conservation Assessment document is 59.97 km^2. The 63 monitoring sites cover 4.79 km^2 (8% of the national resource). This is considered to be a representative sample.
- There are still unmapped areas of 91A0 habitat. These stands need to be identified and mapped. If a large number of new sites were identified, consideration should then be given to extending the monitoring network with under-represented counties given priority for inclusion.
- The majority of the mapped 91A0 habitat was identified by the National Survey of Native Woodlands 2003-2007 (NSNW) (Perrin *et al.,* 2008). However, site selection for the NSNW excluded woodlands that fell below minimum thresholds (*i.e*. below 1 ha in area or less than 40 m in width, or less than 20 m in the case of woodland along lakeshores or riverbanks). As a result, smaller, very narrow and/or fragmented blocks of woodland were excluded. Also, only a subset of sites above the minimum threshold was surveyed due to the practical constraints of the project. This survey had a much broader remit than identifying areas of Annex I habitat.
- The impacts identified in this report must be addressed if progress is to be made in attaining Favourable status. The main negative impacts on 91A0 are invasive non-native species and overgrazing.
- Improving the conservation status of this Annex I woodland is highly dependent on active conservation measures by both public and private landowners. Furthermore, preventing further habitat loss of this Annex I habitat to anthropogenic activities is imperative.
- An active national strategy to achieve sustainable deer grazing levels is urgently required. Co-ordinated local and/or regional deer management groups have an important role to play, especially in deer hotspots. Individual land managers can undertake site-level passive deer control by fencing (*e.g*. wire-and-post, movable A-frame, dead-hedging) and/or planting with tree shelters.
- At European level, there are several threats to *Quercus petraea* in the form of pathogens and pests (Eaton *et al.,* 2016), with several of these already confirmed in the UK, most notably Acute Oak Decline (AOD) and the Oak Processionary Moth (OPM, *Thaumetopoea processionea*) (Quine *et al.,* 2019). Improved biosecurity measures are required to prevent new pests and diseases from entering Ireland, with the 'Plant Health Biosecurity Strategy 2020-2025' by the Department of Agriculture, Food and the Marine an important step in this regard (DAFM, 2019).
- No upper cover/height limit was set for *Rubus fruticosus* during the current survey. This species can proliferate under a range of conditions (*e.g*. undergrazing, increased light

levels and/or the presence of deer fence). The presence of vigorous *R. fruticosus* growth is captured by existing criteria comprising a reduction in positive indicator species, low canopy cover, low native shrub layer and/or fails in the *Quercus* size class distribution. Placing an upper limit on the height of the dwarf shrub/field layer would penalise sites with large numbers of tall seedlings (≤2 m). Future monitoring surveys should continue to record the cover and height of *R. fruticosus* within plots, as it will provide valuable data to assess how these plots develop over time. However, it is not proposed for this to become an assessment criterion.

3 91E0 Alluvial forests

3.1 Interpretation of 91E0 habitat for this survey

91E0 Alluvial forests is a priority Annex I habitat. A number of variants of this woodland habitat exist. The interpretation manual of EU habitats (CEC, 2013) states that all types occur on heavy soils which are periodically inundated by the annual rise of water levels. The herbaceous layer includes many large species such as *Filipendula ulmaria*, *Angelica sylvestris* and *Carex acutiformis*, vernal species such as *Ficaria verna* and *Anemone nemorosa*, and other indicative species are also listed, such as *Carex remota*, *Lycopus europaeus*, *Urtica dioica* and *Geum rivale*.

Riparian forests of *Fraxinus excelsior* and *Alnus glutinosa* (Alno-Padion) of temperate and Boreal Europe lowland and hill watercourses are the most common type to be found in Ireland. They occur within the hydrological system of a river, stream (fast or slow-flowing) or lake. In most cases, they are periodically inundated by flooding but some examples are spring-fed or flush-fed (CEC, 2013; Rodwell & Dring, 2001). The Annex I habitat 7220 Petrifying springs is classed separately.

In addition, gallery forests of tall willows (Salicion albae) occur alongside river channels and occasionally on river islands, where the tree roots are almost continuously submerged, and are also referable to 91E0. These very distinctive woodlands are dominated by *Salix triandra, S.* x *fragilis, S. alba* and *S. viminalis*, sometimes with *S. cinerea*, but *Alnus glutinosa* is relatively rare. There is a luxuriant herb layer of species such as *Phalaris arundinacea*, *Urtica dioica* and *Filipendula ulmaria*.

Alluvial woodland is widespread but localised in Ireland and consists in many cases of small, often rather low-growing fragments and strips. It may occur in mosaic with other woodland types, but the more fragmented examples may be hemmed in by agricultural land. Flooding may occur frequently (annually or more often) or infrequently (at intervals of several years) but the inundation will nonetheless determine the vegetation. The interpretation manual of EU habitats (CEC, 2013) states that all types of 91E0 are periodically flooded but otherwise well-drained and aerated during low water. However, this is not always the case in the wet climate of Ireland, and particularly where the woodland contains springs and flushes or is crossed by small streams.

A functioning alluvial forest with a good structure is a multi-layered system, although the individual layers may be less distinct than in oak woods. The typical canopy species are *Salix* spp., *Fraxinus excelsior* and *Alnus glutinosa*, one or more of which should make up the greater proportion of the canopy. *Betula* spp. and *Crataegus monogyna* are frequently found, with other tree species such as *Quercus robur, Corylus avellana* and *Ulmus glabra* occurring in drier examples of the habitat. Native tree species should dominate, although an exception is made for gallery woodlands in which non-native species of *Salix*, such as *S. fragilis* or *S. alba*, may be frequent. Alluvial woodlands should have a good complement of dead wood, including coarse and fine, standing and fallen dead wood, to accommodate the greatest possible range of invertebrates and other saproxylic organisms. The general structure of the 91E0 habitat is presented in Figure 9.

While the Structure and Functions of the 91E0 habitat may be in Unfavourable condition at some sites (*e.g*. due to a low number of indicator species, moderate cover of non-native invasive species, lack of regeneration, *etc*. See Section 3.3.5), the habitat is still assigned Annex I status.

While a single line of trees cannot be assigned 91E0 status, a contiguous strip of trees which is at least 4 m wide at the base constitutes woodland habitat (Fossitt, 2000) and may be assigned 91E0 status, provided that it conforms to the criteria above regarding species composition and hydrological conditions. Where they occur in mosaic with another woodland type, discontinuous strips and fragments may be classified as 91E0, as they form part of a

larger, functioning woodland. Strips which are short, narrow and discontinuous and surrounded by open habitat should not be assigned to 91E0, if they cannot be considered to be functioning woodlands. However, they may have potential for restoration, where woodland establishment can be implemented to improve habitat connectivity.

The Irish Vegetation Classification (IVC) (Perrin, 2016) primarily places 91E0 habitat within the WL3 *Alnus glutinosa – Filipendula ulmaria* group. All vegetation communities in this group have an affinity to the Annex I habitat comprising WL3A *Fraxinus excelsior – Galium palustre* woodland (37.3% affinity), WL3B *Alnus glutinosa – Ranunculus repens* woodland (54.3% affinity), WL3C *Fraxinus excelsior – Iris pseudacorus* woodland (53.7% affinity), WL3D *Salix cinerea – Urtica dioica* woodland (57.6% affinity), WL3E *Salix cinerea – Galium palustre* woodland (28.1% affinity) and WL3F *Salix cinerea – Phalaris arundinacea* woodland (58.5% affinity). Where a vegetation type is assigned to the WL3 group and conforms to the criteria above regarding hydrological conditions, it should be classified as 91E0.

It should be noted that woodland adjacent to waterbodies, even if it does not conform to 91E0, may provide "fringing habitat" or "riparian habitat" for EU protected aquatic habitats and species (*e.g.* 3110 Oligotrophic lakes, 3260 Vegetation of flowing waters, 1029 Freshwater Pearl Mussel). In SACs for which these aquatic habitats and species are listed as qualifying interests, the area and condition of the woodland habitat may be included as attributes in the Conservation Objectives of the SAC.

Groundwater-fed examples of the 91E0 habitat are categorised as Groundwater-dependent Terrestrial Ecosystems (GWDTEs) under the Irish interpretation of the Water Framework Directive (WFD). Objectives under the WFD include the requirement that anthropogenic pressures on groundwater bodies shall not result in any significant damage to GWDTEs (Kilroy *et al.,* 2008).

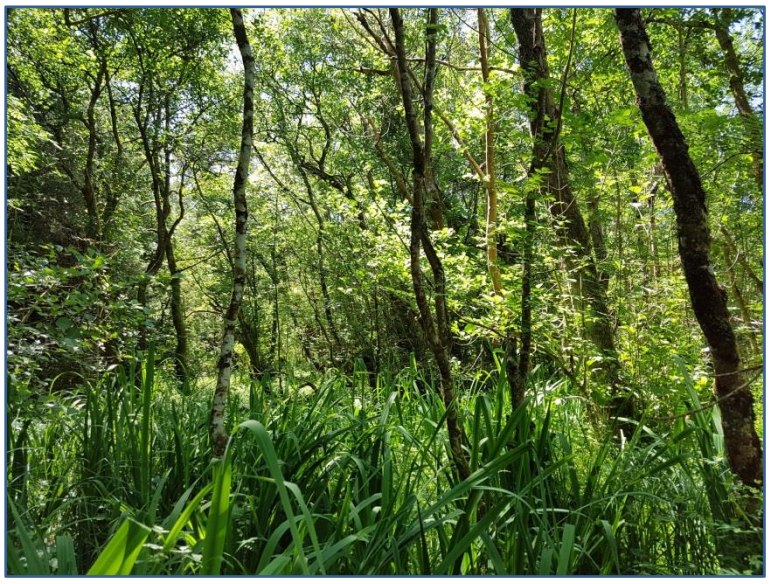

Figure 9 91E0 habitat at Cuscarrick, Co. Galway. Photograph © NPWS. Taken by Orla Daly.

3.2 Review of baseline methodology

- O'Neill & Barron (2013) suggested a need to impose an upper limit on the cover and/or height of the field layer to capture over-vigorous growth within the plots. For this reason, data were collated on the vigorous native species *Rubus fruticosus* and *Urtica dioica*. When all the field data were collated and analysed, an upper limit on the cover of *U. dioica* was set at <75% cover. This constitutes a new assessment criterion at the individual-plot level.
- O'Neill & Barron (2013) noted that recent bark stripping was the only indicator of overgrazing recorded in some sites, which otherwise passed such criteria as target

species regeneration. They recommended only recording severe bark stripping as an overgrazing indicator. Since severe bark stripping can leave a permanent scar on the trunks of trees, the updated methodology only records severe recent bark stripping.

3.3 Methodology

3.3.1 Polygon selection

For most sites, the polygons from the baseline monitoring survey were used. The process whereby these polygons were selected and defined is detailed in O'Neill & Barron (2013). However, based on recommendations from O'Neill & Barron (2013), two 91E0 sites were removed from the monitoring programme in 2017-2018 as they did not conform to the Annex I woodland type (948 Rahin Wood and 1800 Prospect). Alternative sites were selected and substituted prior to the field season (1024 Moone Woodlands and 1410 Tanrego). Polygon selection for these new sites was carried out using the same process as in the previous monitoring survey, with indicative monitoring plot locations marked on the field maps prior to field survey. These stops were repositioned as necessary by the surveyors in the field, bearing in mind the recommendations of O'Neill & Barron (2013) for plot placement.

3.3.2 Field survey and monitoring plots

Survey work was carried out between 24th May and 8th September 2017 and between 9th May and 2nd August 2018. Locations of the surveyed 91E0 polygons are shown in Figure 10.

The 20 m x 20 m monitoring plots were recorded in the same locations as the previous monitoring survey (or as close as local conditions allowed), using the recorded grid references in conjunction with other plot information provided, thus permitting a comparison to be made between monitoring periods. Slope and aspect were recorded and a photograph of the plot was taken.

3.3.3 Area assessment

The Area parameter was assessed in the field, taking note of any recent losses in the monitoring polygon evident during the survey. Any area losses were marked on the field maps and then mapped digitally in the office. Area loss was calculated as a percentage of the original (pre-loss) area as follows:

(Current area / (Current area + area lost)) x 100

This was divided by the number of years since the site was surveyed in the baseline monitoring survey to derive the equivalent annual percentage loss in area as required for assessing Conservation Status (Table 2).

3.3.4 Structure and Functions: data collected

The methodology followed during the previous woodland monitoring survey was also used for the current survey (O'Neill & Barron, 2013), except that the changes noted in section 3.2 were implemented. Data sheets are reproduced in Appendix I. Within each plot, the following Structure and Functions data were recorded:

Species

- Presence of positive indicator species. Table 22 lists the indicator species for 91E0 woodlands.
- Presence of negative indicator species (*i.e.* any non-native species, including herbaceous species).

- Total cover of *Rubus fruticosus* as percentage of plot.
- Median height in centimetres of *R. fruticosus* in plot.
- Total cover of *Urtica dioica* as percentage of plot.

Woodland structure

- Median canopy height in metres. Tree height was measured using a clinometer.
- Total canopy cover as percentage of plot.
- Total percentage of target species in canopy.
- Total cover of negative species as percentage of plot.
- Total native shrub layer cover as percentage of plot. Shrub layer was defined as shrub vegetation 2 - 4 metres in height.
- Total native dwarf shrub/field layer cover as percentage of plot.
- Median height in centimetres of native dwarf shrub/field layer.
- Total bryophyte layer cover as percentage of plot.

Cover scores were recorded as a percentage of the plot area to the nearest 5%, or to the nearest 1% if less than 5%. A cover score of <1% was also permitted.

Table 22 List of positive indicator species for 91E0 woodlands.

91E0
Target species:
Alnus glutinosa
Fraxinus excelsior
Salix cinerea
Salix spp.
Other woody species:
Betula pubescens
Crataegus monogyna
Solanum dulcamara
Viburnum opulus
Herbs, Ferns & Graminoids:
Agrostis stolonifera
Angelica sylvestris
Carex remota
Filipendula ulmaria
Galium palustre
Iris pseudacorus
Lycopus europaeus
Mentha aquatica
Phalaris arundinacea
Ranunculus repens
Rumex sanguineus
Urtica dioica
Mosses:
Calliergonella cuspidata
Climacium dendroides
Thamnobryum alopecurum

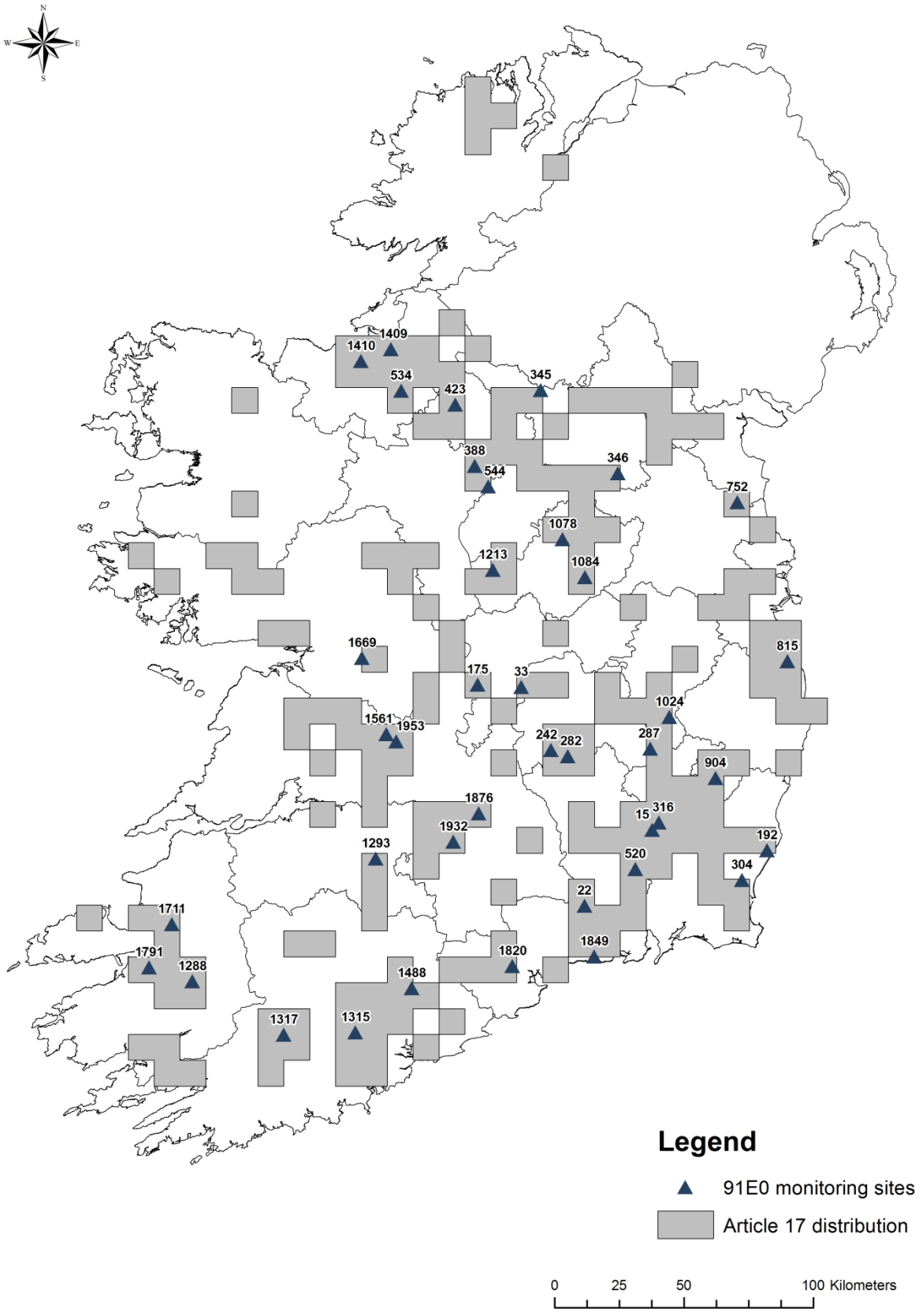

Figure 10 Location of the 40 91E0 monitoring sites. The 10 km distribution of 91E0 habitat in the Republic of Ireland (NPWS, 2019) is also displayed.

Grazing pressure

Grazing pressure (*i.e*. overgrazing) was recorded based on the presence of the following indicators: topiary effect on shrubs and young trees, browse line on mature trees, abundant dung, severe recent bark stripping, and trampling.

Free regeneration

Free regeneration refers to regeneration that appears to have originated from seed. When counting free regeneration, only separate regenerating units were counted, *i.e*. several shoots arising from a single root were regarded as a single regenerating unit.

- Number of saplings of each target species.
- Number of saplings of each non-target native tree species.
- Number of seedlings of each negative tree species.
- Number of saplings of each negative tree species.
- Presence of free regeneration of negative shrub species such as *Rhododendron ponticum* and herbaceous invasive species such as *Impatiens glandulifera*, regardless of height.

Basal regeneration

Basal regeneration from *Salix* spp. was recorded if it was ≥2 m tall and arose from a totally collapsed/prostrate *Salix* sp. trunk of ≥7 cm diameter within 1.3 m of the root plate. Two size classes were used to record this regeneration: <7 cm DBH and ≥7 cm DBH. Such basal regeneration was recorded to get an indication of the occurrence of the vegetative spread of *Salix* spp.

Basal shoots ≥2 m tall arising from vertical (non-prostrate) target species trunks with a DBH of ≥7 cm were not counted unless the tree was completely dead at breast height, *i.e*. 1.3 m above the ground, in which case the whole unit was counted as a single regenerating unit.

Tree girth (target tree species only)

- DBH of target trees was tallied within three size classes: size class 1 = 7-<20 cm; size class 2 = 20-<30 cm; size class 3 = ≥30 cm.
- For multi-stemmed trees, only the largest trunk was counted and assigned to the appropriate DBH size class. The occurrence of large numbers of multi-stemmed trees, or trees with very numerous stems, was noted.
- Trees with forked trunks were measured below the fork if forking occurred more than 1 m up from the base.

Dead wood

Dead wood with a diameter of at least 20 cm was recorded in four categories: old senescent trees (dead limbs or other signs of damage present), standing dead, fallen dead (including large, fallen branches) and rotten stumps (cut/broken trunks of 1 m or less, excluding stumps with basal shoots). Dead wood was recorded regardless of whether the tree was a target, non-target native or non-native species.

3.3.5 Structure and Functions: assessment

Assessments were made at the individual-plot and four-plot levels, and these were combined to give an assessment at the polygon level. The criteria assessed for 91E0 woodland are shown in Table 23 (individual-plot level criteria) and Table 24 (four-plot level criteria). Of the

eleven criteria assessed at the individual-plot level, nine had to reach their target to achieve a pass. Of the four criteria assessed at the four-plot level, three had to reach their target to achieve a pass. For the overall polygon level assessment, a green (Favourable) assessment result could be achieved only if all plots passed at the individual-plot level and at the four-plot level (*i.e*. five passes achieved). One failure out of the five was allowed for a polygon to receive an amber (Unfavourable – Inadequate) assessment. More than one failure resulted in a red (Unfavourable – Bad) assessment. This process is summarised in Table 25.

The area (ha) of 91E0 habitat in 'good' and 'not-good' condition as required for Article 17 reporting was derived from the Structure and Functions results. Following NPWS guidance the following approach was applied: for each monitoring site, equal weight was applied to individual-plot assessment results (n = 4) and the four-plot level assessment result (n = 1), with a Pass equal to 20% and a Fail equal to 0%. For example: A site with three passes and one fail at the individual-plot level (20 + 20 + 20 + 0 = 60) and a pass at the four-plot level (20) had 80% (60 + 20 = 80) of its area in 'good' condition, with the remaining 20% in 'not-good' condition.

N.B. These criteria are to be used for conservation status assessment of 91E0 woodlands. They are not to be used to determine Annex I status. The Annex I habitat 91E0, as it occurs in the Irish context, is defined in Section 3.1.

Table 23 Assessment criteria at the individual-plot level for 91E0 woodlands.

	Assessment criterion	91E0 target for pass
1	Positive indicator species	At least 1 target species
		≥6 positive species
2	Negative species cover	≤10% cover of plot
3	Negative species regeneration	Absent
4	Median canopy height	≥7 m
5	Total canopy cover	≥30% of plot
6	Proportion of target species in canopy	≥50% of canopy
7	Native shrub layer cover	10-75% of plot
8	Native dwarf shrub/field layer	≥20% of plot, height ≥20 cm
9	Bryophyte cover	≥4%
10	Grazing pressure	All 5 indicators absent
11	*Urtica dioica* cover	<75% cover of plot

Table 24 Assessment criteria at the four-plot level for 91E0 woodlands.

	Criterion	Target for pass
1	Target species size class distribution	At least 1 of each size class present over all 4 plots
2	Target species regeneration	At least 1 sapling ≥2 m tall over all 4 plots
3	Other native tree regeneration	At least 1 sapling ≥2 m tall in 2 or more plots
4	Old trees and dead wood	At least 3 from any category (DBH ≥20 cm)

Table 25 Summary of conditions required for Structure and Functions (S&F) assessment results at the individual-plot, four-plot and polygon levels.

Level	No. of criteria assessed	Required for pass	Best result	Worst result
1-plot	11	Passes in ≥9 criteria	Four Passes	Four Fails
4-plot	4	Passes in ≥3 criteria	Pass	Fail
Polygon	Four 1-plot results + one 4-plot result	Various - see below	Green	Red

⇩

No. of 1-plot passes	4-plot result	Polygon S&F assessment result
4	Pass	Green
3	Pass	Amber
4	Fail	Amber
<3	Pass	Red
<4	Fail	Red

3.3.6 Pressures and threats: data collected

The Future Prospects assessment relates to the likely development and maintenance of the Annex I woodland habitat in Favourable condition for the foreseeable future. In order to assess Future Prospects, pressures, threats and impacts throughout the polygon were recorded according to the list given by Ssymank (2011). The following details were recorded for each impact: the intensity of the impact (high, medium or low), effect (positive, negative or neutral), percentage of the polygon affected, and source of the impact (from inside or outside the polygon). The data sheet for recording impacts is shown in Appendix II. Impacts in adjacent Annex I woodland were also noted to provide additional information on the Future Prospects of the Annex I habitat as a whole, particularly where these could impact negatively on the monitoring polygon in the future.

The surveyors' subjective assessment of the woodland polygon's Future Prospects was given according to the following guidelines:

- Green = excellent/good prospects; no significant impact from pressures/threats expected; long-term viability assured.
- Red = bad prospects; severe impact from pressures/threats expected; long-term viability not assured.
- Amber = between these two extremes.

These subjective assessments can be viewed in the Woodlands Monitoring Microsoft Access database that accompanies this report.

3.3.7 Future Prospects: assessment

EU guidance states that the habitat's Future Prospects parameter "*should be evaluated by individually assessing the expected future trends and subsequently Future Prospects of each of the other three parameters* [Range, Area, and Structure and functions], *taking primarily into account the current conservation status of the parameter, threats (related to the parameter assessed) and the conservation measures being taken or planned for the future. Once the*

Future Prospects of each of the other three parameters have been evaluated, they should be combined to give the overall assessment of Future Prospects" (DG Environment 2017).

Future Prospects were assessed at the site level by evaluating the Future Prospects and future expected trend of Area and Structure and Functions at each site, and examining the current pressures, future threats and conservation measures operating on the habitat. Guidance provided by the EU (DG Environment 2017) was followed to determine the future trends and Future Prospects of each parameter. For the target Annex I woodland habitats to be assessed as having Favourable Future Prospects, their prospects had to be judged to be good, with no severe impacts expected from threats and the habitat expected to be stable or improving in the long term. For it to be assessed with Unfavourable-Bad Future Prospects, its prospects had to be judged to be bad, with severe impacts expected from threats and the habitat expected to decline or disappear in the long term. An assessment of Unfavourable-Inadequate Future Prospects was between these two extremes.

To help evaluate Future Prospects according to the above guidance, the pressures, threats and positive activities occurring in each site were evaluated. The surveyors' subjective assessments of the Future Prospects of the habitat at the sites were also considered.

3.3.8 Overall condition assessment

The conservation condition assessment for the Annex I woodland habitat at each site was evaluated based on the results of all three parameters, according to the evaluation matrix in Table 2 and using the guidance provided by the EU (DG Environment 2017). The criteria for all three parameters were combined and an overall conservation status of the sites is presented.

3.4 Results

3.4.1 Area parameter

Table 26 gives a summary of the results of the Area assessment for the 40 91E0 polygons surveyed. Overall, 38 sites (95%) received a green assessment with 2 sites (5%) receiving a Red assessment. Area loss was due to woodland clearance at sites 904 Cronelea (0.42 ha) and 1084 Gaybrook Demesne (0.86 ha), with the percentage (%) loss per annum calculated as 1.7% and 1.8%, respectively. These losses occurred outside the SAC network.

Table 26 Summary of the Area assessment results for 91E0 polygons surveyed in 2017-2018.

Site no.	Site name	County	Area (ha) in 2018	Area lost since 2012	% Area loss per annum (6 years)	Area assessment	Reason
15	Borris	Carlow	3.5	0	0	Green	
22	Fiddown	Kilkenny	8.3	0	0	Green	
33	Camcor Wood	Offaly	3.6	0	0	Green	
175	Townparks	Offaly	3.9	0	0	Green	
192	Litterbeg	Wexford	5.8	0	0	Green	
242	Grantstown Wood	Laois	6.9	0	0	Green	
282	Castledurrow Demesne	Laois	10.1	0	0	Green	
287	Knockbeg College	Laois	4.8	0	0	Green	

Site no.	Site name	County	Area (ha) in 2018	Area lost since 2012	% Area loss per annum (6 years)	Area assessment	Reason
304	Garrylough Lower	Wexford	4.5	0	0	Green	
316	Ballynattin	Carlow	5.4	0	0	Green	
345	Ballyconnell Demesne	Cavan	3.9	0	0	Green	
346	Deerpark (Cavan)	Cavan	3.7	0	0	Green	
388	Derrycarne Demesne South	Leitrim	6.4	0	0	Green	
423	Inisfale Wood	Roscommon	5.8	0	0	Green	
520	Coolnamuck 2	Kilkenny	6.9	0	0	Green	
534	Fidwog	Sligo	2.5	0	0	Green	
544	Gubroe (Castle Forbes)	Longford	4.7	0	0	Green	
752	Yellow Island	Meath	5.7	0	0	Green	
815	Kilmacanoge South	Wicklow	4.1	0	0	Green	
904	Cronelea	Wicklow	3.6	0.42	1.7	Red	Woodland clearance
1024	Moone Woodlands	Kildare	4.5	0	0	Green	
1078	Lough Owel Wood	Westmeath	7.6	0	0	Green	
1084	Gaybrook Demesne	Westmeath	7.0	0.86	1.8	Red	Woodland clearance
1213	Auburn	Westmeath	3.7	0	0	Green	
1288	Game Wood	Kerry	6.4	0	0	Green	
1293	Glen Bog	Limerick	5.5	0	0	Green	
1315	Coolyduff	Cork	7.0	0	0	Green	
1317	The Gearagh	Cork	7.9	0	0	Green	
1409	Hazelwood Demesne	Sligo	3.2	0	0	Green	
1410	Tanrego	Sligo	4.7	0	0	Green	
1488	Scartbarry	Cork	4.6	0	0	Green	
1561	Knockaphort	Clare	5.0	0	0	Green	
1669	Cuscarrick	Galway	4.9	0	0	Green	
1711	Ballyseedy Wood	Kerry	6.4	0	0	Green	
1791	Farrantooreen	Kerry	6.8	0	0	Green	
1820	Killeeshal	Waterford	8.0	0	0	Green	
1849	Kilcannon	Waterford	7.0	0	0	Green	
1876	Moyaliff	Tipperary	7.5	0	0	Green	
1932	Marl Bog	Tipperary	5.6	0	0	Green	
1953	Castlelough	Tipperary	4.1	0	0	Green	

3.4.2 Structure and Functions

3.4.2.1 Polygon results

Table 27 gives a summary of the results for Structure and Functions for the 40 91E0 polygons surveyed. Eighteen polygons (45.0%) received a green Structure and Functions assessment, fourteen (35.0%) received an amber assessment and eight (20.0%) received a red assessment.

The above results take account of discretionary passes, which were allowed in a number of cases. Site 22 Fiddown originally received an amber assessment at the polygon level due to the failure of one plot on three criteria, including total canopy cover. However, as this criterion only failed due to a large *Salix alba* tree falling since the last monitoring period, a discretionary pass was allowed, resulting in a green assessment. Similarly, site 1410 Tanrego originally received an amber assessment due to the failure of one plot on three criteria, including median canopy height. As this criterion only marginally failed at 6 m instead of ≥7 m, a discretionary pass was allowed, resulting in a green assessment. Site 1711 Ballyseedy Wood originally received a red assessment. This was partially due to one plot failing three criteria, including the proportion of target species in the canopy. As this criterion only marginally failed at 47% instead of ≥50%, a discretionary pass was allowed resulting in an amber assessment. The site 1849 Kilcannon originally received an amber assessment due to one plot failing three criteria, including canopy height. However, since it was evident that trees were prevented from developing to full height due to the very wet substrate in which the wood was growing, low canopy was not deemed a problem but rather a consequence of the natural conditions of the site. A discretionary pass was allowed, which resulted in a green assessment.

Table 27 Summary of Structure and Functions (S&F) results at the individual-plot level, four-plot level and polygon level for the 40 91E0 polygons surveyed in 2017-2018.

			1-plot level	4-plot level	Polygon level S&F
Site no.	**Site name**	**County**	**No. of plots in site that passed**	**Result (Pass/Fail)**	**Green/Amber/Red**
15	Borris	Carlow	3	Pass	Amber
22	Fiddown	Kilkenny	4	Pass	Green
33	Camcor Wood	Offaly	4	Pass	Green
175	Townparks	Offaly	2	Pass	Red
192	Litterbeg	Wexford	3	Pass	Amber
242	Grantstown Wood	Laois	3	Pass	Amber
282	Castledurrow Demesne	Laois	4	Pass	Green
287	Knockbeg College	Laois	2	Pass	Red
304	Garrylough Lower	Wexford	3	Pass	Amber
316	Ballynattin	Carlow	4	Pass	Green
345	Ballyconnell Demesne	Cavan	4	Pass	Green
346	Deerpark (Cavan)	Cavan	2	Pass	Red
388	Derrycarne Demesne South	Leitrim	4	Pass	Green
423	Inisfale Wood	Roscommon	3	Pass	Amber
520	Coolnamuck 2	Kilkenny	0	Pass	Red
534	Fidwog	Sligo	2	Pass	Red
544	Gubroe (Castle Forbes)	Longford	4	Pass	Green

			1-plot level	4-plot level	Polygon level S&F
Site no.	**Site name**	**County**	**No. of plots in site that passed**	**Result (Pass/Fail)**	**Green/Amber/Red**
752	Yellow Island	Meath	2	Pass	Red
815	Kilmacanoge South	Wicklow	4	Pass	Green
904	Cronelea	Wicklow	3	Pass	Amber
1024	Moone Woodlands	Kildare	4	Pass	Green
1078	Lough Owel Wood	Westmeath	3	Pass	Amber
1084	Gaybrook Demesne	Westmeath	3	Pass	Amber
1213	Auburn	Westmeath	2	Pass	Red
1288	Game Wood	Kerry	3	Pass	Amber
1293	Glen Bog	Limerick	4	Pass	Green
1315	Coolyduff	Cork	4	Pass	Green
1317	The Gearagh	Cork	4	Pass	Green
1409	Hazelwood Demesne	Sligo	3	Pass	Amber
1410	Tanrego	Sligo	4	Pass	Green
1488	Scartbarry	Cork	4	Pass	Green
1561	Knockaphort	Clare	4	Pass	Green
1669	Cuscarrick	Galway	4	Pass	Green
1711	Ballyseedy Wood	Kerry	3	Pass	Amber
1791	Farrantooreen	Kerry	3	Pass	Amber
1820	Killeeshal	Waterford	1	Pass	Red
1849	Kilcannon	Waterford	4	Pass	Green
1876	Moyaliff	Tipperary	4	Pass	Green
1932	Marl Bog	Tipperary	3	Pass	Amber
1953	Castlelough	Tipperary	3	Pass	Amber

The Structure and Functions results from the previous and the current survey are compared in Table 28. Of the 38 91E0 sites monitored by both surveys, there was no change in the results at 21 sites (55.3%), there was a decline in the result at 12 sites (31.6%), and an improvement in the results at 5 sites (13.2%).

Table 28 Comparison of the Structure and Functions (S&F) polygon level results for the 2011-2012 and 2017-2018 91E0 woodland monitoring surveys. A dagger (†) after the SAC code indicates that 91E0 is a qualifying interest for the SAC.

Site no.	Site name	SAC code	S&F result 2011-12	S&F result 2017-18	Trend direction	Rationale
15	Borris	002162 †	Green	Amber	Decline	*Impatiens glandulifera* site. More plots failed on negative spp. cover and proportion of target spp. in canopy
22	Fiddown	002137 †	Green	Green	No change	
33	Camcor Wood	000412 †	Green	Green	No change	

Site no.	Site name	SAC code	S&F result 2011-12	S&F result 2017-18	Trend direction	Rationale
175	Townparks		Green	Red	Decline	*Leucojum aestivum* covers large areas and impacts native field layer. *L. aestivum* was not recorded in 2011-2012 but this may be due to the site being surveyed in October
192	Litterbeg		Amber	Amber	No change	
242	Grantstown Wood		Red	Amber	Improve	At individual-plot level, 3 plots passed in 2017-2018 compared to 2 in 2011-2012. Plot 3 failed more criteria in 2011-2012: canopy cover and native shrub layer cover
282	Castledurrow Demesne	002162 †	Green	Green	No change	
287	Knockbeg College	002162 †	Red	Red	No change	
304	Garrylough Lower		Red	Amber	Improve	At individual-plot level, 3 plots passed in 2017-2018 compared to 2 in 2011-2012. Plot 2 failed on more criteria in 2011-2012: lack of positive spp. and proportion of target spp. in the canopy
316	Ballynattin		Green	Green	No change	
345	Ballyconnell Demesne		Green	Green	No change	
346	Deerpark (Cavan)		Red	Red	No change	
388	Derrycarne Demesne South		Green	Green	No change	
423	Inisfale Wood		Red	Amber	Improve	At individual-plot level, 3 plots passed in 2017-2018 compared to 2 in 2011-2012. Plot 2 failed on more criteria in 2011-2012: bryophyte cover and native dwarf/field layer cover and height
520	Coolnamuck 2	002162 †	Amber	Red	Decline	*Impatiens glandulifera* caused all plots to fail both negative spp. criteria in 2011-2012 and 2017-2018. Main difference in 2017-2018 is more plots failing on bryophyte cover
534	Fidwog	001898 †	Amber	Red	Decline	Main difference is more plots failing on native shrub layer cover
544	Gubroe (Castle Forbes)	001818	Green	Green	No change	

Site no.	Site name	SAC code	S&F result 2011-12	S&F result 2017-18	Trend direction	Rationale
752	Yellow Island	002299 †	Green	Red	Decline	Mainly due to *Impatiens glandulifera*, which was not present in 2011-2012
815	Kilmacanoge South		Amber	Green	Improve	At individual-plot level, 4 plots passed in 2017-2018 compared to 3 in 2011-2012. Plot 3 failed 1 more criterion in 2011-2012: dwarf shrub/field layer cover and height
904	Cronelea		Green	Amber	Decline	Main difference is grazing pressure in all plots in 2017-2018, this was not an issue in 2011-2012. *Ilex aquifolium* was supressed by overgrazing and trees were bark-stripped
1078	Lough Owel Wood	000688	Green	Amber	Decline	Plot 4 was moved in 2017-2018. This may explain some change in results. In 2017-2018 more plots failed on proportion of target spp. in canopy and lack of positive spp.
1084	Gaybrook Demesne		Amber	Amber	No change	
1213	Auburn		Amber	Red	Decline	Main difference is more plots failing due to lack of positive species, negative spp. regeneration and proportion of target spp. in canopy
1288	Game Wood	000365 †	Green	Amber	Decline	Main difference is grazing pressure in all plots in 2017-2018, this was not recorded in 2011-2012
1293	Glen Bog	001430 †	Green	Green	No change	
1315	Coolyduff		Green	Green	No change	
1317	The Gearagh	000108 †	Green	Green	No change	
1409	Hazelwood Demesne	001976 †	Red	Amber	Improve	At individual-plot level, 3 plots passed in 2017-2018 compared to 1 in 2011-2012. More plots failed on proportion of target spp. in canopy and bryophyte cover in 2011-2012
1488	Scartbarry		Green	Green	No change	
1561	Knockaphort		Green	Green	No change	
1669	Cuscarrick	000304	Green	Green	No change	
1711	Ballyseedy Wood	002112 †	Green	Amber	Decline	Mainly due to increased negative spp. cover and regeneration in 2017-2018

Site no.	Site name	SAC code	S&F result 2011-12	S&F result 2017-18	Trend direction	Rationale
1791	Farrantooreen	000343 †	Green	Amber	Decline	The negative spp. *Selaginella kraussiana* and *Lysichiton americanus* have spread since 2011-2012. This was detected by criteria including negative spp. regeneration, negative spp. cover and bryophyte cover
1820	Killeeshal		Red	Red	No change	
1849	Kilcannon		Green	Green	No change	
1876	Moyaliff		Green	Green	No change	
1932	Marl Bog		Green	Amber	Decline	Mainly due to more plots failing on proportion of target trees in canopy and negative spp. cover
1953	Castlelough		Amber	Amber	No change	

3.4.2.2 Area in good condition

The area of 91E0 habitat in ‘good’ and ‘not-good’ condition for the 40 polygons surveyed is presented in Table 29. The overall area of 91E0 habitat surveyed in ‘good’ and ‘not-good’ condition is presented in Table 30. Of the 221.6 ha surveyed, 188 ha (84.8%) was assessed as ‘good’ condition and 33.6 ha (15.2%) was assessed as ‘not-good’ condition.

Table 29 Area of 91E0 habitat in 'good' and 'not-good' condition in 2017-2018.

Site no.	Site name	Total no. passes (max.= 5)	Total no. fails (max.= 5)	% no. passes	% no. fails	Total area (ha)	Area in good condition (ha)	Area in not-good condition (ha)
15	Borris	4	1	80	20	3.5	2.8	0.7
22	Fiddown	5	0	100	0	8.3	8.3	0.0
33	Camcor Wood	5	0	100	0	3.6	3.6	0.0
175	Townparks	3	2	60	40	3.9	2.3	1.6
192	Litterbeg	4	1	80	20	5.8	4.7	1.2
242	Grantstown Wood	4	1	80	20	6.9	5.5	1.4
282	Castledurrow Demesne	5	0	100	0	10.1	10.1	0.0
287	Knockbeg College	5	0	100	0	4.8	4.8	0.0
304	Garrylough Lower	4	1	80	20	4.5	3.6	0.9
316	Ballynattin	5	0	100	0	5.4	5.4	0.0
345	Ballyconnell Demesne	5	0	100	0	3.9	3.9	0.0
346	Deerpark (Cavan)	3	2	60	40	3.7	2.2	1.5
388	Derrycarne Demesne South	5	0	100	0	6.4	6.4	0.0
423	Inisfale Wood	4	1	80	20	5.8	4.6	1.2
520	Coolnamuck 2	1	4	20	80	6.9	1.4	5.5
534	Fidwog	3	2	60	40	2.5	1.5	1.0
544	Gubroe (Castle Forbes)	5	0	100	0	4.7	4.7	0.0
752	Yellow Island	3	2	60	40	5.7	3.4	2.3
815	Kilmacanoge South	5	0	100	0	4.1	4.1	0.0
904	Cronelea	4	1	80	20	3.6	2.9	0.7
1024	Moone Woodlands	5	0	100	0	4.5	4.5	0.0
1078	Lough Owel Wood	4	1	80	20	7.6	6.0	1.5
1084	Gaybrook Demesne	4	1	80	20	7.0	5.6	1.4
1213	Auburn	3	2	60	40	3.7	2.2	1.5

Site no.	Site name	Total no. passes (max.= 5)	Total no. fails (max.= 5)	% no. passes	% no. fails	Total area (ha)	Area in good condition (ha)	Area in not-good condition (ha)
1288	Game Wood	4	1	80	20	6.4	5.1	1.3
1293	Glen Bog	5	0	100	0	5.5	5.5	0.0
1315	Coolyduff	5	0	100	0	7.0	7.0	0.0
1317	The Gearagh	5	0	100	0	7.9	7.9	0.0
1409	Hazelwood Demesne	4	1	80	20	3.2	2.6	0.6
1410	Tanrego	5	0	100	0	4.7	4.7	0.0
1488	Scartbarry	5	0	100	0	4.6	4.6	0.0
1561	Knockaphort	5	0	100	0	5.0	5.0	0.0
1669	Cuscarrick	5	0	100	0	4.9	4.9	0.0
1711	Ballyseedy Wood	4	1	80	20	6.4	5.1	1.3
1791	Farrantooreen	4	1	80	20	6.8	5.4	1.4
1820	Killeeshal	2	3	40	60	8.0	3.2	4.8
1849	Kilcannon	5	0	100	0	7.0	7.0	0.0
1876	Moyaliff	5	0	100	0	7.5	7.5	0.0
1932	Marl Bog	4	1	80	20	5.6	4.5	1.1
1953	Castlelough	4	1	80	20	4.1	3.2	0.8
	Total					**221.6**	**188.0**	**33.6**

Table 30 Total area of 91E0 habitat in 'good' and 'not-good' condition in 2017-2018.

Condition	Total area (ha)	Percentage (%) of area surveyed
'good'	188.0	84.8
'not-good'	33.6	15.2
Total	**221.6**	**100**

3.4.2.3 Criteria results

Table 31 summarises the pass rates for the individual monitoring criteria measured in 2017-2018 at the 40 91E0 sites.

Individual-plot structural criteria

The 40 sites had >95% pass rates for median canopy height, total canopy cover, *Urtica dioica* cover and dwarf shrub/field layer cover and height. Other criteria with high pass rates (90-95%) were positive indicator species, proportion of target species in canopy and native shrub layer cover. Slightly lower pass rates were achieved for bryophyte cover (84% pass rate) and grazing

pressure (86% pass rate). Failure rates were high for negative species cover (31% failure rate) and negative species regeneration (66% failure rate).

Four-plot structural criteria

Pass rates for all four-plot level criteria were high (≥95% pass rate), and in fact all 40 of the 91E0 polygons passed their assessments at the overall four-plot level.

Table 31 Pass and failure rates for individual Structure and Functions monitoring criteria at the individual-plot and four-plot levels for the 40 91E0 sites surveyed in 2017-2018. The number of discretionary passes allowed is also presented.

	% Pass	% Fail	No. of discretionary passes
Individual-plot level criteria			
Positive indicator species	92	8	-
Negative species cover	69	31	-
Negative species regeneration	34	66	-
Median canopy height	98	2	2
Total canopy cover	99	1	1
Proportion of target species in canopy	91	9	1
Native shrub layer cover	91	9	-
Native dwarf shrub/field layer cover and height	99	1	-
Bryophyte cover	84	16	-
Grazing pressure absent	86	14	-
Urtica dioica cover	97	3	-
Overall pass (individual-plot level)	79	21	
Four-plot level criteria			
Target species size class distribution	98	3	-
Target species regeneration	100	0	-
Other native tree regeneration	98	3	-
Old trees and dead wood	95	5	-
Overall pass (four-plot level)	100	0	

Target tree species DBH data

The distribution of target tree girths in three size classes at the 91E0 sites is presented in Figure 11. This shows polygons with high numbers of small target trees (DBH 7-<20 cm) at the left of the graph, and those with lower numbers of small target trees at the right.

In 35 of the 40 sites (88%), more target trees were recorded in the small (DBH 7-<20 cm) size class than the other two classes. In five of the 40 sites (12%), the highest frequency of target trees was in the large size class (DBH ≥30 cm). No sites had the highest frequency of trees in the medium size class (DBH 20-<30 cm) (Figure 12).

A similar examination of the size distribution of the 3,849 target trees measured across all 40 sites reveals the small size class had the highest number of trees, with 2,617 trunks measured (68%); the medium size class was next, with 776 trees (20%), and the lowest frequency was attained by the large size class at 456 trees (12%) (Figure 13). The above trends were common across the three main target species, *Alnus glutinosa*, *Fraxinus excelsior* and *Salix cinerea*

(Table 32). For other *Salix* species (grouped together), the medium size class held the lowest percentage of trunks, with the small size class having the highest.

Fraxinus excelsior was recorded as having the highest proportion of trees in the small size class (77%) compared to 66% for *Salix cinerea* and 59% for *Alnus glutinosa*. *Alnus glutinosa* had the greatest frequency of medium-sized trees (27%). Other *Salix* species had the greatest frequency of large-sized trees (17%).

Table 32 Distribution of target tree DBH in three size classes among individual target species in 91E0 woodlands surveyed in 2017-2018.

	Size class			
	7-<20 cm	**20-<30 cm**	**≥30 cm**	**Total**
Fraxinus excelsior	1,101 (77%)	210 (15%)	125 (9%)	1,436 (100%)
Alnus glutinosa	656 (59%)	305 (27%)	157 (14%)	1,118 (100%)
Salix cinerea	725 (66%)	233 (21%)	140 (13%)	1,098 (100%)
Other *Salix* spp.	135 (69%)	28 (14%)	34 (17%)	197 (100%)

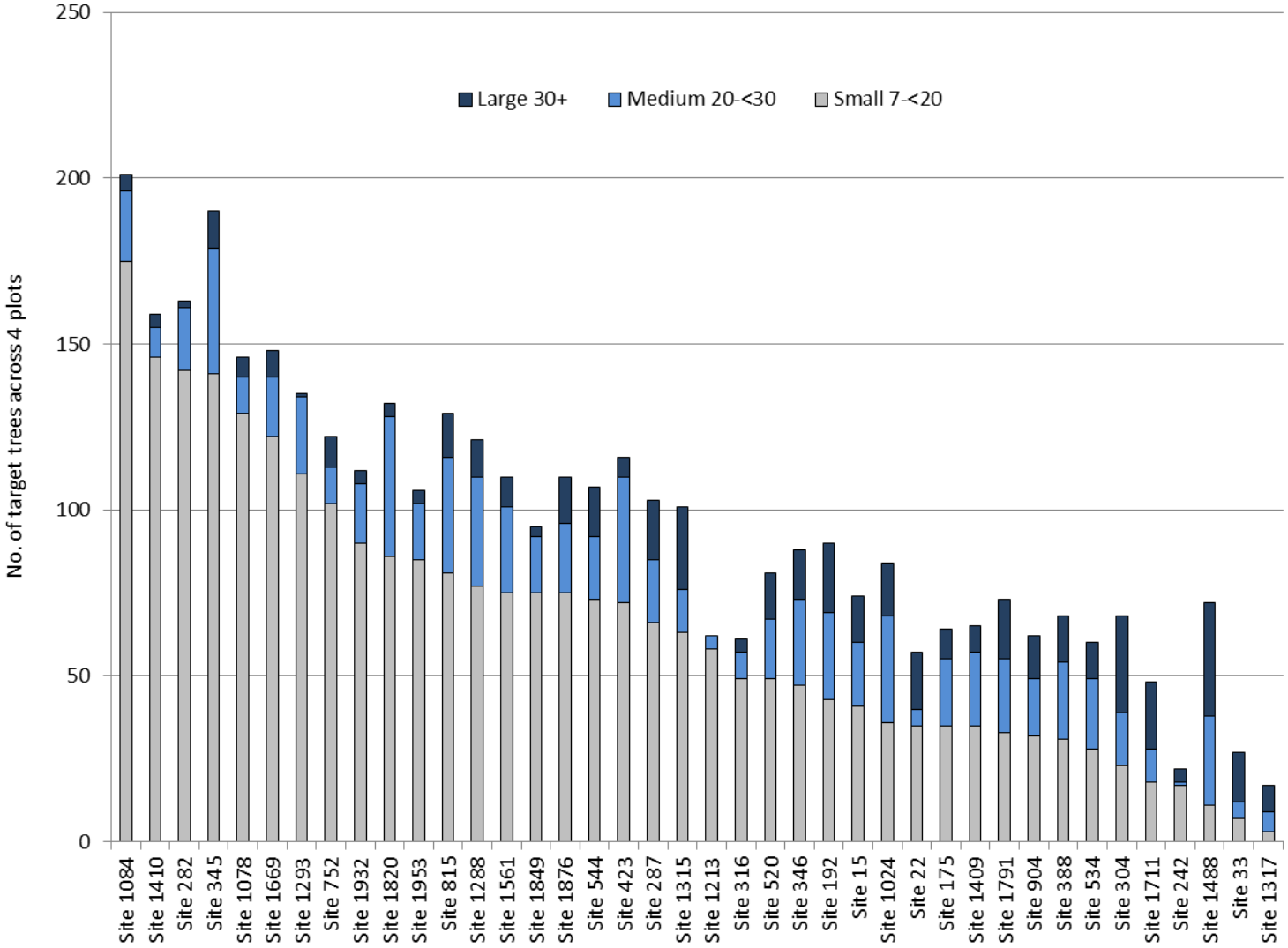

Figure 11 Distribution of target tree DBH in three size classes at the 40 91E0 sites.

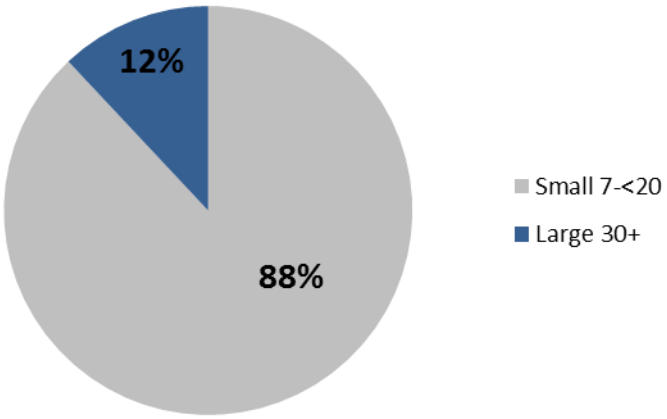

Figure 12 Proportion of 91E0 sites with the majority of target trees in either the small or large size class. No site had the majority of trees in the medium size class.

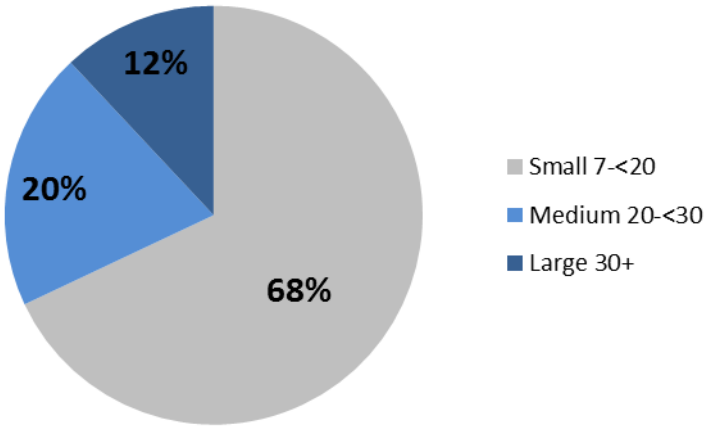

Figure 13 Proportion of target trees measured in three size classes across all 40 91E0 sites.

Negative species: Most frequent negative taxa

The most commonly recorded negative taxa are shown in Table 33. In total, nine taxa of trees and fifteen taxa of shrubs/herbs were recorded. *Acer pseudoplatanus* and *Fagus sylvatica* were the most frequently recorded non-native trees at 72.5% and 55% of sites respectively. *Aesculus hippocastanum* (22.5%) was the third most common non-native tree, followed by *Abies* spp. (*A. alba* and *A. grandis*) (15%) and *Picea* spp. (*P. abies* and *P. sitchensis*) (15%). *Ribes* spp. (*R. nigrum* and *R. rubrum*) was the most common non-native shrub/herb at 22.5%, followed by *Impatiens glandulifera* (12.5%) and *Rhododendron ponticum* (12.5%).

Table 33 Negative taxa recorded in the plots at the 91E0 sites surveyed in 2017-2018.

Trees	Frequency in 91E0 sites (n=40)	Shrubs/herbs	Frequency in 91E0 sites (n=40)
Acer pseudoplatanus	29	*Ribes* spp.	9
Fagus sylvatica	22	*Impatiens glandulifera*	5
Aesculus hippocastanum	9	*Rhododendron ponticum*	5
Picea spp.	6	*Cornus sericea*	3
Abies spp.	6	*Prunus laurocerasus*	3
Alnus incana	1	*Cotoneaster* spp.	1
Populus spp.	1	*Symphoricarpos albus*	1
Tsuga heterophylla	1	*Escallonia* spp.	1
Pterocarya fraxinifolia	1	*Fallopia japonica*	1
		Leucojum aestivum	1
		Ligustrum spp.	1
		Luma apiculata	1
		Lysichiton americanus	1
		Selaginella kraussiana	1
		Crocosmia × *crocosmiiflora*	1

Negative species: Cover and regeneration

As noted in Table 31, failure rates were high for negative species cover (*i.e*. over the 10% threshold) and negative species regeneration, with 31% and 66% of 91E0 plots failing, respectively. Of the 105 plots that failed based on the presence of negative species regeneration, 53 of the failed plots (50%) only contained negative tree regeneration (with no negative shrub regeneration), 26 (25%) only contained negative shrub/herb regeneration (with no negative tree regeneration), with 26 (25%) containing both negative tree and negative shrub/herb regeneration.

Table 34 shows total regeneration statistics for negative tree species within the 91E0 plots. Only species of which more than one sapling (*i.e*. regeneration measuring 2 m or more in height) was recorded within the dataset are listed. The total number of regenerating units*, i.e.* seedlings and saplings, was highest for *Acer pseudoplatanus*, with 798 young plants recorded. *Acer pseudoplatanus* regeneration was also recorded in more sites, with seedlings and saplings of that species recorded in 21.9% and 24.4% of 91E0 plots, respectively. This is followed by *Fagus sylvatica* with seedlings and saplings recorded in 16.9% and 10.0% of plots, respectively. Seedling numbers were sometimes extremely high within individual plots, with 321 *Acer pseudoplatanus* seedlings found in a single plot at site 346 Deerpark. Of more concern, though, is the survival rate of seedlings to saplings. In site 1084 Gaybrook Demesne, 35 saplings of *Acer pseudoplatanus* were recorded in a single plot, while eight *Aesculus hippocastanum* saplings were recorded from a plot in 1409 Hazelwood Demesne.

Table 34 Negative tree species regeneration recorded in two height classes in 91E0 plots in 2017-2018.

	***Abies* spp.**		***Acer pseudoplatanus***		***Aesculus hippocastanum***		***Alnus incana***		***Fagus sylvatica***		***Picea sitchensis***		***Pterocarya fraxinifolia***	
Height	<2m	≥2m	<2m	≥2m	<2m	≥2m	<2m	≥2m	<2m	≥2m	<2m	≥2m	<2m	≥2m
Total no.	3	8	613	185	39	24	9	6	72	30	4	7	0	1
No. of plots	2	3	35	39	8	10	2	2	27	16	3	3	0	1
Median	1.5	3	2	3	3.5	1	4.5	3	1	2	1	1	0	1
Max. in 1 plot	2	4	321	35	15	8	8	5	21	4	2	5	0	1
Frequency (n=160 plots)	1.3	1.9	21.9	24.4	5.0	6.3	1.3	1.3	16.9	10.0	1.9	1.9	0.0	0.6

Rubus fruticosus: Cover and height

Table 35 summarises *Rubus fruticosus* cover and height data for the 157 plots that had this parameter recorded. The majority of the plots had 1-<20% cover. However, higher covers were achieved with eight plots containing 60-<80% cover and one containing 80-100% cover. The maximum median height was often high, *e.g.* 300 cm. This is less of a concern in plots with a lower cover score, as tall patches of *R. fruticosus* frequently occur in natural light gaps, or trail over old dead wood and/or uprooted trees. However, high covers of tall *R. fruticosus* across a site indicate an imbalance in the ecosystem that can be attributed to factors such as sub-optimal grazing levels, altered light levels and/or the site drying out. The field layer at site 1488 Scartbarry was dominated by *R. fruticosus*; three of the plots had ≥70% cover and a median height ranging from 90-120 cm. The prolific growth of the species at this site is mainly driven by the open canopy, as there are relatively few small trees but numerous medium and large trees, mostly *Alnus glutinosa*. The dominance of *R. fruticosus* at this site is impacting the presence of positive indicator species.

Table 35 Summary of *Rubus fruticosus* cover and heights within plots.

Cover range	No. of plots	Max. median height in one plot (cm)	Min. median height in one plot (cm)
0	15	0	0
1-<20%	104	300	5
20-<40%	18	150	50
40-<60%	11	130	69
60-<80%	8	200	85
80-100%	1	80	80
Total	157	300	0

Urtica dioica: Cover

Urtica dioica is a positive indicator for the 91E0 habitat; however, in exceptional cases it may become overly dominant. Table 36 summarises *U. dioica* cover for the 158 plots that had this parameter recorded. The majority of the plots recorded had 0-25% cover of this species. However, higher covers were achieved, with five plots at sites 242 Grantstown Wood and 287 Knockbeg College, both in Co. Laois, having 75-100% cover. According to O'Neill & Barron (2013), *U. dioica* became dominant at these sites following flooding that enriched the soil; run-off from adjacent agricultural fields is also suspected at 287 Knockbeg College. These sites also support several dead/senescent trees in the canopy as a result of a prolonged flood event. Increased light and enrichment are factors which favour proliferation of *U. dioica*.

Table 36 Summary of *Urtica dioica* cover

Cover range	No. of plots
0	74
1-<25%	68
25-<50%	9
50-<75%	2
75-100%	5
Total	**158**

3.4.3 Pressures, threats and other activities

Prior to evaluating the Future Prospects parameter, the negative and positive impacts recorded for the 91E0 sites were examined. These are shown in Tables 37 and 38 respectively, together with the intensity (high, medium or low), percentage of the habitat affected, and total frequency for each of the activities. Neutral impacts are shown in Table 39. Neutral impacts were not considered when assessing the Future Prospects parameter.

3.4.3.1 Negative impacts

Negative impacts were recorded from 39 of the 40 91E0 sites (97.5%) (Table 37). I01 invasive non-native species was the most frequently recorded negative impact, occurring at 38 sites (95%). This impact was recorded as high intensity at 10 sites and medium intensity at 14 sites. It affected >75% of the habitat at seven sites, and between 26-75% of the habitat at six sites.

H05.01 Garbage and solid waste was the second most frequently recorded negative impact, at 13 sites (32.5%), and was the second most frequently recorded negative impact. It was primarily recorded as low intensity (11 sites) and only ever affected a small area of habitat.

K04.03 Introduction of disease refers to the suspected presence of Ash Dieback disease at the sites. This disease affects *Fraxinus excelsior* causing dieback of the crown, loss of leaves and can result in tree death (Khela & Oldfield, 2018). It was recorded from nine sites (22.5%), and was the third most frequently recorded negative impact. At seven sites, it was recorded as low intensity and affected ≤1% of the habitat. However, at the remaining two sites, the disease was having a more serious impact on *Fraxinus excelsior* saplings, and was also suppressing canopy trees. These sites were 1084 Gaybrook Demesne, Co. Westmeath (medium intensity; 10% of the habitat affected) and 1669 Cuscarrick, Co. Galway (high intensity; 75% of the habitat affected).

B02.02 Forestry clearance was recorded from six sites (15%), and was the fourth most frequently recorded negative impact. At two of the sites, this impact resulted in the loss of habitat area. At site 1084 Gaybrook Demesne, 0.86 ha of the monitoring polygon was recently felled, and at site 904 Cronelea, 0.42 ha of the monitoring polygon was recently felled. At both these sites, felling took place towards the edges of the wood, with clearances likely related to the expansion of productive agriculture.

I02 Problematic native species was recorded at five sites (12.5%). This impact was recorded as both medium and low intensity. At four sites it affected ≥75% of the habitat. The main problematic native species was *Rubus fruticosus* agg., with dense stands of *Urtica dioica* also considered problematic.

The other negative impacts recorded were B06 Grazing in forests/woodland (three sites), D01.01 Paths, tracks, cycling tracks (three sites), B02.01.02 Forest replanting (non-native trees) (one site), B02.03 Removal of forest undergrowth (one site), B02.06 Thinning of tree layer (one site), H01.03 Other point source pollution to surface water (one site), J02.04 Flooding modifications (one site), J02.07 Water abstractions from groundwater (one site) and K02.03 Eutrophication (natural) (one site).

3.4.3.2 Positive impacts

Positive impacts were recorded from eight sites (20%) (Table 38). B06 Grazing in forests/woodland refers to extensive grazing by deer of the 91E0 habitat. This was the most frequently recorded positive impact, occurring at four of the forty sites. B02.03 Removal of forest undergrowth refers to the removal of non-native species. This impact was recorded from two sites, with *Acer pseudoplatanus* removal at 345 Ballyconnell Demesne (NPWS-managed) and *Rhododendron ponticum* removal at 1288 Game Wood (NPWS-managed). B02.02 Forestry clearance refers to the removal of conifers from site 282 Castledurrow Demesne (within a Coillte Biodiversity Area); drain blocking was also recorded from this site (impact code

J02.01.03). Natural regeneration on adjacent clear-fell was recorded at 33 Camcor Wood (impact code B07).

Table 37 Summary of the negative impacts recorded in the 40 91E0 sites surveyed in 2017-2018.

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
I01	Invasive non-native species	10	14	14	25	6	7	38
H05.01	Garbage and solid waste	1	1	11	13			13
K04.03	Introduction of disease (microbial pathogens)	1	1	7	8	1		9
B02.02	Forestry clearance	3	2	1	6			6
I02	Problematic native species		3	2		1	4	5
B06	Grazing in forests/ woodland	1	2				3	3
D01.01	Paths, tracks, cycling tracks	2		1	3			3
B02.01.02	Forest replanting (non-native trees)			1	1			1
B02.03	Removal of forest undergrowth			1	1			1
B02.06	Thinning of tree layer			1	1			1
H01.03	Other point source pollution to surface water	1			1			1
J02.04	Flooding modifications		1			1		1
J02.07	Water abstractions from groundwater			1	1			1
K02.03	Eutrophication (natural)	1			1			1
	Totals	**20**	**24**	**40**	**61**	**9**	**14**	

Table 38 Summary of the positive impacts recorded in the 40 91E0 sites surveyed in 2017-2018.

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
B06	Grazing in forests/ woodland			4	1		3	4
B02.03	Removal of forest undergrowth		1	1	2			2
B02.02	Forestry clearance		1				1	1
B07	Forestry activities not referred to above	1			1			1

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
J02.01.03	Infilling of ditches, dykes, ponds, pools, marshes or pits		1				1	1
	Totals	**1**	**3**	**5**	**4**	**0**	**5**	

3.4.3.3 Neutral impacts

Neutral impacts were recorded from 24 91E0 sites (60%) (Table 39). The most frequent neutral impact was B06 Grazing in forests/ woodland (9 sites), followed by D01.01 Paths, tracks, cycling tracks (7 sites).

Table 39 Summary of the neutral impacts recorded in the 40 91E0 sites surveyed in 2017-2018.

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
B06	Grazing in forests/ woodland			9	1	3	5	9
D01.01	Paths, tracks, cycling tracks		2	5	7			7
G01.02	Walking, horse riding and non-motorised vehicles		1	2	3			3
G05.09	Fences, fencing			3	3			3
H05.01	Garbage and solid waste			3	3			3
J02.07	Water abstractions from groundwater			3	1		2	3
B02.03	Removal of forest undergrowth		1	1	2			2
B02.06	Thinning of tree layer			2	2			2
B02.02	Forestry clearance			1	1			1
C01	Mining and quarrying			1	1			1
D01.02	Roads, motorways			1	1			1
F03.01	Hunting			1	1			1
J02	Human induced changes in hydraulic conditions		1				1	1
J02.06.06	Surface water abstractions by hydro-energy			1			1	1
K01.01	Erosion			1	1			1
L07	Storm, cyclone		1		1			1
	Totals	**0**	**6**	**34**	**28**	**3**	**9**	

3.4.4 Future prospects

The Future Prospects assessments for the 40 91E0 sites surveyed are shown in Table 40. The effects of negative and positive activities were considered in the context of each site's Area and Structure and Functions assessment to make an overall Future Prospects assessment for each site. Future Prospects over the next 12 years (two reporting periods) were assessed. In total, 14 of the sites (35.0%) received a green Future Prospects assessment, 16 sites (40.0%) received an amber assessment and 10 sites (25.0%) received a red assessment.

Table 40 Summary of the Future Prospects (FP) of the 40 91E0 sites surveyed in 2017-2018.

Site no.	Site name	FP of Area	FP of S&F	FP of habitat	Rationale
15	Borris	Green	Amber	Amber	Negative impact of invasive non-native shrubs and trees
22	Fiddown	Green	Green	Green	No negative impacts recorded
33	Camcor Wood	Green	Green	Green	No significant negative impacts recorded
175	Townparks	Green	Red	Red	Negative impact of invasive non-native herb *Leucojum aestivum*
192	Litterbeg	Green	Amber	Amber	Negative impact of invasive non-native trees
242	Grantstown Wood	Green	Amber	Amber	Negative impact of the problematic native species *Urtica dioica* and *Rubus fruticosus*
282	Castledurrow Demesne	Green	Green	Green	No significant negative impacts recorded
287	Knockbeg College	Green	Red	Red	Negative impact of the invasive non-native herb *Impatiens glandulifera* and the problematic native *Urtica dioica*
304	Garrylough Lower	Green	Amber	Amber	Negative impact of invasive non-native trees and the problematic native *Rubus fruticosus*
316	Ballynattin	Green	Amber	Amber	Ash Dieback threatens S&F, negative impact of invasive non-native trees
345	Ballyconnell Demesne	Green	Green	Green	No significant negative impacts recorded
346	Deerpark (Cavan)	Green	Red	Red	Negative impact of invasive non-native trees and shrubs
388	Derrycarne Demesne South	Green	Green	Green	No significant negative impacts recorded. Threats include Ash Dieback in an adjacent wood
423	Inisfale Wood	Green	Amber	Amber	Negative impact of invasive non-native shrubs and trees, Ash Dieback threatens S&F
520	Coolnamuck 2	Green	Red	Red	Negative impact of invasive non-native herb *Impatiens glandulifera*
534	Fidwog	Green	Red	Red	Negative impact of invasive non-native trees
544	Gubroe (Castle Forbes)	Green	Amber	Amber	Ash Dieback threatens S&F
752	Yellow Island	Green	Red	Red	Negative impact of invasive non-native herb *Impatiens glandulifera*
815	Kilmacanoge South	Green	Green	Green	No significant negative impacts recorded
904	Cronelea	Red	Amber	Red	Negative impact of woodland clearance
1024	Moone Woodlands	Green	Green	Green	No significant negative impacts recorded

Site no.	Site name	FP of Area	FP of S&F	FP of habitat	Rationale
1078	Lough Owel Wood	Green	Amber	Amber	Negative impact of invasive non-native trees
1084	Gaybrook Demesne	Red	Amber	Red	Negative impact of woodland clearance, invasive non-native shrubs and threat of Ash Dieback
1213	Auburn	Green	Red	Red	Negative impact of invasive non-native trees and threat of Ash Dieback
1288	Game Wood	Green	Amber	Amber	Negative impact of deer overgrazing and invasive non-native shrub *Rhododendron ponticum*
1293	Glen Bog	Green	Amber	Amber	Ash Dieback threatens S&F
1315	Coolyduff	Green	Green	Green	No significant negative impacts recorded
1317	The Gearagh	Green	Green	Green	No significant negative impacts recorded
1409	Hazelwood Demesne	Green	Amber	Amber	Negative impact of invasive non-native shrubs and trees
1410	Tanrego	Green	Green	Green	No significant negative impacts recorded
1488	Scartbarry	Green	Green	Green	No significant negative impacts recorded
1561	Knockaphort	Green	Green	Green	No significant negative impacts recorded
1669	Cuscarrick	Green	Amber	Amber	Negative impact of invasive non-native shrubs and trees, Ash Dieback impacting canopy
1711	Ballyseedy Wood	Green	Amber	Amber	Negative impact of invasive non-native trees
1791	Farrantooreen	Green	Amber	Amber	Negative impact of several invasive non-native species including *Lysichiton americanus* and *Selaginella kraussiana*
1820	Killeeshal	Green	Red	Red	Negative impact of the invasive non-native shrub *Rhododendron ponticum*
1849	Kilcannon	Green	Green	Green	No significant negative impacts recorded
1876	Moyaliff	Green	Green	Green	No significant negative impacts recorded
1932	Marl Bog	Green	Amber	Amber	Ash Dieback threatens S&F, presence of invasive non-native trees
1953	Castlelough	Green	Amber	Amber	Negative impact of invasive non-native trees

3.4.5 Overall condition assessment

3.4.5.1 Polygon result

Table 41 shows the overall condition assessments for the 40 91E0 sites surveyed in 2017-2018, achieved by combining the assessment results of Area, Structure and Functions and Future Prospects for each polygon. A total of 14 sites (35.0%) received a green assessment (Favourable), 16 (40.0%) received an amber assessment (Unfavourable – Inadequate) and 10 (25.0%) received a red assessment (Unfavourable – Bad) (Figure 14).

Table 41 Overall condition assessments for the 40 91E0 sites surveyed in 2017-2018. A dagger (†) after the SAC code indicates that 91E0 is a qualifying interest for the SAC.

Site no.	Site name	Area	S&F	FP	Overall Conservation Status	SAC
15	Borris	Green	Amber	Amber	Amber	002162†
22	Fiddown	Green	Green	Green	Green	002137†
33	Camcor Wood	Green	Green	Green	Green	000412†
175	Townparks	Green	Red	Red	Red	
192	Litterbeg	Green	Amber	Amber	Amber	
242	Grantstown Wood	Green	Amber	Amber	Amber	
282	Castledurrow Demesne	Green	Green	Green	Green	002162†
287	Knockbeg College	Green	Red	Red	Red	002162†
304	Garrylough Lower	Green	Amber	Amber	Amber	
316	Ballynattin	Green	Green	Amber	Amber	
345	Ballyconnell Demesne	Green	Green	Green	Green	
346	Deerpark (Cavan)	Green	Red	Red	Red	
388	Derrycarne Demesne South	Green	Green	Green	Green	
423	Inisfale Wood	Green	Amber	Amber	Amber	
520	Coolnamuck 2	Green	Red	Red	Red	002162†
534	Fidwog	Green	Red	Red	Red	001898†
544	Gubroe (Castle Forbes)	Green	Green	Amber	Amber	001818
752	Yellow Island	Green	Red	Red	Red	002299†
815	Kilmacanoge South	Green	Green	Green	Green	
904	Cronelea	Red	Amber	Red	Red	
1024	Moone Woodlands	Green	Green	Green	Green	
1078	Lough Owel Wood	Green	Amber	Amber	Amber	000688
1084	Gaybrook Demesne	Red	Amber	Red	Red	
1213	Auburn	Green	Red	Red	Red	
1288	Game Wood	Green	Amber	Amber	Amber	000365†
1293	Glen Bog	Green	Green	Amber	Amber	001430†
1315	Coolyduff	Green	Green	Green	Green	
1317	The Gearagh	Green	Green	Green	Green	000108†
1409	Hazelwood Demesne	Green	Amber	Amber	Amber	001976†
1410	Tanrego	Green	Green	Green	Green	000622
1488	Scartbarry	Green	Green	Green	Green	
1561	Knockaphort	Green	Green	Green	Green	
1669	Cuscarrick	Green	Green	Amber	Amber	000304
1711	Ballyseedy Wood	Green	Amber	Amber	Amber	002112†

Site no.	Site name	Area	S&F	FP	Overall Conservation Status	SAC
1791	Farrantooreen	Green	Amber	Amber	Amber	000343†
1820	Killeeshal	Green	Red	Red	Red	
1849	Kilcannon	Green	Green	Green	Green	
1876	Moyaliff	Green	Green	Green	Green	
1932	Marl Bog	Green	Amber	Amber	Amber	
1953	Castlelough	Green	Amber	Amber	Amber	

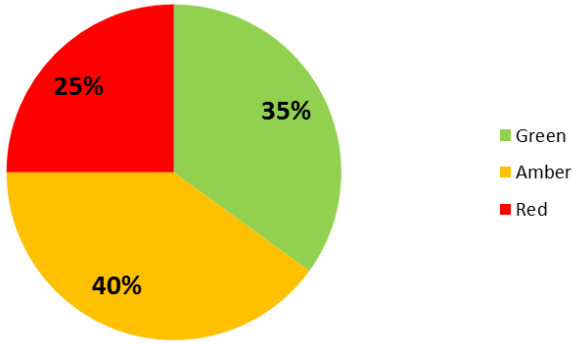

Figure 14 Proportion of polygons with overall assessments of green, amber and red for 40 91E0 woodlands surveyed in 2017-2018.

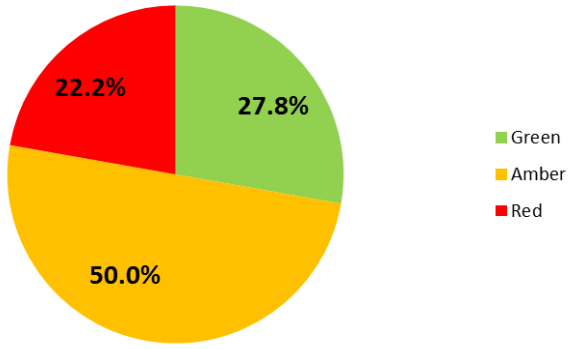

Figure 15 Proportion of polygons with overall assessments of green, amber and red for the 18 91E0 woodlands that are within the SAC network.

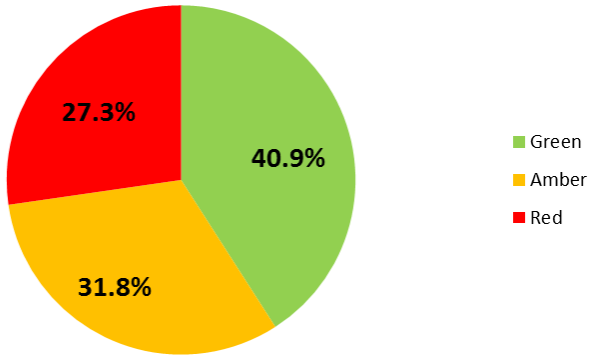

Figure 16 Proportion of polygons with overall assessments of green, amber and red for the 22 91E0 woodlands that are outside the SAC network.

Overall condition assessment results were examined in the context of whether or not the sites were within an SAC. Of the 14 sites that achieved a green assessment, five (35.7%) are within an SAC. Habitat 91E0 is a qualifying interest in four of these. Of the 16 sites that received an amber assessment, nine (56.3%) are within an SAC. Habitat 91E0 is a qualifying interest in six of these. Of the 10 sites that received a red assessment, four (40.0%) are within an SAC, and 91E0 is a qualifying interest at all four.

Figure 15 and Figure 16 respectively display the proportion of polygons within the SAC network and the proportion of polygons outside the SAC network that received overall conservation assessments of green, amber and red. Of the 18 sites within SACs, 27.8% received a green assessment, 50.0% received an amber assessment and 22.2% received a red assessment. Of the 22 sites outside SACs, 40.9% received a green assessment, 31.8% received an amber assessment and 27.3% received a red assessment.

3.4.5.2 National result

Using the results of the monitoring survey and external sources listed in the National Conservation Assessment (NCA) (NPWS, 2019), the Annex I woodland habitat 91E0 received an overall national assessment of Unfavourable-Bad based on the information provided in Table 42.

Table 42 National Conservation Assessment (NCA) for the Annex I habitat 91E0. Adapted from NPWS (2019).

Parameter	Justification for assessment	National Assessment
Range	Stable, no recorded loss; approximately equal to Favourable Reference Range.	**Favourable**
Area	Decreasing due to anthropogenic loss totalling 3.65 ha as recorded by the Woodland Monitoring Surveys of 2011-2012 and 2017-2018, and Devaney *et al.* (2017); current area is more than 10% below the Favourable Reference Area.	**Unfavourable-Bad**
Structure & Functions	Decreasing, evidence of decline in condition since the last monitoring survey; 15.2% of the habitat is in Unfavourable condition.	**Unfavourable-Inadequate**
Future Prospects	Pressures and threats including non-native invasive species, problematic native species and disease are causing deterioration in habitat quality. Area parameter threatened by woodland clearance.	**Unfavourable-Bad**
Overall NCA	Combining individual parameter results according to the evaluation matrix in Table 2.	**Unfavourable-Bad**
Trend	Overall trend in Conservation Status	**Deteriorating**

3.5 Discussion

The National Conservation Assessment (NCA) of Unfavourable-Bad for the priority Annex I woodland 91E0 (NPWS, 2019) remains unchanged since the previous Article 17 report (NPWS, 2013).

Within this NCA, the Area parameter is Unfavourable-Bad with a decreasing trend. This is attributed to anthropogenic loss as recorded by Woodland Monitoring Surveys of 2011-2012 and 2017-2018. Additional loss was also detected using the Deforestation Estimation and Mapping in Ireland dataset (DEFORMAP), as detailed in the NCA report (NPWS, 2019). Anthropogenic activities that resulted in the loss of this habitat during the last two reporting periods included river bank clearance in association with a drainage scheme, construction and conversion to agricultural grassland (NPWS, 2019). Any loss of this Annex I habitat is

detrimental, given that this resource is already highly fragmented. At present, the current surface area of this habitat is considered insufficient to ensure long-term viability (*i.e*. more than 10% below the Favourable Reference Area). This habitat provides a range of valuable ecosystem services including flood risk management, reducing diffuse pollution, moderating water temperatures and river bank stabilisation (DAFM, 2018a). It is imperative to prevent further loss of this Annex I habitat and its associated ecosystem functions.

Planting and restoration initiatives are vital steps in the conservation of this habitat. Existing 91E0 habitat should be expanded where possible, and degraded examples of 91E0 should be retained and restored. Considerable potential also exists for converting low-lying conifer plantations within riparian/alluvial zones into native woodland, allowing inundation and reinstating natural floodplain dynamics (WOI, 2016).

The Woodland for Water (DAFM, 2018a) measure promotes native woodland establishment adjacent to waterbodies. It encourages planting along streams, rivers and lakes to create permanent woodlands that will protect and enhance water quality and adjacent aquatic habitats. Under this measure farmers and other landowners can avail of grants and 15-year premiums available under the Native Woodland Establishment Scheme. The Native Woodland Conservation Scheme is available to both public and private landowners. This scheme supports the restoration of existing native woodlands and the conversion of conifer stands to native woodland. Another promising initiative is the EU KerryLIFE project, aimed at rehabilitating Freshwater Pearl Mussel populations, and one which promotes native broadleaf planting in order to stabilise riparian soils.

In December 2012, the 91E0 target species *Fraxinus excelsior* was removed from the approved list of species to plant under the afforestation grant scheme due to the presence of Ash Dieback disease in Ireland. Coillte also made a policy decision not to replant with *Fraxinus excelsior* (DAFM, 2018b). This has the potential to impact future gains in 91E0 habitat.

The Structure and Functions parameter was assessed as Unfavourable-Inadequate with a decreasing trend. The most frequent criteria to fail the Structure and Functions assessment were negative species regeneration and negative species cover. The number of plots failing on these criteria has increased since the Woodland Monitoring Survey 2011-2012. The most frequent invasive non-native species within this habitat were *Acer pseudoplatanus, Fagus sylvatica, Aesculus hippocastanum,* conifers (*Abies* spp., *Picea* spp.), *Ribes* spp., *Impatiens glandulifera* and *Rhododendron ponticum*. The natural periodic flooding of this habitat leaves it particularly susceptible to invasive species, as floods assist in the dispersal of seeds, and also create sufficient disturbance to aid establishment (O'Neill & Barron, 2013).

Invasive non-native species were the main reasons for declines in Structure and Functions. This was evident at: 15 Borris (*Impatiens glandulifera*), 752 Yellow Island (*Impatiens glandulifera*), 1711 Ballyseedy Wood (mainly *Acer pseudoplatanus* and *Abies alba*) and 1791 Farrantooreen (*Selaginella kraussiana* and *Lysichiton americanus*). These sites were previously assessed as green but decreased to amber in 2017-2018. *Impatiens glandulifera* was not present at site 752 Yellow Island in 2011-2012. This invasive herb produces large numbers of seeds in exploding seed pods. Once released, the seeds spread along river channels, which act as conduits. National Biodiversity Data Centre records indicate that although there were no records of *Impatiens glandulifera* at site 752 Yellow Island prior to the Monitoring Survey 2017-2018, there were records both up- and downstream of the site. At site 1791 Farrantooreen, the main problematic species are *Lysichiton americanus* and *Selaginella kraussiana,* which have spread at the site since 2011-2012. The creeping *Selaginella kraussiana,* forms dense mats, and is negatively impacting the bryophyte layer. Overgrazing was responsible for declines in the Structure and Functions assessment result at sites 1288 Game Wood in Killarney National Park, Co. Kerry and 904 Cronelea, Co. Wicklow.

Pass rates for 91E0 structural data were high. Only one site, 1213 Auburn, failed the target tree class criterion. This was due to the absence of large target trees, with most large trees at this site represented by the non-target *Betula pubescens*. Surveyors regarded this site as a marginal example of the Annex I habitat, as it is primarily a birch wood with 91E0 elements

(*Fraxinus excelsior, Alnus glutinosa* and *Salix* spp.). Target tree regeneration does not appear to be a problem at the monitoring sites, with all sites passing this criterion, *Fraxinus excelsior* in particular having excellent regeneration rates. Only one site, 1288 Game Wood, a heavily grazed site within Killarney National Park, failed on other native tree regeneration. The amount of dead wood within 91E0 is typically high, with only two sites failing this criterion (1849 Kilcannon and 1293 Glen Bog).

The Future Prospects parameter was assessed as Unfavourable-Bad. This was due to pressures/threats comprising invasive non-native species (95% of sites), Ash Dieback (22.5% of sites), forestry clearance (15% of sites) and problematic native species (12.5% of sites).

Ash Dieback has the potential to result in widespread loss of *Fraxinus excelsior* from woodland habitats over the next few decades (Broome & Mitchell, 2017). The disease is now fully established and has been identified from all counties in Ireland (COFORD, 2020). As of 31st July 2017, at the time of this survey, the disease was confirmed from 384 forestry plantations across 24 counties in the Republic of Ireland. It was confirmed from native hedgerows across 17 counties and from roadside landscaped plantings across 14 counties (DAFM, 2018b). In April 2018, the Department of Agriculture, Food and the Marine (DAFM) concluded that control was no longer feasible due to the extent of the disease. There were no records of Ash Dieback during the Woodland Monitoring Survey 2011-2012. In 2017-2018, the disease was suspected from nine sites: 316 Ballynattin, 388 Derrycarne Demesne South, 423 Inisfale Wood, 544 Gubroe (Castle Forbes), 1084 Gaybrook Demesne, 1213 Auburn, 1293 Glen Bog, 1669 Cuscarrick and 1932 Marl Bog.

Ash Dieback has the potential to drive substantial change in the canopy and ground flora composition of ash-dominated sites (Mitchell *et al.,* 2016). According to DAFM (2018b) young *Fraxinus excelsior* plants are more immediately susceptible, older trees succumb to the disease more slowly, and mature trees can survive infection for several years. At the majority of monitoring sites, this disease was only detected in saplings. However, at sites 1084 Gaybrook Demesne, Co. Westmeath and 1669 Cuscarrick, Co. Galway, it was evident that canopy trees were also impacted. Both sites contain invasive non-native shrubs and trees; a reduced canopy cover resulting from dieback will likely result in further proliferation of these and/or problematic native species such as *Rubus fruticosus*. According to Lawrence & Cheffings (2014), at sites where *Fraxinus excelsior* is common (*i.e*. occupying >20% of the canopy), the large gaps created will be filled by other trees currently in the woodland and/or the surrounding area. Where gaps are smaller (*i.e*. loss of only one or two trees), the canopies of existing trees will expand to fill the gaps. There is also a chance the disease could lead to an increase in woodland clearance events (*e.g*. if sites lose a large proportion of canopy trees or if they lose trees along their edge). Research on the disease is ongoing both in Ireland and elsewhere in Europe to develop trees with a tolerance of the disease (COFORD, 2020; Teagasc, 2022).

Of the 40 monitoring sites surveyed in 2017-2018, conservation measures were recorded from four sites (10%). Two of these sites were NPWS-managed, one was within a Coillte Biodiversity Area, and the other was directly adjacent to a Coillte LIFE site. The conservation measures recorded were non-native species removal (three sites), natural regeneration on an adjacent clearfell (one site) and drain blocking (one site). No conservation measures were recorded from 91E0 habitat on privately-owned land.

Improving the conservation status of Annex I habitat 91E0 is highly dependent on preventing further losses, on actively increasing the habitat area and undertaking conservation measures to restore degraded habitats. This can in part be realised through the Native Woodland Schemes. Incentivising farmers to maintain and enhance natural habitats on their farms and full enforcement of environmental laws (*e.g*. Environmental Liability Regulations) are necessary for the habitat to attain favourable conservation status nationally.

3.6 Conclusions and recommendations

- The total mapped area for priority 91E0 habitat as reported in the National Conservation Assessment document is 19.64 km^2. The 40 monitoring sites cover 2.2 km^2 (11.3% of the national resource). This is considered to be a representative sample.
- There are still unmapped areas of 91E0 habitat. These remaining sites need to be identified and mapped. If a large number of new sites were identified, consideration should then be given to extending the monitoring network.
- The majority of the mapped 91E0 habitat was identified by the National Survey of Native Woodlands 2003-2007 (NSNW) (Perrin *et al.,* 2008). However, site selection for the NSNW excluded woodlands below certain minimum thresholds (*i.e.* below 1 ha in area or less than 40 m in width, or less than 20 m in the case of woodland along lakeshores or riverbanks). This means that smaller, very narrow and/or fragmented blocks of woodland were excluded from the survey. Also, only a subset of sites above the minimum threshold was surveyed due to the practical constraints of the project. This survey had a much broader remit than identifying areas of Annex I habitat.
- The impacts highlighted in this report need to be addressed if progress is to be made towards attaining Favourable status. The main negative impacts on 91E0 are invasive non-native species.
- Widespread control of invasive non-native species is required if the conservation status of this priority habitat is to be improved. At-risk sites should be identified and establishment of problematic species prevented (*e.g*. by examining the distributions of invasive non-native species such as *Impatiens glandulifera*). Eradication programmes are required for sites already infested.
- An active national strategy to achieve sustainable deer grazing levels is urgently required. Co-ordinated local and/or regional deer management groups have an important role to play, especially in deer hotspots. Where necessary, individual land managers can undertake site-level passive deer control by fencing (*e.g*. wire-and-post, movable A-frame, dead-hedging) and/or planting with tree shelters.
- Ash Dieback disease poses a significant threat to the integrity of priority 91E0 Annex I habitat, especially ash-dominated sites. This has implications for both the Structure and Functions and Future Prospects assessment for the habitat. Careful site-level management is needed to ensure that light gaps created by dieback are colonised by native species rather than invasive non-native species.
- The presence of disease should be added as a Structure and Functions assessment criterion at the individual-plot level.
- It is recommended that the cover of *Fraxinus excelsior* in the canopy, native shrub layer and field layer be recorded from plots. The frequency of *Fraxinus excelsior* within the monitoring polygon should also be recorded (*e.g*. under the headings: Absent, Rare, Occasional, Locally frequent, Frequent, Abundant).
- Biosecurity measures were employed during this survey to prevent the movement of infected plant material (*i.e*. disinfecting boots, removing soil and leaf debris from clothes and kit). This is recommended for future monitoring surveys and/or site visits. Any amenity areas with Ash Dieback should have signs erected to notify the public.
- Preliminarily studies from the UK indicate that *Alnus glutinosa* best replicates the ecosystem functions of *Fraxinus excelsior*. This could be a good planting alternative to *Fraxinus excelsior* where soil conditions allow (Broome & Mitchell, 2017).
- No upper cover/height limit was set for *Rubus fruticosus* during the current survey. Ecologically this species can proliferate under a wide range of conditions *e.g*. undergrazing, increased light levels, presence of a deer fence and/or sites drying out. The presence of vigorous *R. fruticosus* growth is captured by existing criteria

comprising a reduction in positive indicator species, low canopy cover and/or low native shrub layer. Placing an upper limit on the height of the field layer would penalise sites with large numbers of tall seedlings (≤2 m). It is recommended that future monitoring surveys continue to record the cover and height of *R. fruticosus* within plots, as it will provide valuable data to assess how these plots develop over time. However, it is not proposed for this to become an assessment criterion.

- It is recommended that the site 1213 Auburn be removed from the monitoring programme, as it has only tenuous affinities to this Annex I habitat. This site overlies fen peat and has high covers of *Molinia caerulea* and *Betula pubescens* throughout.

4 91D0 Bog woodland

4.1 Interpretation of 91D0 habitat for this survey

Bog woodland is a very distinctive woodland type. The definition presented in the Interpretation Manual of European Habitats (CEC, 2013) is as follows: 'Coniferous and broad-leaved forests on a humid to wet peaty substrate, with the water level permanently high and even higher than the surrounding water table. The water is always very poor in nutrients (raised bogs and acid fens). These communities are generally dominated by *Betula pubescens, Frangula alnus, Pinus sylvestris, Pinus rotundata* and *Picea abies*, with species specific to bogland or, more generally, to oligotrophic environments, such as *Vaccinium* spp., *Sphagnum* spp., *Carex* spp. [Vaccinio-Piceetea: Piceo-Vaccinienion uliginosi (Betulion pubescentis, Ledo-Pinion) i.a.].' Four sub-types are listed, of which only the *Sphagnum* birch woods type is currently recognised in Ireland (Cross & Lynn, 2013a). The Irish Vegetation Classification (IVC) (Perrin, 2016) places 91D0 habitat within the WL4 *Betula pubescens – Molinia caerulea* group. Two vegetation communities in this group have an affinity to the Annex I habitat, namely WL4C *Betula pubescens – Sphagnum palustre woodland* (77.8% affinity) and WL4E *Betula pubescens – Salix cinerea woodland* (17.0% affinity).

For the purposes of this survey, woodland dominated by a *Betula pubescens* canopy with a *Sphagnum* cover ≥25% is classified as bog woodland. This includes some areas which are transitional to carr but species indicative of ground-water influence should only be minor constituents*. Betula pubescens* is the dominant species and typically there is a thin shrub layer consisting mostly of willows (*e.g*. *Salix aurita, S. cinerea*). *Pinus rotundata* and *Picea abies* do not occur on raised bogs in Ireland and *Frangula alnus* is very rare. *Pinus sylvestris* occurs locally, especially on raised bogs, but is not a constant species. The dwarf shrub and field layers may be poorly to well-developed. Typical dwarf shrub species include *Calluna vulgaris* and typical herbs include *Molinia caerulea, Juncus effusus* and *Dryopteris dilatata*. In contrast, the moss layer is well developed and is dominated by *Sphagnum* species, often also with an abundance of *Polytrichum commune* (Cross & Lynn, 2013a). Epiphytic moss and lichen communities are a characteristic feature of bog woodlands *e.g*. *Parmelia* spp., *Ramalina* spp., and *Usnea* spp. (NPWS, 2007). The general structure of the habitat is presented in Figure 17.

Figure 17 91D0 habitat at Muff, Co. Donegal. Photograph © NPWS. Taken by Fionnuala O'Neill.

Bog woodland occurs in three distinct habitats:

- On raised bogs, where it is associated with weakly flushed sites on the high bog. Typical raised bog species, such as *Eriophorum vaginatum* and the dwarf shrubs *Vaccinium oxycoccos* and *Empetrum nigrum*, may occur and in places *Myrica gale* is abundant.
- On cutaway bog (locally fen), where it sometimes occurs in association with weak ground-water influence, indicated by the presence of carr species, *e.g*. *Fraxinus excelsior*, *Equisetum palustre*.
- Within sessile oak (*Quercus petraea*) woodlands, in association with nutrient-poor flushes and with small amounts of characteristic oak woodland species, *e.g*. *Blechnum spicant*.

Bog woodlands are closely linked to precise hydrological conditions that are required for both their initiation and maintenance. These conditions are characteristically restricted to small areas, and consequently the area of individual bog woodlands is typically small. Bog woodlands on raised bog and within sessile oak woodlands are considered more or less permanent, provided hydrology remains stable, whereas bog woodlands on cutover may represent a more transient community that gradually reverts to raised bog or dries out to become another woodland type (Cross & Lynn, 2013a).

In addition, groundwater-fed examples of the 91D0 habitat are categorised as Groundwater-dependent Terrestrial Ecosystems (GWDTEs) under the Irish interpretation of the Water Framework Directive (WFD). Objectives under the WFD include the requirement that anthropogenic pressures on groundwater bodies shall not result in any 'significant damage' to GWDTEs (Kilroy *et al.,* 2008).

4.2 Review of baseline methodology

91D0 plot size and plot number

Plots size was maintained consistently at 10 m x 10 m. This was implemented following a review of the baseline survey, which indicated that plot sizes of 10 m x 10 m and 20 m x 20 m were used interchangeably, among and across sites. The smaller plot size reduces edge effects, in what are often narrow and/or small blocks of dispersed woodland. It also allowed four plots to be recorded at all sites. An increase in monitoring plot sample size reduced reliance on expert judgement when assessing Structure and Functions, especially at those sites where only two plots were recorded during the Woodland Monitoring Survey 2011-2012 (sites 1649 Addergoole, 1402 Burren and 607 Cloonshanville).

Dead wood

Cross & Lynn (2013a) recommended a revision of the dead wood criterion, stating that the initial targets were set too high (*i.e*. ≥1 old/senescing tree or dead stem in two plots, plus ≥4 standing dead or fallen dead with DBH ≥10 cm present across all four plots). The reduced plot size in 2017-2018 reinforced the need for a revision. Following analysis of the 2017-2018 field data, targets were set at ≥3 old trees and dead wood with DBH ≥10 cm from any of three dead wood categories present across all four plots.

Canopy

The definition of canopy within bog woodlands was set at ≥4 m following Fossitt (2000). Outlining this definition was necessary as field surveyors noted that some plots had a significant open shrub layer (*i.e*. trees between 1-3.9 m). The assessment criterion median canopy height (m) now only records the median height of trees that are ≥4 m and the percentage canopy cover (%) criterion only records the cover of trees that are ≥4 m.

Data on open shrub layer

Data on the median height (m) and percentage cover (%) of the open shrub layer (*i.e*. trees of 1-3.9 m) were collated in 2017-2018. These are valuable data for assessing how these plots change over time.

Positive indicators

Salix x *multinervis* was added as a positive indicator species. This tree is a hybrid of *S. aurita* and *S. cinerea*, both of which were listed as positive indicators in the baseline methodology. According to Preston *et al.* (2002), *S.* x *multinervis* is a 'shrub or small tree [which] can occur on woodland margins on acidic soils, growing where the parent species coexist, and often where *S. aurita* is absent'.

Data on vigorous species

The baseline methodology already recorded the percentage cover (%) of *Pteridium aquilinum* and *Rubus fruticosu*s within plots. These species can behave as problematic native species within the 91D0 habitat and are considered to be negative indicators for the habitat. In 2017-2018 the median height (cm) of *R. fruticosus* was also recorded.

Data on *Pinus sylvestris*

Pinus sylvestris is a reintroduced species in Ireland, with a putative native population occurring on limestone pavement in the Burren (Roche *et al.*, 2018). It can act as a pioneer species, particularly on raised bogs which have undergone drainage or disturbance (Stoll *et al.,* 1994). Cross & Lynn (2013a) suggested including *P. sylvestris* as a negative indicator for the 91D0 habitat, stating that higher covers of this species can indicate that the habitat is drying out.

Based on this, the following *P. sylvestris* data were collated:

- percentage (%) cover in plots,
- *P. sylvestris* DBH within four size classes in plots,
- frequency in the polygon: Absent, Rare, Occasional, Locally frequent, Frequent, Abundant.

Grazing pressure

Similar to the updated 91A0 and 91E0 methodologies, the grazing pressure indicator of bark stripping was changed so that only severe recent bark stripping was recorded.

4.3 Methodology

4.3.1 Polygon selection

For the nine sites previously surveyed by Cross & Lynn (2013a), the monitoring polygons from the 2011-2012 survey were used. NPWS selected six additional 91D0 sites for survey in 2017-2018. Polygon boundaries for these sites were derived from the 91D0 polygon distribution map given in NPWS (2013). Indicative monitoring plot locations were marked on the field maps prior to the field survey. New monitoring plots were added to the sites surveyed by Cross & Lynn (2013a) which had fewer than four plots recorded in 2011-2012. Provisional plot locations were repositioned as necessary by surveyors in the field, bearing in mind the recommendations in Cross & Lynn (2013a) for plot placement.

4.3.2 Field survey and monitoring plots

Survey work was carried out between 30th June and 11th September in 2017 and between 29th May and 4th September in 2018. Locations of the surveyed 91D0 polygons are shown in Figure 18.

On arrival at the polygon, an initial assessment was made as to whether it conformed to 91D0 woodland. One site was rejected (297 Killeany, Co. Laois). The cover of *Sphagnum* was ≤5%, with this site being more representative of wet woodland than bog woodland.

At the remaining fourteen sites, detailed assessments were conducted at the four monitoring plots within the polygon, each plot measuring 10 m x 10 m and containing the target species. For plots previously surveyed in 2011-2012, the same locations (or as close as local conditions allowed) were revisited, using the grid references and other plot information provided. Slope and aspect were recorded and a photograph of the plot was taken.

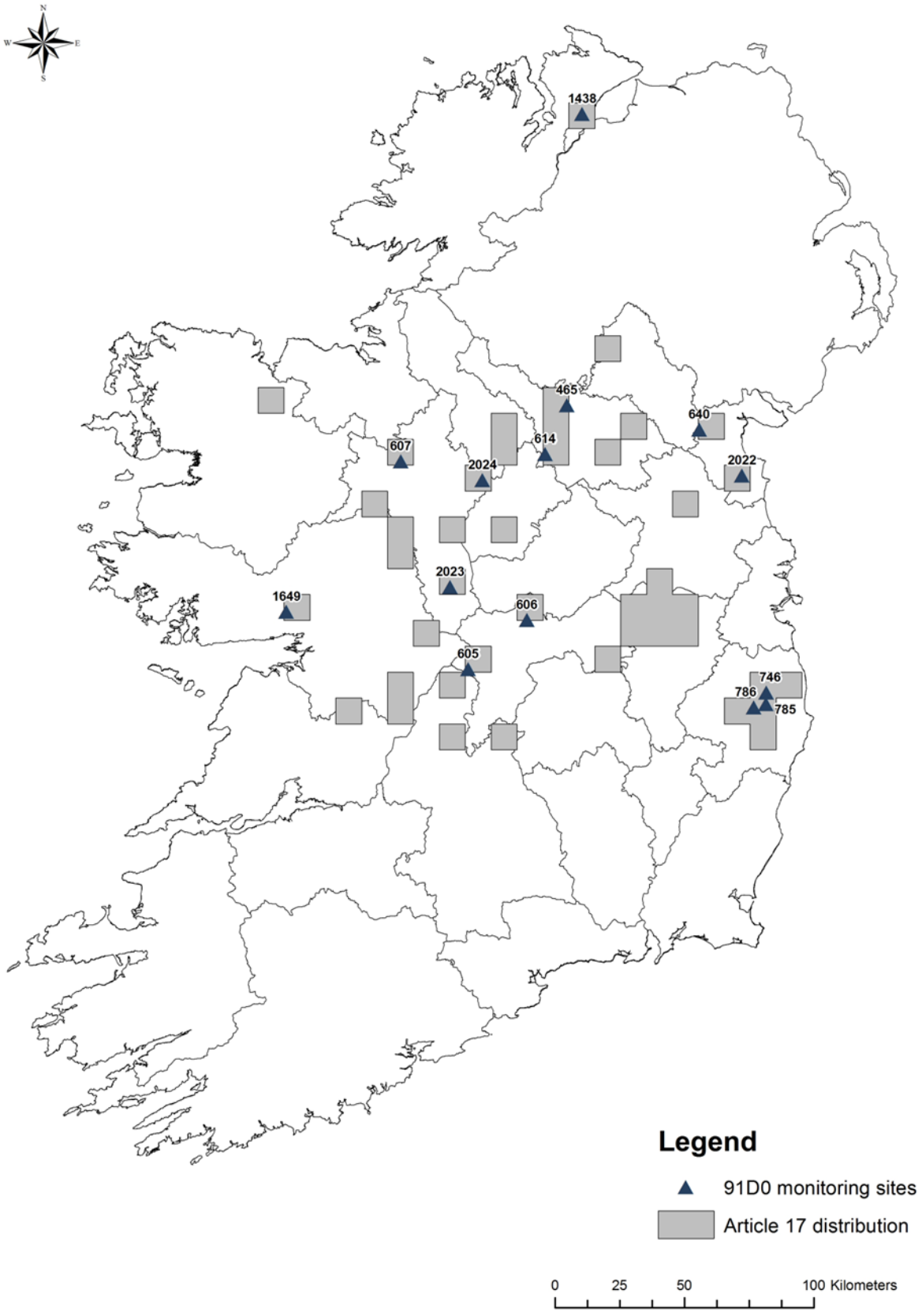

Figure 18 Location of the 14 91D0 monitoring sites. The 10 km distribution of 91D0 habitat in the Republic of Ireland (NPWS, 2019) is also displayed.

4.3.3 Area assessment

The Area parameter was assessed in the field, taking note of any recent losses in the monitoring polygon evident during the survey. Any area losses were marked on the field maps and then mapped digitally in the office. Area loss was calculated as a percentage of the original (pre-loss) area as follows:

(Current area / (Current area + area lost)) x 100

This was divided by the number of years since the site was surveyed by the baseline monitoring survey to derive the equivalent annual percentage loss in area as required for assessing Conservation Status (Table 2).

4.3.4 Structure and Functions: data collected

The methodology employed for the monitoring and conservation assessment was based on that used in the previous monitoring survey (Cross & Lynn, 2013a). Any changes to the baseline methodology as outlined in Section 4.2 of this report have been incorporated in the text below. Data sheets are reproduced in Appendix I. Within each plot, the following data were recorded for the Structure and Functions assessment.

Species

- Presence of positive indicator species. Table 43 lists the indicator species for 91D0 woodlands.
- Presence of negative indicator species (*i.e*. non-native species, including herbaceous species).
- Total cover of the negative indicator *Pteridium aquilinum* as percentage of plot.
- Total cover of the negative indicator *Rubus fruticosus* as percentage of plot.
- Median height in centimetres of *R. fruticosus* in plot.
- Total cover of *Urtica dioica* as percentage of plot.
- Total cover of *Pinus sylvestris* as percentage of plot.

Woodland structure

- Median canopy height in metres. Canopy was defined as trees ≥4 m tall. Tree height was measured using a clinometer.
- Total canopy cover as percentage of plot. Crown extent rather than area covered by leaves was estimated to allow more consistent recording, regardless of seasonal variation in canopy.
- Median open shrub layer height in metres. Open shrub layer was defined as trees 1-3.9 m tall that were not under canopy.
- Total open shrub layer cover as percentage of plot.
- Total cover of the target species as percentage of plot (this was later converted to the percentage of the target species in the canopy).
- Total cover of negative species as percentage of plot.
- Total dwarf shrub layer cover as percentage of plot.
- Total *Calluna vulgaris* cover as percentage of plot.
- Total *Sphagnum* cover as percentage of plot.

- Total bryophyte layer cover as percentage of plot.

Cover scores were recorded as a percentage of the plot area to the nearest 5%, or to the nearest 1% if less than 5%. A cover score of <1% was also permitted.

Grazing pressure

Grazing pressure (*i.e*. overgrazing) was recorded based on the presence of the following four indicators: topiary effect on shrubs and young trees, browse line on mature trees, abundant dung, and severe recent bark stripping.

Free regeneration

Free regeneration refers to regeneration that appears to have originated from seed. When counting free regeneration, only separate regenerating units were counted, *i.e*. several shoots arising from a single root were regarded as a single regenerating unit.

- Number of target species saplings. For the target species, *Betula pubescens,* the term "sapling" refers to young regenerating tree species with a diameter less than 5 cm and measuring 1 m or more in height.
- Number of saplings of each non-target native tree species. For non-target species, the term "sapling" refers to young regenerating tree species with a DBH (diameter at breast height, *i.e*. at 1.3 m) less than 7 cm and measuring 2 m or more in height.
- Number of seedlings of each negative tree species.
- Number of saplings of each negative tree species.
- Presence of free regeneration of negative shrub species such as *Rhododendron ponticum,* or invasive herbaceous species, regardless of height.

Tree girth

- The DBH of the target species, *Betula pubescens*, was tallied within three size classes: size class 1 = 5-<10 cm; size class 2 = 10-<20 cm; size class 3 = ≥20 cm.
- The DBH of *Pinus sylvestris* was tallied within four size classes: size class 1 = 7-<20 cm; size class 2 = 20-<30 cm; size class 3 = 30-<40 cm, size class 4 = ≥40 cm.
- For multi-stemmed trees, only the largest trunk was counted and assigned to the appropriate DBH size class. The occurrence of large numbers of multi-stemmed trees, or trees with very numerous stems, was noted.
- Trees with forked trunks were measured below the fork if forking occurred more than 1 m up from the base.

Dead wood

Dead wood with a diameter of at least 10 cm was recorded in three categories: old/senescing tree or dead stem, standing dead and fallen dead. Dead wood was recorded regardless of whether the tree was a target, non-target native or non-native species.

Table 43 List of positive indicator species for 91D0 woodlands.

91D0
Target species:
Betula pubescens
Other trees:
Salix aurita
Salix cinerea
S. x multinervis
Dwarf Shrubs, Herbs, Ferns & Graminoids:
Calluna vulgaris
Carex rostrata
Dryopteris carthusiana
Dryopteris dilatata
Empetrum nigrum
Epilobium palustre
Juncus effusus
Molinia caerulea
Potentilla erecta
Vaccinium myrtillus
Vaccinium oxycoccos
Mosses:
Aulacomnium palustre
Hylocomium splendens
Polytrichum commune
Sphagnum fallax
Sphagnum fimbriatum
Sphagnum palustre

4.3.5 Structure and Functions: assessment

Assessments were made at the individual-plot and four-plot levels, and these were combined to give an assessment at the polygon level. The criteria assessed for 91D0 woodland are shown in Table 44 (individual-plot level criteria) and Table 45 (four-plot level criteria). Of the nine criteria assessed at the individual-plot level, seven had to reach their target to achieve a pass. Of the three criteria assessed at the four-plot level, two had to reach their target to achieve a pass. For the overall polygon level assessment, a green (Favourable) assessment result could be achieved only if all plots passed at the individual-plot level and at the four-plot level (*i.e*. five passes achieved). One failure out of the five was allowed for a polygon to receive an amber (Unfavourable – Inadequate) assessment. More than one failure resulted in a red (Unfavourable – Bad) assessment. This process is summarised in Table 46.

The area (ha) of 91D0 habitat in ‘good’ and ‘not-good’ condition as required for Article 17 reporting was derived from the Structure and Functions results. Following NPWS guidance the

following approach was applied: for each monitoring site, equal weight was applied to individual-plot assessment results (n = 4) and the four-plot level assessment result (n = 1), with a Pass equal to 20% and a Fail equal to 0%. For example: A site with three passes and one fail at the individual-plot level (20 + 20 + 20 + 0 = 60) and a pass at the four-plot level (20) had 80% (60 + 20 = 80) of its area in 'good' condition, with the remaining 20% in 'not-good' condition.

N.B. These criteria are to be used for conservation status assessment of 91D0 woodlands. They are not to be used to determine Annex I status. The Annex I habitat 91D0, as it occurs in the Irish context, is defined in Section 4.1.

Table 44 Assessment criteria at the individual-plot level for 91D0 woodlands

	Assessment criterion	**91D0 target for pass**
1	Positive indicator species	Presence of *Betula pubescens*
		Presence of *Sphagnum* sp.
		≥5 other positive species
2	Negative species cover	≤10% cover of plot
3	Median canopy height	≥4 m
4	Total canopy cover	≥30% of plot
5	Proportion of *Betula* in canopy	≥50% of canopy
6	Native dwarf shrub layer cover	<50% of plot
7	*Calluna vulgaris* cover	<40% of plot
8	*Sphagnum* cover	≥25% of plot
9	Total bryophyte cover	≥50% of plot

Table 45 Assessment criteria at the four-plot level for 91D0 woodlands.

	Criterion	**Target for pass**
1	*Betula pubescens* size class distribution	At least 1 of each size class present over all 4 plots
2	*Betula pubescens* regeneration	At least 1 sapling ≥1 m tall in each plot
3	Old trees and dead wood	At least 3 from any category (DBH ≥10 cm)

Table 46 Summary of conditions required for Structure and Functions (S&F) assessment results at the individual-plot, four-plot and polygon levels.

Level	No. of criteria assessed	Required for pass	Best result	Worst result
1-plot	9	Passes in ≥7 criteria	Four Passes	Four Fails
4-plot	3	Passes in ≥2 criteria	Pass	Fail
Polygon	Four 1-plot results + one 4-plot result	Various - see below	Green	Red

No. of 1-plot passes	4-plot result	Polygon S&F assessment result
4	Pass	Green
3	Pass	Amber
4	Fail	Amber
<3	Pass	Red
<4	Fail	Red

4.3.6 Pressures and threats: data collected

The Future Prospects assessment relates to the likely development and maintenance of the Annex I woodland habitat in Favourable condition for the foreseeable future. In order to assess Future Prospects, pressures, threats and impacts throughout the polygon were recorded according to the list given by Ssymank (2011). The following details were recorded for each impact: the intensity of the impact (high, medium or low), effect (positive, negative or neutral), percentage of the polygon affected, and source of the impact (from inside or outside the polygon). The data sheet for recording impacts is shown in Appendix II. Impacts in adjacent Annex I woodland were also noted to provide additional information on the Future Prospects of the Annex I habitat as a whole, particularly where these could impact negatively on the monitoring polygon in the future.

The surveyors' subjective assessment of the woodland polygon's Future Prospects was given according to the following guidelines:

- Green = excellent/good prospects; no significant impact from pressures/threats expected; long-term viability assured.
- Red = bad prospects; severe impact from pressures/threats expected; long-term viability not assured.
- Amber = between these two extremes.

These subjective assessments can be viewed in the Woodlands Monitoring Microsoft Access database that accompanies this report.

4.3.7 Future Prospects: assessment

EU guidance states that the habitat's Future Prospects parameter *"should be evaluated by individually assessing the expected future trends and subsequently Future Prospects of each of the other three parameters [Range, Area, and Structure and functions], taking primarily into account the current conservation status of the parameter, threats (related to the parameter assessed) and the conservation measures being taken or planned for the future. Once the*

Future Prospects of each of the other three parameters have been evaluated, they should be combined to give the overall assessment of Future Prospects" (DG Environment 2017).

Future Prospects were assessed at the site level by evaluating the Future Prospects and future expected trend of Area and Structure and Functions at each site, and examining the current pressures, future threats and conservation measures operating on the habitat. Guidance provided by the EU (DG Environment 2017) was followed to determine the future trends and Future Prospects of each parameter. For the target Annex I woodland habitats to be assessed as having Favourable Future Prospects, their prospects had to be judged to be good, with no severe impacts expected from threats and the habitat expected to be stable or improving in the long term. For it to be assessed with Unfavourable-Bad Future Prospects, its prospects had to be judged to be bad, with severe impacts expected from threats and the habitat expected to decline or disappear in the long term. An assessment of Unfavourable-Inadequate Future Prospects was between these two extremes.

To help evaluate Future Prospects according to the above guidance, the pressures, threats and positive activities occurring in each site were evaluated. The surveyors' subjective assessments of the Future Prospects of the habitat at the sites were also considered.

4.3.8 Overall condition assessment

The conservation condition assessment for the Annex I woodland habitat at each site was evaluated based on the results of all three parameters, according to the evaluation matrix in Table 2 and using the guidance provided by the EU (DG Environment 2017). The criteria for all three parameters were combined and an overall conservation status of the sites is presented.

4.4 Results

4.4.1 Area parameter

Table 47 gives a summary of the results of the Area assessment for the 14 91D0 polygons surveyed. All sites (100%) received a green assessment as no area loss was recorded.

Table 47 Summary of the Area assessment results for 91D0 polygons surveyed in 2017-2018

Site no.	Site name	County	Area (ha) in 2018	Area lost since 2012	% Area loss per annum (6 years)	Area assess-ment
465	Annagh	Cavan	2.8	0	0	Green
605	All Saints	Offaly	14.3	0	0	Green
606	Clara Bog	Offaly	1.5	0	0	Green
607	Cloonshanville	Roscommon	2.2	0	0	Green
614	Corndonaghy Bog	Cavan	4.5	0	0	Green
640	Red Bog	Louth	4.2	0	0	Green
746	Baltynanima	Wicklow	7.1	0	0	Green
785	Castlekevin	Wicklow	2.4	0	0	Green
786	Giant's Cut	Wicklow	5.2	0	0	Green
1438	Muff	Donegal	12.9	0	0	Green
1649	Addergoole	Galway	1.2	0	0	Green
2022	Burren	Louth	4.3	0	0	Green
2023	Ballynamona Bog	Roscommon	2.4	0	0	Green
2024	Clooneen	Longford	1.7	0	0	Green

4.4.2 Structure and Functions

4.4.2.1 Polygon results

Table 48 gives a summary of the results for Structure and Functions for the fourteen 91D0 polygons surveyed. Ten polygons (71.4%) received a green Structure and Functions assessment, with four polygons (28.6%) receiving an amber assessment. No polygons received a red assessment.

The above results take account of discretionary passes, which were allowed in a number of cases. Site 614 Corndonaghy Bog, originally received an amber assessment due to two criteria failing at the four-plot level, including *Betula pubescens* size class (with no large tree ≥20 cm recorded from the plots). However, since a large tree was observed in close proximity to the edge of one plot, a discretionary pass was allowed. Site 640 Red Bog originally received an amber assessment due to two criteria failing at the four-plot level, including dead wood. However, since four standing dead ≥10 cm occurred on the edge of one plot, a discretionary pass was allowed. Site 2022 Burren was also given a discretionary pass for dead wood. This is an extremely wet site with stunted tree growth. Dead wood ≥10 cm was only recorded from one plot. However, small-diameter dead wood, including old/senescent trees, was frequent throughout; on this basis, a discretionary pass was allowed. Based on these discretionary passes, all three sites received green assessments.

Table 48 Summary of Structure and Functions (S&F) results at the individual-plot level, four-plot level and polygon level for the 14 91D0 polygons surveyed in 2017-2018.

			1-plot level	4-plot level	Polygon level S&F
Site no.	**Site name**	**County**	**No. of plots in site that passed**	**Result (Pass/Fail)**	**Green/Amber/Red**
465	Annagh	Cavan	4	Pass	Green
605	All Saints	Offaly	4	Pass	Green
606	Clara Bog	Offaly	4	Pass	Green
607	Cloonshanville	Roscommon	4	Pass	Green
614	Corndonaghy Bog	Cavan	4	Pass	Green
640	Red Bog	Louth	4	Pass	Green
746	Baltynanima	Wicklow	3	Pass	Amber
785	Castlekevin	Wicklow	3	Pass	Amber
786	Giant's Cut	Wicklow	4	Pass	Green
1438	Muff	Donegal	4	Pass	Green
1649	Addergoole	Galway	4	Pass	Green
2022	Burren	Louth	4	Pass	Green
2023	Ballynamona Bog	Roscommon	4	Fail	Amber
2024	Clooneen	Longford	3	Pass	Amber

The Structure and Functions results from the previous and the current survey are compared in Table 49. Of the nine 91D0 sites monitored by both surveys, there was no change in the results at eight sites (88.9%) and a decline in the result at one site (11.1%).

Table 49 Comparison of the Structure and Functions (S&F) results for the 2011-2012 and 2017-2018 91D0 woodland monitoring surveys. A dagger (†) after the SAC code indicates that 91D0 is a qualifying interest for the SAC.

Site no.	Site name	SAC code	S&F result 2011-12	S&F result 2017-18	Trend direction	Rationale
465	Annagh	000007†	Green	Green	No change	
605	All Saints	000566†	Green	Green	No change	
606	Clara Bog	000572†	Green	Green	No change	
607	Cloonshanville	000614†	Green	Green	No change	
640	Red Bog		Green	Green	No change	
785	Castlekevin		Green	Amber	Decline	Plot 1 failed on more criteria in 2017-2018 including bryophyte cover and positive indicator spp. Only 3 plots were recorded in 2011-2012.
786	Giant's Cut	002122	Green	Green	No change	
1649	Addergoole	000297†	Green	Green	No change	
2022	Burren		Green	Green	No change	

4.4.2.2 Area in good condition

The area of 91D0 habitat in ‘good’ and ‘not-good’ condition for the 14 polygons surveyed is presented in Table 50. The overall area of 91D0 habitat surveyed in ‘good’ and ‘not-good’ condition is presented in Table 51.

Of the 66.8 ha surveyed, 64.1 ha (95.9%) was assessed as ‘good’ condition and 2.7 ha (4.1%) was assessed as ‘not-good’ condition.

Table 50 Area of 91D0 habitat in 'good' and 'not-good' condition in 2017-2018.

Site no.	Site name	Total no. passes (max.= 5)	Total no. fails (max .=5)	% no. passes	% no. fails	Total area (ha)	Area in good condition (ha)	Area in not-good condition (ha)
465	Annagh	5	0	100	0	2.8	2.8	0.0
605	All Saints	5	0	100	0	14.3	14.3	0.0
606	Clara Bog	5	0	100	0	1.5	1.5	0.0
607	Cloonshanville	5	0	100	0	2.2	2.2	0.0
614	Corndonaghy Bog	5	0	100	0	4.5	4.5	0.0
640	Red Bog	5	0	100	0	4.2	4.2	0.0
746	Baltynanima	4	1	80	20	7.1	5.7	1.4
785	Castlekevin	4	1	80	20	2.4	1.9	0.5
786	Giant's Cut	5	0	100	0	5.2	5.2	0.0
1438	Muff	5	0	100	0	12.9	12.9	0.0
1649	Addergoole	5	0	100	0	1.2	1.2	0.0
2022	Burren	5	0	100	0	4.3	4.3	0.0
2023	Ballynamona Bog	4	1	80	20	2.4	2.0	0.5
2024	Clooneen	4	1	80	20	1.7	1.4	0.3
	Total					**66.8**	**64.1**	**2.7**

Table 51 Total area of 91D0 habitat in 'good' and 'not-good' condition in 2017-2018.

Condition	Total area (ha)	Percentage (%) of area surveyed
'good'	64.1	95.9
'not-good'	2.7	4.1
Total	**66.8**	**100**

4.4.2.3 Criteria results

Table 52 summarises the pass rates for the individual monitoring criteria measured in 2017-2018 at the 14 91D0 sites.

Individual-plot structural criteria

The 14 sites had a pass rate ≥95% for six criteria comprising negative species cover, total canopy cover, median canopy height, proportion of *Betula pubescens* in the canopy, *Calluna vulgaris* cover and bryophyte cover. There were slightly lower pass rates for positive indicator species (91%), native dwarf shrub layer cover (89%) and *Sphagnum* cover (91%).

Four-plot structural criteria

At the four-plot level, the highest pass rate was for old trees and dead wood (86% pass rate). Failure rates were high for *Betula pubescens* regeneration (29% failure rate) and *Betula pubescens* size class distribution (36% failure rate). All failures under the *Betula pubescens* size class distribution criterion (5 out of 5) were attributed to lack of trees in the large size class (≥20 cm).

Table 52 Pass and failure rates for individual Structure and Functions monitoring criteria at the individual-plot and four-plot levels for the 14 91D0 sites surveyed in 2017-2018. The number of discretionary passes allowed is also displayed.

	% Pass	% Fail	No. of discretionary passes
Individual-plot level criteria			
Positive indicator species	91	9	-
Negative species cover	98	2	-
Median canopy height	100	0	-
Total canopy cover	95	5	-
Proportion of target species in canopy	96	4	-
Native dwarf shrub layer cover	89	11	-
Calluna vulgaris cover	100	0	-
Sphagnum cover	91	9	-
Bryophyte cover	96	4	-
Overall pass (individual-plot level)	95	5	
Four-plot level criteria			
Target species size class distribution	64	36	1
Target species regeneration	71	29	-
Old trees and dead wood	86	14	2
Overall pass (four-plot level)	93	7	

Negative species: Most frequent negative taxa

The most commonly recorded negative taxa are shown in Table 53. In total, six taxa were recorded in the plots. The most frequent negative species was *Rubus fruticosus* (92.9% of sites), followed by *Pteridium aquilinum* (35.7% of sites) and *Acer pseudoplatanus* (21.4% of sites). The other negative trees were *Fagus sylvatica* (14.3% of sites), *Picea sitchensis* and *Pinus contorta* (7.1% of sites each). Although not recorded in the plots, non-native shrubs were present at the sites. These species are discussed further under negative impacts.

Table 53 Negative taxa recorded in plots at the 91D0 sites surveyed in 2017-2018.

Negative taxa	Frequency in 91D0 sites (*n*=14)
Rubus fruticosus	13
Pteridium aquilinum	5
Acer pseudoplatanus	3
Fagus sylvatica	2
Picea sitchensis	1
Pinus contorta	1

Negative species: Cover and regeneration

As noted in Table 52, there were high pass rates for negative species cover (*i.e.* below the 10% threshold), with only one plot failing this criterion. This plot was at site 640 Red Bog, and failure was due to 15% cover of the negative species *Rubus fruticosus*.

Table 54 shows total regeneration statistics for negative tree species within the 91D0 plots. The total number of regenerating units, *i.e.* seedlings and saplings, was highest for *Fagus sylvatica*, with eight young plants recorded. The highest seedling number recorded within a single plot was three, *i.e*. three *Picea sitchensis* seedlings at site 786 Giant's Cut. The highest number of saplings recorded within a single plot was one, *i.e*. one *Fagus sylvatica* sapling at site 1438 Muff and one *Pinus contorta* sapling at 607 Cloonshanville.

Table 54 Negative tree species regeneration recorded in two height classes in 91D0 plots in 2017-2018.

	Acer pseudo-platanus		***Fagus sylvatica***		***Picea sitchensis***		***Pinus contorta***	
Height	<2m	≥2m	<2m	≥2m	<2m	≥2m	<2m	≥2m
Total no.	7	0	7	1	6	0	0	1
No. of plots	5	0	4	1	2	0	0	1
Median	1	0	2	1	3	0	0	1
Max. in 1 plot	2	0	2	1	3	0	0	1
Frequency (*n*=56 plots)	8.9	0.0	7.1	1.8	3.6	0.0	0.0	1.8

Pinus sylvestris: Cover and frequency

Pinus sylvestris was only recorded in three plots (5.4% of plots). The maximum cover of this species within these plots was 1%. Sites 605 All Saints and 2023 Ballynamona Bog each had a single *Pinus sylvestris* sapling in one plot. Site 2022 Burren had a single sapling and a small *Pinus sylvestris* tree (DBH 7-<20 cm) in one plot.

Table 55 summarises the frequency of *Pinus sylvestris* at the fourteen sites. It was absent from six sites (42.9%), occasional in three (21.4%) and rare in five (35.7%). There were no incidences of locally frequent, frequent or abundant *Pinus sylvestris.*

Table 55 Frequency of *Pinus sylvestris* within the 14 91D0 polygons. Options are Absent, Rare, Occasional, Locally frequent, Frequent or Abundant.

Site no.	Site name	*Pinus sylvestris* frequency
465	Annagh	Absent
607	Cloonshanville	Absent
614	Corndonaghy Bog	Absent
640	Red Bog	Absent
746	Baltynanima	Absent
785	Castlekevin	Absent
605	All Saints	Occasional
606	Clara Bog	Occasional
1438	Muff	Occasional
786	Giant's Cut	Rare
1649	Addergoole	Rare
2022	Burren	Rare
2023	Ballynamona Bog	Rare
2024	Clooneen	Rare

4.4.3 Pressures, threats and other activities

Prior to evaluating the Future Prospects parameter, the negative and positive impacts recorded for the 91D0 sites were examined. These are shown in Tables 56 and 57 respectively, together with the intensity (high, medium or low), percentage of the habitat affected, and total frequency for each of the activities. Neutral impacts are shown in Table 58. Neutral impacts were not considered when assessing the Future Prospects parameter.

4.4.3.1 Negative impacts

Negative impacts were recorded from all 14 91D0 sites (100%). J02.07 Water abstractions from groundwater refers to drainage. This impact was the most frequently recorded negative impact, occurring at 10 sites (71%). It was mostly recorded as low intensity but affected >75% of the habitat at seven sites. The majority of drains recorded were old rather than recent in origin.

I01 invasive non-native species was the second most frequently recorded impact, occurring at nine sites (64%). It was recorded as low intensity at all sites, and generally only affected <5% of the habitat. One exception was site 786 Giant's Cut, which had 75% of the habitat affected by *Picea sitchensis* and scattered *Rhododendron ponticum.* Other monitoring sites with *Rhododendron ponticum* include: 785 Castlekevin, 2023 Ballynamona Bog, 2022 Burren and 2024 Clooneen. *Fallopia japonica* was present at site 1438 Muff, with *Prunus laurocerasus* present at 2022 Burren.

C01.03 Peat extraction was a negative impact at five sites (36%). It was high intensity at two sites, medium intensity at two sites, and low intensity at one site. At four sites it affected >75% of the habitat due to drying impacts of this activity. Active peat cutting was recorded from two sites: 1649 Addergoole and 2024 Clooneen.

B06 Grazing in forests/woodland by deer was recorded as a medium intensity negative impact from three sites (21%): 746 Baltynanima, 785 Castlekevin and 786 Giant's Cut. These sites occur in upland valley situations in Co. Wicklow.

I02 Problematic native species, namely dense *Pteridium aquilinum*, was recorded from two sites, 2023 Ballynamona Bog and 2024 Clooneen. The presence of this species could indicate the habitat is drying out.

J01.01 Burning down was recorded from 2023 Ballynamona Bog. This refers to a recent fire on the open bog adjacent to the site, with approximately 5% of the woodland impacted.

C01.01.01 Sand and gravel quarries was negatively impacting site 605 All Saints. Quarrying takes place in two locations to the south of the bog complex and is impacting the hydrology of the site (Fernandez *et al.*, 2014).

The other negative impacts were nitrogen deposition from pig slurry (impact code H01.05) at site 640 Red Bog and dumping (impact code H05.01) at 2022 Burren.

Table 56 Summary of the negative impacts recorded in the 14 91D0 sites surveyed in 2017-2018

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
J02.07	Water abstractions from groundwater	2	3	5	2	1	7	10
I01	Invasive non-native species			9	8	1		9
C01.03	Peat extraction	2	2	1		1	4	5
B06	Grazing in forests/ woodland		3				3	3
I02	Problematic native species	1		1	2			2
H01.05	Diffuse pollution to surface waters due to agricultural and forestry activities			1		1		1
H05.01	Garbage and solid waste			1	1			1
J01.01	Burning down		1		1			1
C01.01.01	Sand and gravel quarries		1				1	1
	Totals	**5**	**10**	**18**	**14**	**4**	**15**	

4.4.3.2 Positive impacts

Positive impacts were recorded from three 91D0 sites (21%). Drain blocking (impact code J02.01.03) was recorded from two sites (606 Clara Bog and 607 Cloonshanville). At 607 Cloonshanville, an adjacent conifer plantation was clearfelled (impact code B02.02). Sites 606 Clara Bog and 607 Cloonshanville are both within raised bogs that have been restored as part of EU LIFE projects. Natural succession from fen to raised bog (impact code K02.01) was recorded as a positive impact at site 2022 Burren.

4.4.3.3 Neutral impacts

Neutral impacts were recorded from five 91D0 sites (36%). The neutral impacts of grazing (impact code B06) and tracks (impact code D01.01) were recorded from two sites each. A new road bridge (impact code D01.02) was built in close proximity to site 465 Annagh. Since there was no evidence this development has impacted the hydrology of the site, it was scored as neutral. Dense *Pteridium aquilinum* (impact code I02) and old burning (impact code J01.01)

were having a neutral impact on site 605 All Saints, *i.e*. both impacts were recorded outside the monitoring polygon. Old drains with a neutral impact were recorded at site 786 Giant's Cut.

Table 57 Summary of the positive impacts recorded in the 14 91D0 sites surveyed in 2017-2018.

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
J02.01.03	Infilling of ditches, dykes, ponds, pools, marshes or pits			2	1		1	2
B02.02	Forestry clearance			1	1			1
K02.01	Species composition change (succession)			1	1			1
	Totals	**0**	**0**	**4**	**3**	**0**	**1**	

Table 58 Summary of the neutral impacts recorded in the 14 91D0 sites surveyed in 2017-2018.

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
B06	Grazing in forests/ woodland			2	1		1	2
D01.01	Paths, tracks, cycling tracks			2	2			2
D01.02	Roads, motorways			1			1	1
I02	Problematic native species			1	1			1
J01.01	Burning down			1	1			1
J02.07	Water abstractions from groundwater			1			1	1
	Totals	**0**	**0**	**8**	**5**	**0**	**3**	

4.4.4 Future Prospects

The Future Prospects assessment for the 14 91D0 sites surveyed are shown in Table 59. The effects of negative and positive activities were considered in the context of each site's Area and Structure and Functions assessment to make an overall Future Prospects assessment for each site. Future Prospects over the next 12 years (two reporting periods) were assessed. Eight of the sites (57.1%) received a green Future Prospects assessment with six sites (42.9%) receiving an amber assessment.

Table 59 Summary of the Future Prospects (FP) of the 14 91D0 sites surveyed in 2017-2018.

Site no.	Site name	FP of Area	FP of S&F	FP of habitat	Rationale
465	Annagh	Green	Green	Green	No significant negative impacts recorded; new road bridge was scored as a neutral impact as there is no evidence it is impacting hydrology
605	All Saints	Green	Amber	Amber	Negative impacts of drainage and quarrying. Fernandez *et al.* (2014) provided some evidence that 91D0 is drying out *e.g.* inactive flushes
606	Clara Bog	Green	Green	Green	Positive impact of drain blocking, EU LIFE restoration site
607	Cloonshanville	Green	Green	Green	Positive impact of drain blocking and clearfelling of adjacent conifers, EU LIFE restoration site
614	Corndonaghy Bog	Green	Green	Green	No significant negative impacts recorded
640	Red Bog	Green	Green	Green	No significant negative impacts recorded
746	Baltynanima	Green	Amber	Amber	Negative impact of overgrazing by deer and invasive non-native trees
785	Castlekevin	Green	Amber	Amber	Negative impact of overgrazing by deer and invasive non-native *Rhododendron ponticum*
786	Giant's Cut	Green	Amber	Amber	Negative impact of overgrazing by deer (affecting regeneration) and invasive non-natives (*Picea sitchensis* and *Rhododendron ponticum*)
1438	Muff	Green	Green	Green	No significant negative impacts recorded
1649	Addergoole	Green	Green	Green	No significant negative impacts recorded
2022	Burren	Green	Green	Green	No significant negative impacts recorded
2023	Ballynamona Bog	Green	Amber	Amber	Negative impacts of drainage, peat extraction, invasive non-native *Rhododendron ponticum* and problematic native spp.
2024	Clooneen	Green	Amber	Amber	Negative impacts of drainage, peat extraction, invasive non-natives (*Rhododendron ponticum* and *Picea sitchensis*) and problematic native spp.

4.4.5 Overall condition assessment

4.4.5.1 Polygon result

Table 60 shows the overall condition assessments for the fourteen 91D0 sites surveyed in 2017-2018, achieved by combining the assessment results of Area, Structure and Functions and Future Prospects for each polygon. A total of eight sites (57.1%) received a green assessment (Favourable) with six sites (42.9%) receiving an amber assessment (Unfavourable – Inadequate) (Figure 19). No site received a red assessment.

Overall condition assessment results were examined in the context of whether or not the sites were within an SAC. Of the eight sites that achieved a green assessment, four (50.0%) are within an SAC, with 91D0 a qualifying interest at all four. Of the six sites that received an amber assessment, five (83.83) are within an SAC, with 91D0 a qualifying interest at three.

Table 60 Overall condition assessments for the 14 91D0 sites surveyed in 2017-2018. A dagger (†) after the SAC code indicates that 91D0 is a qualifying interest for the SAC.

Site no.	Site name	Area	S&F	FP	Overall Conservation Status	SAC
465	Annagh	Green	Green	Green	Green	000007†
605	All Saints	Green	Green	Amber	Amber	000566†
606	Clara Bog	Green	Green	Green	Green	000572†
607	Cloonshanville	Green	Green	Green	Green	000614†
614	Corndonaghy Bog	Green	Green	Green	Green	
640	Red Bog	Green	Green	Green	Green	
746	Baltynanima	Green	Amber	Amber	Amber	002122
785	Castlekevin	Green	Amber	Amber	Amber	
786	Giant's Cut	Green	Green	Amber	Amber	002122
1438	Muff	Green	Green	Green	Green	
1649	Addergoole	Green	Green	Green	Green	000297†
2022	Burren	Green	Green	Green	Green	
2023	Ballynamona Bog	Green	Amber	Amber	Amber	002339†
2024	Clooneen	Green	Amber	Amber	Amber	002348†

Figure 20 and Figure 21 respectively display the proportion of polygons within the SAC network and the proportion of polygons outside the SAC network that received overall conservation assessments of green and amber. Of the nine sites within SACs, 44.4% received a green assessment, and 55.6% received an amber assessment. Of the five sites outside the SAC network, 80.0% received a green assessment and 20.0% received an amber assessment.

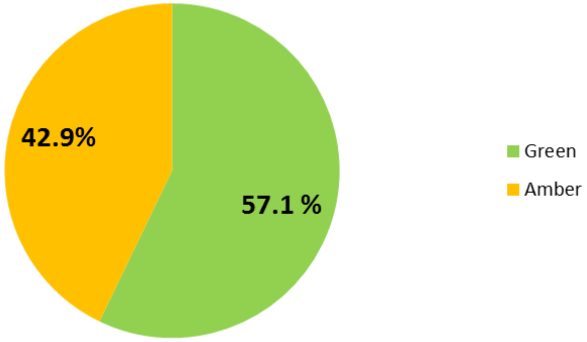

Figure 19 Proportion of polygons with overall assessments of green and amber for the fourteen 91D0 woodlands surveyed in 2017-2018.

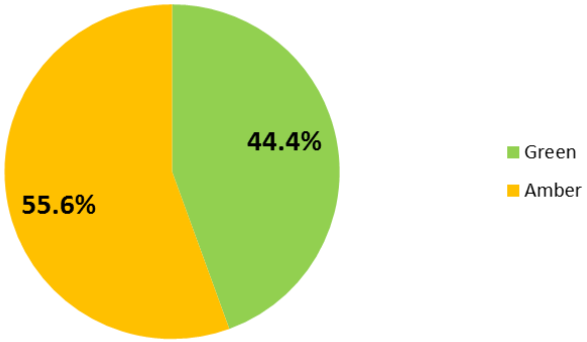

Figure 20 Proportion of polygons with overall assessments of green and amber for the nine 91D0 woodlands that are within the SAC network.

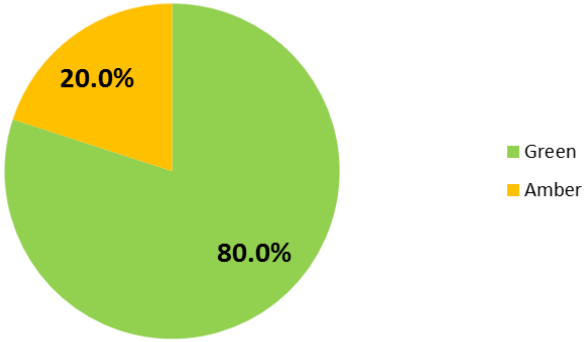

Figure 21 Proportion of polygons with overall assessments of green and amber for the five 91D0 woodlands that are outside the SAC network.

4.4.5.2 National result

Using the results of the monitoring survey and external sources listed in the National Conservation Assessment (NCA) (NPWS, 2019), the Annex I woodland 91D0 received an overall national assessment of Favourable based on the information provided in Table 61.

Table 61 National Conservation Assessment (NCA) for the Annex I habitat 91D0. Adapted from NPWS (2019).

Parameter	Justification for assessment	National Assessment
Range	Stable, no recorded loss; equal to Favourable Reference Range	**Favourable**
Area	Stable; current area is equal to the Favourable Reference Area	**Favourable**
Structure & Functions	Stable, no evidence of decline in condition since the last monitoring survey; greater than 90% of the habitat is in Favourable condition	**Favourable**
Future Prospects	Threats and conservation measures in balance	**Favourable**
Overall NCA	Combining individual parameter results according to the evaluation matrix in Table 2	**Favourable**
Trend	Overall trend in Conservation Status	**Stable**

4.5 Discussion

The National Conservation Assessment (NCA) of Favourable for the priority Annex I woodland 91D0 remains unchanged since the previous Article 17 report (NPWS, 2013).

Within this NCA, the Area parameter is Favourable with a stable trend. No anthropogenic losses of this habitat were recorded by the Woodland Monitoring Surveys of 2011-2012 and 2017-2018. However, anthropogenic loss was recorded during the 2007-2012 reporting period, as outlined in the NCA report (NPWS, 2019). Any loss of this Annex I habitat is detrimental, given that this resource is already highly fragmented and has low area cover. There are several instances where only one small stand occupies a single 10 km grid square; loss of these sites would result in a contraction of range. The Favourable Area assessment is largely based on the premise that the habitat is expanding on cutaway and cutover bogs.

The Structure and Functions parameter was assessed as Favourable with a stable trend. Pass rates were high for the individual-plot level assessments *e.g.* 91% of plots passed on *Sphagnum* cover, with only five plots failing this criterion comprising one plot each from 2024 Clooneen, 746 Baltynanima and 785 Castlekevin, and two from 1438 Muff. The most frequent criteria to fail at the four-plot level were lack of trees in the largest size class and old trees and dead wood. Discretionary passes were allowed when the Structure and Functions assessment was noted to be unduly harsh, taking site-specific conditions into account.

The Future Prospects parameter was assessed as Favourable, based on the balancing of pressures, threats and conservation measures. The main negative activities impacting 91D0 are drainage, peat extraction, invasive non-native species, burning, overgrazing and woodland clearance. This habitat is highly dependent on a high water table. Peat extraction and drainage disrupt its hydrology, leading to desiccation of the bog and loss of habitat characteristics. Once the supporting substrate becomes drier, the underlying water table drops, leaving these woodlands open to invasion by non-native and vigorous native species (Curtis *et al.,* 2009) *e.g*. sites 2023 Ballynamona Bog and 2024 Clooneen, with the invasive non-native *Rhododendron ponticum* and dense bracken present at both. Burning poses a significant threat to this habitat, with sites with compromised hydrology particularly vulnerable. A recent fire on the open bog at site 2023 Ballynamona Bog had damaged the woodland margins. During the 2001-2006 reporting period, a severe fire on the high bog at site 605 All Saints resulted in the loss of 0.8 ha of 91D0 habitat (Fernandez *et al.,* 2014). This site received a green Structure and Functions assessment but amber Future Prospects during the current survey, as there is evidence the habitat is drying out. This is serious, given the extent and importance of this site as the largest 91D0 woodland in the country. Overgrazing by deer was recorded in upland valley situations, with this pressure negatively impacting regeneration.

During the current survey, additional data were collated for *Pinus sylvestris* at both the plot and monitoring polygon level. These were collated, as the previous monitoring survey suggested that higher covers of this species can indicate the habitat is drying out (Cross & Lynn, 2013a; Fernandez *et al.,* 2014). The frequency and cover of *P. sylvestris* within the monitoring plots was extremely low, with this species only present in three out of the fifty-six plots recorded. At the polygon level, *P. sylvestris* was present at eight of the fourteen sites surveyed. The highest frequency recorded at the polygon level was occasional, with this species occasional at three sites: 606 Clara Bog, 1438 Muff and 605 All Saints. All three of these sites were assessed as having a green Structure and Functions assessment. With regard to Future Prospects, no significant negative impacts were recorded from sites 606 Clara Bog or 1438 Muff. However, site 605 All Saints received an amber Future Prospects assessment due to drainage. All Saints Bog was surveyed through the Raised Bog Monitoring Project in 2011 (Fernandez *et al.,* 2014). This survey reported the recent spread of *P. sylvestris* across the entire high bog, with the species being particularly concentrated within inactive flushes, drier sections of active flushes, and the bog woodland. They noted that *P. sylvestris* likely germinated after the severe fire that occurred within the 2001-2006 reporting period, and that its spread was likely an indication of further drying-out of the site.

As a peat-forming habitat, 91D0 woodland is closely associated with, and is considered a component of, the raised bog environment. Raised bog restoration projects can reinstate natural hydrological conditions that can improve the Structure and Functions and Future Prospects of existing stands. As part of the National Raised Bog SAC Management Plan 2017–2022, site-specific restoration plans have been drafted and will be implemented at 53 raised bog SACs on a phased basis. The draft restoration plans include restoration of high bog, as well as surrounding cutover. Where relevant, site-specific conservation objectives for bog woodland have also been set (Mackin *et al.,* 2017). 'The Living Bog' Raised Bog Restoration Project 2016-2020 (LIFE14 NAT/IE/000032) was the first project to use these draft restoration plans. Drain blocking has been conducted at site 606 Clara Bog as part of this project.

As part of its Biodiversity Action Plan, Bord na Móna rehabilitates areas of cutaway bog to promote biodiversity. The main habitats emerging comprise a mosaic of wetland and woodland. Since these areas are largely underlain by peat soils, birch-dominated stands typically develop, with patches of willow and pine (Bord na Móna, 2016). Planting of birch and other native trees is also planned as part of a joint project between Coillte and Bord na Móna (Bord na Móna, 2019). Developing birch stands on cutaway bog have the potential to form 91D0 in future. Their development will vary and will be determined largely by local conditions (*e.g*. hydrological conditions, presence of *Sphagnum* spp.).

Another relevant initiative was the launch of The Irish Deer Management Forum in 2015. This group set out a series of management actions in the document *Deer Management in Ireland: A Framework for Action*. The aim of this Framework of Action was to manage deer responsibly in order to minimise their impact on agriculture, woodlands and other conservation habitats (Annett, 2015).

4.6 Conclusions and recommendations

- The total mapped area for priority 91D0 habitat as reported in the National Conservation Assessment document is 2.13 km^2. The 14 monitoring sites cover 0.67 km^2 (31.4% of the national resource). This is considered to be a representative sample with regard to area; however, there is a bias towards some of the best examples of this habitat.
- It is recommended that the monitoring programme be expanded. The 91D0 habitat distribution map associated with the National Conservation Assessment report can be used to select new sites.
- There are still unmapped areas of 91D0 habitat. These stands need to be identified and mapped.

- The small size of these woodlands meant they were mostly excluded from the National Survey of Native Woodlands 2003-2007 (NSNW) (Perrin *et al.,* 2008), as sites below 1 ha or less than 40 m in width were not visited. However, the NSNW did identify some previously unknown 91D0 sites within sessile oak woodlands.
- The impacts acting on these habitats, as highlighted in this report, need to be addressed.
- Trampling should be added to the assessment as a grazing pressure indicator.
- The EU Interpretation Manual (CEC, 2013) lists *Pinus sylvestris* as a component species of 91D0 habitat. While some data are available regarding the occurrence of *Pinus sylvestris* in 91D0 habitat in Ireland (O'Connell, 1988; Roche *et al.* 2009, 2015), further surveys are required to fully characterise this habitat in an Irish context.
- There is a need to investigate and quantify 91D0 habitat increases on cutaway and cutover bogs. The current Favourable Area assessment is based on the assumption that the habitat is increasing in these areas, with these increases offsetting anthropogenic loss. The National Forestry Inventory (NFI) is a useful resource that could assist in the identification of existing and/or potential future stands of this Annex I habitat.
- An active national strategy to achieve sustainable deer grazing levels is urgently required. Co-ordinated local and/or regional deer management groups have an important role to play, especially in deer hotspots. Where necessary, individual land managers can undertake site-level passive deer control by fencing (*e.g.* wire-and-post, movable A-frame, dead-hedging) and/or planting with tree shelters.

5 91J0 Yew woodlands

5.1 Interpretation of 91J0 habitat for this survey

Yew woodland is a highly restricted habitat type in Ireland, only occurring at a limited number of sites in the south-west, predominantly on shallow soils over limestone pavement or outcrops. The canopy of this woodland is typically dominated by *Taxus baccata*, with other canopy species including *Fraxinus excelsior* and the introduced *Fagus sylvatica*. *Corylus avellana* and *Ilex aquifolium* are components of the shrub layer, although typically occurring in small quantities. The woodland's dense evergreen canopy can restrict regeneration, which is typically limited or absent. The field layer is characteristically both species-poor and limited in cover, with the most frequent and abundant species being *Hedera helix* (which is locally dominant), *Brachypodium sylvaticum, Viola riviniana* and ferns, in particular *Asplenium scolopendrium*. The rocky woodland floor can often support an extensive carpet of bryophytes, dominated by a few robust pleurocarpous mosses including *Thamnobryum alopecurum* and *Isothecium myosuroides* (Cross & Lynn, 2013b). The general structure of the habitat is presented in Figure 22.

The Irish Vegetation Classification (IVC) (Perrin, 2016) primarily places the 91J0 habitat within the WL2 *Fraxinus excelsior – Hedera helix* group. Only one vegetation community in this group has an affinity to the Annex I habitat: WL2F *Taxus baccata – Ilex aquifolium* woodland (80.0% affinity).

In east Galway (Kylagowan), yew woodland with *Quercus petraea* and *Ilex aquifolium* occurs on podzols over acidic tills, and the associated field layer is typical of the Annex I 91A0 woodland habitat. Yew occurs as the dominant species in the sub-canopy within this woodland. Yew is fairly common throughout the woodlands and plantations in the vicinity (Cross & Lynn, 2013b).

Figure 22 91J0 habitat at Reenadina, Co. Kerry. Photograph © NPWS. Taken by Orla Daly.

The definition for 91J0 * *Taxus baccata* woods of the British Isles presented in the Interpretation Manual (CEC, 2013) is based largely on British stands. Yew woodland in Ireland differs significantly from the British variants in three key respects (Perrin, 2002). Firstly, in Britain this habitat type occurs predominantly on former chalk downland, while in Ireland it occurs principally on areas of limestone pavement or rocky limestone knolls. Secondly, the typical plant species differ markedly between British and Irish stands. *Buxus sempervirens* and *Mercurialis perennis* are not found at any Irish stands; the former species is introduced in Ireland and the latter is of dubious native status. *Sorbus aria* is found occasionally on the

margins of some Irish stands but is not typical of the woodland interior. Thirdly, (an aspect not mentioned in the Interpretation Manual) Irish stands appear to develop from a *Corylus avellana*-dominated scrub stage, while British stands are known to develop from scrub dominated by *Crataegus monogyna* and *Juniperus communis* (Cross & Lynn, 2013b).

5.2 Review of baseline methodology

- The target for native shrub layer (2-4 m) cover was changed from ≥20% to 10-75%. This brings the 91J0 target for this criterion in line with those used for 91A0 and 91E0 habitats.
- Data were collated on the cover (%) and height (cm) of *Rubus fruticosus* in order to capture over-vigorous growth within the plots.
- Similar to the updated methodologies of 91A0, 91E0 and 91D0, the grazing pressure indicator of bark stripping has been changed so that only severe recent bark stripping is recorded.
- DBH of *Fraxinus excelsior* was recorded within four size classes.

5.3 Methodology

5.3.1 Polygon selection

For the five sites previously surveyed, the polygons from the 2011 monitoring survey were used. NPWS selected one additional 91J0 site for inclusion in the 2017-2018 monitoring programme. Polygon boundaries for the new site were derived from the 91J0 polygon distribution map in NPWS (2013). Indicative monitoring plot locations were marked on the field maps prior to field survey. This was completed for the new site and for sites surveyed by Cross & Lynn (2013b) that had fewer than four plots recorded in 2011. These provisional stop locations were repositioned as necessary by the surveyors in the field, bearing in mind the recommendations of Cross & Lynn (2013b) for plot placement.

5.3.2 Field survey and monitoring plots

Survey work was carried out between 30th May and 11th July in 2018. Locations of the surveyed 91J0 polygons are shown in Figure 23.

Detailed assessments were then carried out at the four monitoring plots within the polygon, each plot measuring 20 m x 20 m and containing the target species. For plots previously surveyed in 2011, the same locations (or as close as local conditions allowed) were revisited, using the recorded grid references in conjunction with other plot information provided. Slope and aspect were recorded and a photograph of the plot was taken.

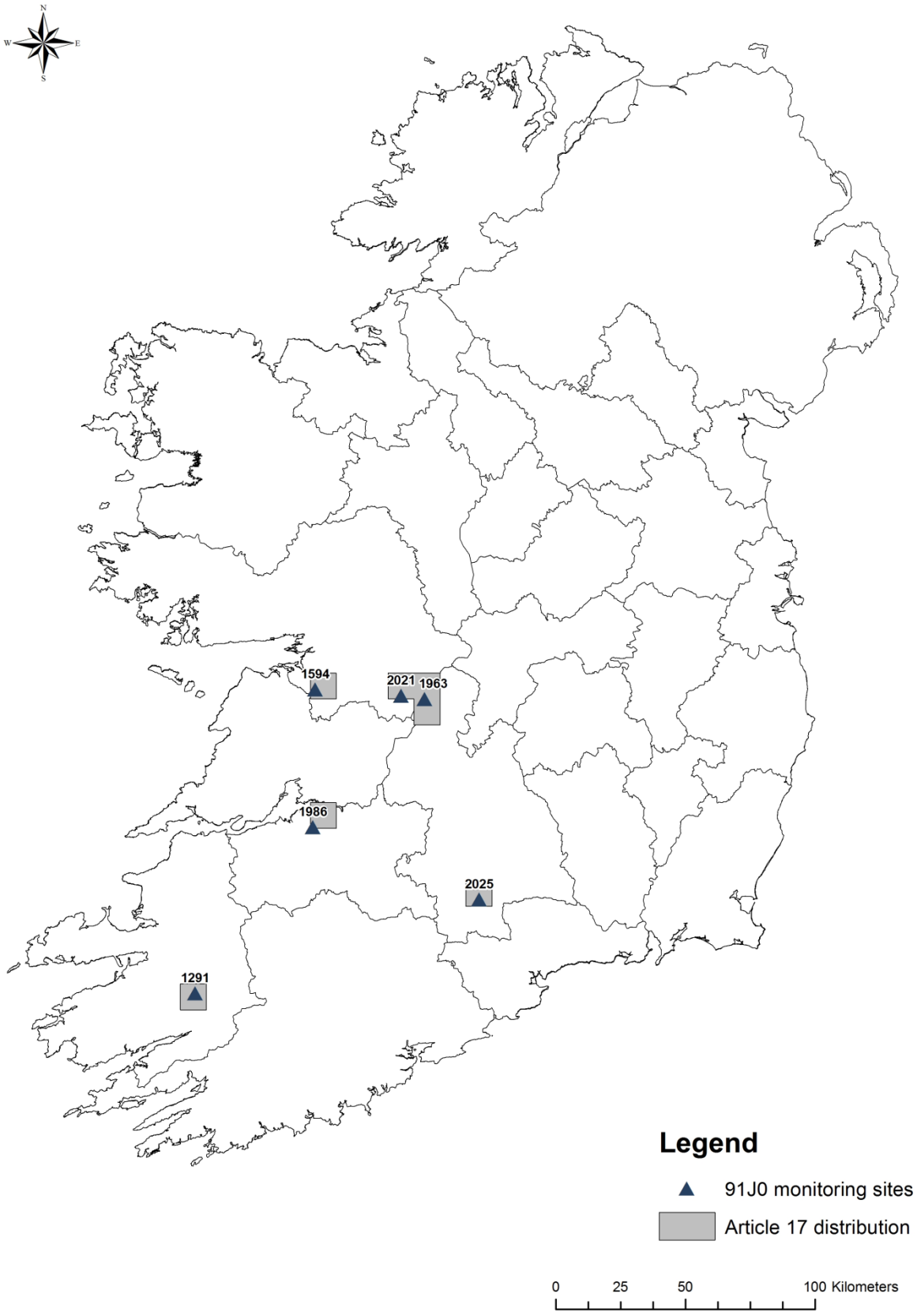

Figure 23 Location of the six 91J0 monitoring sites. The 10 km distribution of 91J0 habitat in the Republic of Ireland (NPWS, 2019) is also displayed.

5.3.3 Area assessment

The Area parameter was assessed in the field, taking note of any recent losses in the monitoring polygon evident during the survey. Any areas losses were marked on the field maps and then mapped digitally in the office. Area loss was calculated as a percentage of the original (pre-loss) area as follows:

(Current area / (Current area + area lost)) x 100

This was divided by the number of years since the site was surveyed in the baseline monitoring survey to derive the equivalent annual percentage loss in area as required for assessing Conservation Status (Table 2).

5.3.4 Structure and Functions: data collection

The methodology employed for the monitoring and conservation assessment was based on that used in the previous monitoring survey (Cross & Lynn, 2013b). Data sheets are reproduced in Appendix I. Within each plot, the following data were recorded for the Structure and Functions assessment.

Species

- Presence of positive indicator species. Table 62 lists the indicator species for 91J0 woodlands.
- Presence of negative indicator species (*i.e*. any non-native species, including herbaceous species).
- Total cover of *Rubus fruticosus* as percentage of plot.
- Median height in centimetres of *R. fruticosus* in plot.

Woodland structure

- Median canopy height in metres. Tree height was measured using a clinometer.
- Total canopy cover as percentage of plot. Crown extent rather than area covered by leaves was estimated to allow more consistent recording, regardless of seasonal variation in canopy.
- Total cover of the target species as percentage of plot (this was later converted to the percentage of target species in the canopy).
- Total cover of *Fraxinus excelsior* as percentage of plot
- Total cover of negative species as percentage of plot.
- Total native shrub layer cover as percentage of plot. Shrub layer was defined as shrub vegetation 2-4 metres in height.
- Total native dwarf shrub/field layer cover as percentage of plot.
- Median height in centimetres of native dwarf shrub/field layer.
- Total bryophyte layer cover as percentage of plot.

Cover scores were recorded as a percentage of the plot area to the nearest 5%, or to the nearest 1% if less than 5%. A cover score of <1% was also permitted.

Grazing pressure

Grazing pressure (*i.e*. overgrazing) was recorded based on the presence of the following four indicators: topiary effect on shrubs and young trees, browse line on mature trees, abundant dung, and severe recent bark stripping.

Free regeneration

Free regeneration refers to regeneration that appears to have originated from seed. When counting free regeneration, only separate regenerating units were counted, *i.e*. several shoots arising from a single root were regarded as a single regenerating unit.

- Number of seedlings and saplings of the target species.
- Number of saplings of each non-target native tree species.
- Number of seedlings of each negative tree species.
- Number of saplings of each negative tree species.
- Presence of free regeneration of negative shrub species such as *Rhododendron ponticum,* or invasive herbaceous species, regardless of height.

Table 62 List of positive indicator species for 91J0 woodlands.

91J0
Target species:
Taxus baccata
Other woody species:
Corylus avellana
Fraxinus excelsior
Ilex aquifolium
Lonicera periclymenum
Quercus robur
Sorbus aucuparia
Herbs, Ferns & Graminoids:
Asplenium scolopendrium
Brachypodium sylvaticum
Carex flacca
Potentilla sterilis
Viola reichenbachiana/riviniana
Mosses & Liverworts:
Fissidens dubius
Isothecium myosuroides
Metzgeria furcata
Neckera complanata
Neckera crispa
Thamnobryum alopecurum

Basal regeneration

Basal shoots ≥2 m tall arising from a larger trunk with a DBH of ≥7 cm were not counted unless the tree was completely dead at breast height, *i.e*. 1.3 m above the ground, in which case the whole unit was counted as a single regenerating unit.

Tree girth

DBH of the target species and *Fraxinus excelsior* was tallied within four size classes as follows: size class 1 = 7-<20 cm; size class 2 = 20-<30 cm; size class 3 = 30-<40 cm; size class 4= ≥40 cm.

- For multi-stemmed trees, only the largest trunk was counted and assigned to the appropriate DBH size class. The occurrence of large numbers of multi-stemmed trees, or trees with very numerous stems, was noted.
- Trees with forked trunks were measured below the fork if forking occurred more than 1 m up from the base.

Dead wood

Dead wood with a diameter of at least 20 cm was recorded in four categories: old senescent trees (dead limbs or other signs of damage present), standing dead, fallen dead (including large, fallen branches) and rotten stumps (cut/broken trunks of 1 m or less, excluding stumps with basal shoots). Dead wood was recorded regardless of whether the tree was a target, non-target native or non-native species.

5.3.5 Structure and Functions: assessment

Assessments were made at the individual-plot and four-plot levels, and these were combined to give an assessment at the polygon level. The criteria assessed for 91J0 woodland are shown in Table 63 (individual-plot level criteria) and Table 64 (four-plot level criteria). Of the eleven criteria assessed at the individual-plot level, nine had to reach their target to achieve a pass. Of the four criteria assessed at the four-plot level, three had to reach their target to achieve a pass. For the overall polygon level assessment, a green (Favourable) assessment result could be achieved only if all plots passed at the individual-plot level and at the four-plot level (*i.e*. five passes achieved). One failure out of the five was allowed for a polygon to receive an amber (Unfavourable – Inadequate) assessment. More than one failure resulted in a red (Unfavourable – Bad) assessment. This process is summarised in Table 65.

The area (ha) of 91J0 habitat in ‘good’ and ‘not-good’ condition as required for Article 17 reporting was derived from the Structure and Functions results. Following NPWS guidance the following approach was applied: for each monitoring site, equal weight was applied to individual-plot assessment results (*n*=4) and the four-plot level assessment result (*n*=1), with a Pass=20% and a Fail=0%. For example: A site with three passes and one fail at the individual-plot level (20 + 20 + 20 + 0 = 60) and a pass at the four-plot level (20) had 80% (60 + 20 = 80) of its area in ‘good’ condition, with the remaining 20% in ‘not-good’ condition.

N.B. The following criteria are to be used for conservation status assessment of 91J0 woodlands. They are not to be used to determine Annex I status. The Annex I habitat 91J0, as it occurs in the Irish context, is defined in Section 5.1.

Table 63 Assessment criteria at the individual-plot level for 91J0 woodlands.

	Assessment criterion	91J0 target for pass
1	Positive indicator species	Presence of *Taxus baccata*
		≥6 non-target positive species
2	Negative species cover	≤10% cover of plot
3	Negative species regeneration	Absent
4	Median canopy height	≥10 m
5	Total canopy cover	≥30% of plot
6	Proportion of *Taxus* in canopy	≥50% of canopy
7	Native shrub layer cover	10-75% of plot
8	Native dwarf shrub/field layer cover	≥20% of plot
9	Native dwarf shrub/field layer height	height ≥20 cm
10	Bryophyte cover	≥4%
11	Grazing pressure	All 4 overgrazing indicators absent

Table 64 Assessment criteria at the four-plot level for 91J0 woodlands.

	Criterion	Target for pass
1	*Taxus baccata* size class distribution	At least 1 of each size class present over all 4 plots
2	*Taxus baccata* regeneration	At least 1 sapling ≥2 m tall over all 4 plots
3	Other native tree regeneration	At least 1 sapling ≥2 m tall in 2 or more plots
4	Old trees and dead wood	At least 3 from any category (DBH ≥20 cm)

Table 65 Summary of conditions required for Structure and Functions (S&F) assessment results at the individual-plot, four-plot and polygon levels.

Level	No. of criteria assessed	Required for pass	Best result	Worst result
1-plot	11	Passes in ≥9 criteria	Four Passes	Four Fails
4-plot	4	Passes in ≥3 criteria	Pass	Fail
Polygon	Four 1-plot results + one 4-plot result	Various - see below	Green	Red

No. of 1-plot passes	4-plot result	Polygon S&F assessment result
4	Pass	Green
3	Pass	Amber
4	Fail	Amber
<3	Pass	Red
<4	Fail	Red

5.3.6 Pressures and threats: data collection

The Future Prospects assessment relates to the likely development and maintenance of the Annex I woodland habitat in Favourable condition for the foreseeable future. In order to assess Future Prospects, pressures, threats and impacts throughout the polygon were recorded according to the list given by Ssymank (2011). The following details were recorded for each impact: the intensity of the impact (high, medium or low), effect (positive, negative or neutral), percentage of the polygon affected, and source of the impact (from inside or outside the polygon). The data sheet for recording impacts is shown in Appendix II. Impacts in adjacent Annex I woodland were also noted to provide additional information on the Future Prospects of the Annex I habitat as a whole, particularly where these could impact negatively on the monitoring polygon in the future.

The surveyors' subjective assessment of the woodland polygon's Future Prospects was given according to the following guidelines:

- Green = excellent/good prospects; no significant impact from pressures/threats expected; long-term viability assured.
- Red = bad prospects; severe impact from pressures/threats expected; long-term viability not assured.
- Amber = between these two extremes.

These subjective assessments can be viewed in the Woodlands Monitoring Microsoft Access database that accompanies this report.

5.3.7 Future Prospects: assessment

EU guidance states that the habitat's Future Prospects parameter *"should be evaluated by individually assessing the expected future trends and subsequently Future Prospects of each of the other three parameters [Range, Area, and Structure and functions], taking primarily into account the current conservation status of the parameter, threats (related to the parameter assessed) and the conservation measures being taken or planned for the future. Once the Future Prospects of each of the other three parameters have been evaluated, they should be combined to give the overall assessment of Future Prospects*" (DG Environment 2017).

Future Prospects were assessed at the site level by evaluating the Future Prospects and future expected trend of Area and Structure and Functions at each site, and examining the current pressures, future threats and conservation measures operating on the habitat. Guidance provided by the EU (DG Environment 2017) was followed to determine the future trends and Future Prospects of each parameter. For the target Annex I woodland habitats to be assessed as having Favourable Future Prospects, their prospects had to be judged to be good, with no severe impacts expected from threats and the habitat expected to be stable or improving in the long term. For it to be assessed with Unfavourable-Bad Future Prospects, its prospects had to be judged to be bad, with severe impacts expected from threats and the habitat expected to decline or disappear in the long term. An assessment of Unfavourable-Inadequate Future Prospects was between these two extremes.

To help evaluate Future Prospects according to the above guidance, the pressures, threats and positive activities occurring in each site were evaluated. The surveyors' subjective assessments of the Future Prospects of the habitat at the sites were also considered.

5.3.8 Overall condition assessment

The conservation condition assessment for the Annex I woodland habitat at each site was evaluated based on the results of all three parameters, according to the evaluation matrix in Table 2 and using the guidance provided by the EU (DG Environment 2017). The criteria for

all three parameters were combined and an overall conservation status of the sites is presented.

5.4 Results

5.4.1 Area parameter

Table 66 summarises the Area assessment results for 91J0. All six sites received a green assessment as no anthropogenic area loss was recorded. Habitat loss was recorded at site 1594 Garryland. This was caused by exceptionally high water levels due to a prolonged flood event of an adjacent turlough in 2015. Several yew trees within the flood zone died, with approximately 0.1 ha of the 91J0 habitat affected. This loss did not result in a negative assessment for the Area parameter, as it was likely due to a natural cycle in another Annex I habitat (3180 Turloughs) rather than being anthropogenic in origin. In addition to this, yew seedlings were observed in the damaged areas, therefore, it is likely that the loss is temporary (although it will take several decades for the habitat to recover).

Table 66 Summary of the Area assessment results for 91J0 polygons surveyed in 2018.

Site no.	Site name	County	Area (ha) in 2018	Area lost since 2011	% Area lost per annum (7 years)	Area assessment
1291	Reenadina	Kerry	15.5	0	0	Green
1594	Garryland	Galway	3.2	0*	0	Green
1963	Cornalack	Tipperary	2.4	0	0	Green
1986	Curraghchase	Limerick	3.3	0	0	Green
2021	Kylagowan	Galway	2.9	0	0	Green
2025	Cahir Woods	Tipperary	1.4	0	0	Green

*Area losses were due to natural causes therefore were not counted as an area loss for this assessment

5.4.2 Structure and Functions

5.4.2.1 Polygon results

One of the six (16.7%) 91J0 polygons received a green Structure and Functions assessment, with five (83.3%) receiving a red assessment. No polygons received an amber assessment (Table 67).

Table 67 Summary of Structure and Functions (S&F) results at the individual-plot level, four-plot level and polygon level for the six 91J0 polygons surveyed in 2018.

			1-plot level	4-plot level	Polygon level S&F
Site no.	**Site name**	**County**	**No. of plots in site that passed**	**Result (Pass/Fail)**	**Green/Amber/Red**
1291	Reenadina	Kerry	1	Fail	Red
1594	Garryland	Galway	1	Pass	Red
1963	Cornalack	Tipperary	4	Pass	Green
1986	Curraghchase	Limerick	1	Pass	Red
2021	Kylagowan	Galway	1	Pass	Red
2025	Cahir Woods	Tipperary	3	Fail	Red

The Structure and Functions results from the previous and the current survey are compared in Table 68. Of the five 91J0 sites monitored by both surveys, there was no genuine change in the Structure and Functions at these sites.

Table 68 Comparison of the Structure and Functions (S&F) polygon level results for the 2011 and 2018 91J0 woodland monitoring surveys. A dagger (†) after the SAC code indicates that 91J0 is a qualifying interest for the SAC.

Site no.	**Site name**	**SAC code**	**S&F result 2011-12**	**S&F result 2017-18**	**Trend direction**	**Rationale**
1291	Reenadina	000365†	Red	Red	No change	
1594	Garryland	000252†	Red*	Red	No change	*This differs from the Amber assessment of Cross & Lynn (2013b, Table 10). It is based on the failure of 2 plots at individual-plot level and failure at 4-plot level (Cross & Lynn, 2013b, Tables 7 & 8)
1963	Cornalack	002241†	Green	Green	No change	
1986	Curraghchase	000174†	Red	Red	No change	
2025	Cahir Woods	002137†	Amber	Red	No change	Amber assessment in 2011 relied on expert judgement as only 2 plots were recorded. Change in result is due to better sampling (4 plots). There was no genuine change

5.4.2.2 Area in good condition

The area of 91J0 habitat in ‘good’ and ‘not-good’ condition for the six polygons surveyed is given in Table 69. The overall area of 91J0 habitat surveyed in ‘good’ and ‘not-good’ condition is given in Table 70. Of the 27.1 ha surveyed, 9.8 ha (36.2%) was assessed as ‘good’ condition and 17.3 ha (63.8%) was assessed as ‘not-good’ condition.

Table 69 Area of 91J0 habitat in 'good' and 'not-good' condition in 2018.

Site no.	Site name	Total no. passes (max.= 5)	Total no. fails (max.= 5)	% no. passes	% no. fails	Total area (ha)	Area in good condition (ha)	Area in not-good condition (ha)
1291	Reenadina	1	4	20	80	14.0	2.8	11.2
1594	Garryland	2	3	40	60	3.2	1.3	1.9
1963	Cornalack	5	0	100	0	2.4	2.4	0.0
1986	Curraghchase	2	3	40	60	3.3	1.3	2.0
2021	Kylagowan	2	3	40	60	2.9	1.1	1.7
2025	Cahir Woods	3	2	60	40	1.4	0.9	0.6
	Total					**27.1**	**9.5**	**17.6**

Table 70 Total area of 91J0 habitat in 'good' and 'not-good' condition in 2018.

Condition	Total area (ha)	Percentage (%) of area surveyed
'good'	9.8	36.2
'not-good'	17.3	63.8
Total	**27.1**	**100**

5.4.2.3 Criteria results

Table 71 shows the pass rates for individual monitoring criteria measured in 2018 at the six 91J0 sites.

Individual-plot structural criteria

The six sites had ≥95% pass rates for positive indicator species, median canopy height, total canopy cover and bryophyte cover. There were lower pass rates for the proportion of *Taxus baccata* in the canopy (88% pass rate). A third of plots failed grazing pressure (33% failure rate) and 40 to 50% failed on negative species cover, native shrub layer cover, and native field layer cover and height. The highest failure rate was for negative species regeneration, present in 63% of the plots.

Four-plot structural criteria

At the four-plot level, the highest pass rates were for old trees and dead wood (100%) and other native tree regeneration (83%). A third of plots failed the *Taxus baccata* size class distribution criterion (33% failure rate), with half of the plots failing *Taxus baccata* regeneration (50% failure rate).

Table 71 Pass and failure rates for individual Structure and Functions monitoring criteria at the individual-plot and four-plot levels for the six 91J0 sites surveyed in 2018. The number of discretionary passes allowed is also displayed.

	% Pass	% Fail	No. of discretionary passes
Individual-plot level criteria			
Positive indicator species	96	4	-
Negative species cover	54	46	-
Negative species regeneration	38	63	-
Median canopy height	96	4	-
Total canopy cover	100	0	-
Proportion of target species in canopy	88	13	-
Native shrub layer cover	58	42	-
Native field layer cover and height	58	42	-
Bryophyte cover	100	0	-
Grazing pressure absent	67	33	-
Overall pass (individual-plot level)	*46*	*54*	
Four-plot level criteria			
Target species size class distribution	67	33	-
Target species regeneration	50	50	-
Other native tree regeneration	83	17	-
Old trees and dead wood	100	0	-
Overall pass (four-plot level)	*67*	*33*	

Target tree species DBH data

The distribution of *Taxus baccata* tree girths in four size classes at the 91J0 sites is presented in Figure 24. This shows polygons with high numbers of small *Taxus baccata* trees (DBH 7-<20 cm) at the left of the graph, and those with low numbers of small trees at the right. From this graph it can be seen that there is an overall increase in the frequency of large *Taxus baccata* trees (DBH ≥40 cm) as the frequency of smaller trees decreases. Site 2021 Kylagowan has the largest number of trees in the small size class, and the lowest number of trees in the large size class. Site 2025 Cahir Woods at the far right of the graph had no trees recorded in the small size class. Site 1291 Reenadina has the most even distribution of trees across the four size classes.

In three of the six sites (50%), more *Taxus baccata* trees were recorded in the small size class than in the other three size classes, as seen at 2021 Kylagowan, 1963 Cornalack and 1986 Curraghchase. At the remaining three sites (50%), more *Taxus baccata* trees were recorded in the large size class than in the other three size classes, as seen at 1291 Reenadina, 1594 Garryland and 2025 Cahir Woods. This is displayed in Figure 25.

Looking at the size distribution of the 276 *Taxus baccata* trees measured across all six sites, the small size class had the highest number of trees, with 121 trunks measured (44%); the large size class was next, with 75 trees (27%). The lowest frequency was attained by the larger of the two medium size classes (DBH 30-<40 cm) with 34 trees (12%). This is shown in Figure 26.

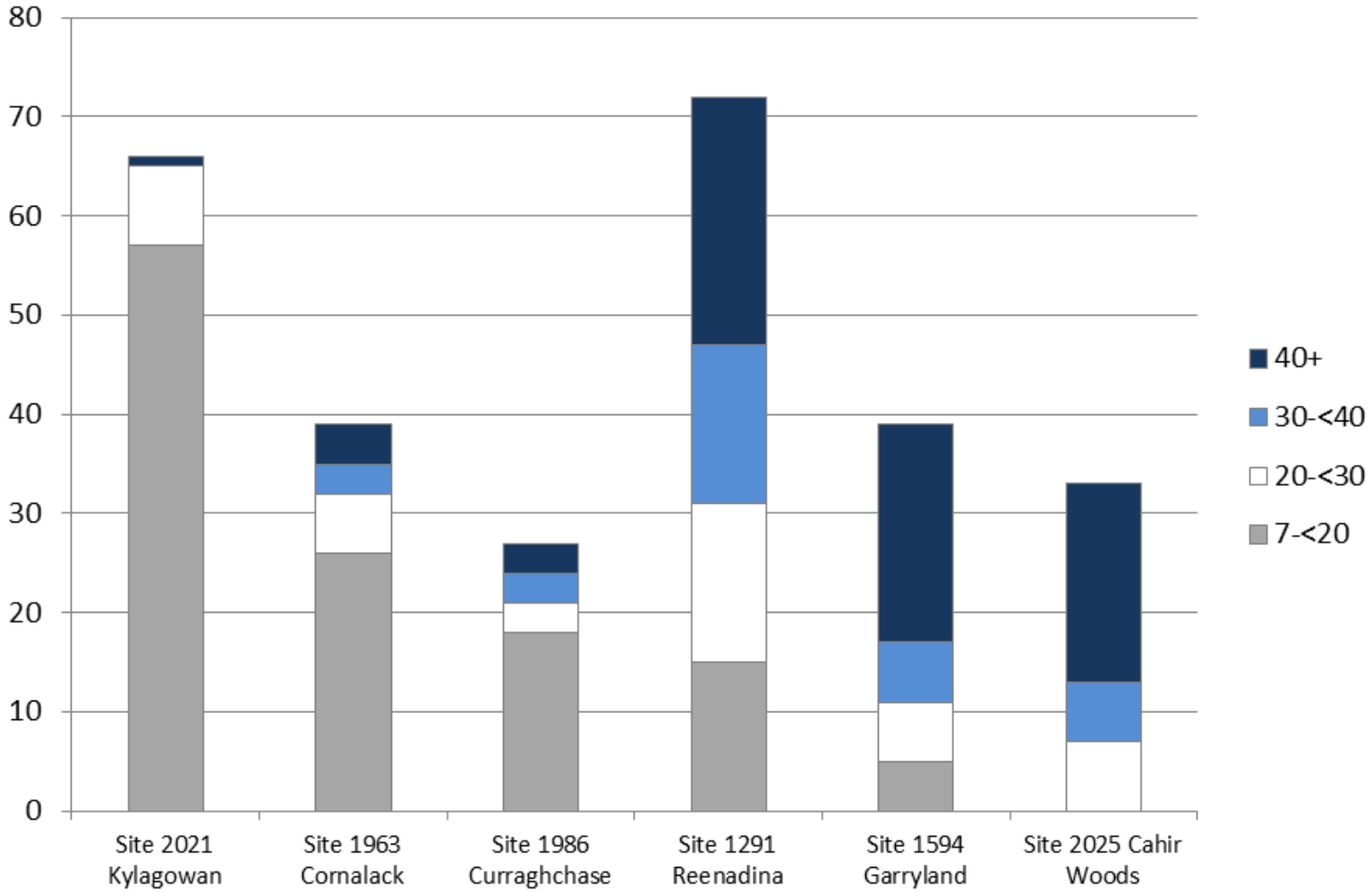

Figure 24 Distribution of *Taxus baccata* tree DBH in four size classes at the six 91J0 sites.

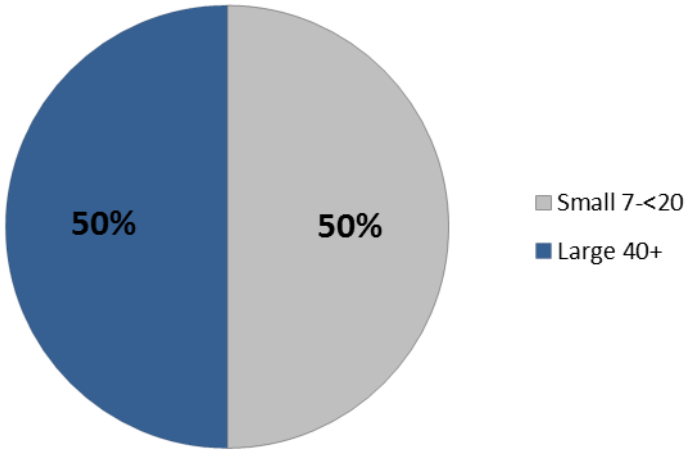

Figure 25 Proportion of 91J0 sites with the highest number of *Taxus baccata* trees in the small and large size class. No site had the majority of trees in the medium size classes.

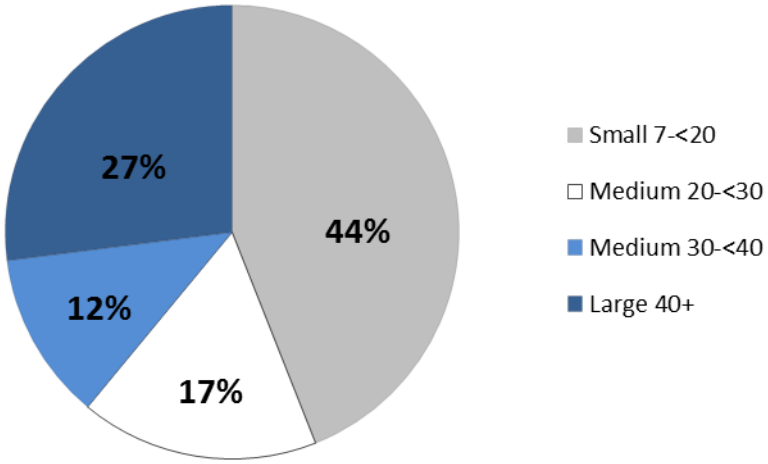

Figure 26 Proportion of *Taxus baccata* trees measured in four size classes across all six 91J0 sites.

Negative species: Most frequent negative taxa

The most commonly recorded negative taxa are shown in Table 72. In total, twelve tree taxa and three shrub species were recorded. *Acer pseudoplatanus* (66.7% of sites) and *Fagus sylvatica* (50% of sites) were the most frequently recorded non-native tree species. The remaining ten tree taxa were recorded from one site each. The most frequently recorded non-native shrubs were *Prunus laurocerasus* and *Clematis vitalba,* both recorded from two sites each (33.3% of sites). The non-native shrub *Prunus lusitanica* was recorded from one site (16.7% of sites).

Table 72 Negative taxa recorded in the plots at the 91J0 sites surveyed in 2018.

Trees	Frequency in 91J0 sites (n=6)	Shrubs	Frequency in 91J0 sites (n=6)
Acer pseudoplatanus	4	*Prunus laurocerasus*	2
Fagus sylvatica	3	*Clematis vitalba*	2
Tilia cordata	1	*Prunus lusitanica*	1
Ulmus procera	1		
Abies alba	1		
Quercus ilex	1		
Acer campestre	1		
Acer platanoides	1		
Castanea sativa	1		
Larix sp.	1		
Carpinus betulus	1		
Populus sp.	1		

Negative species: Cover and regeneration

As noted in Table 71, failure rates were high for negative species cover (*i.e*. over the 10% threshold) and negative species regeneration, with 46% and 63% of 91J0 plots failing, respectively. Of the fifteen plots that failed due to negative species regeneration, eight (53.3%) only contained negative tree regeneration (with no negative shrub regeneration), with the remaining seven (44.7%) containing both negative tree and negative shrub regeneration.

Table 73 shows total regeneration of negative tree species within the 91J0 plots. Only species of which more than one sapling (*i.e*. 2 m or more in height) was recorded within the dataset are listed. The total number of regenerating units, *i.e*. seedlings and saplings, was highest for *Fagus sylvatica*, at 268. Seedling numbers were sometimes extremely high within individual plots, with 85 *Fagus sylvatica* seedlings found in a plot in site 1594 Garryland. Of more concern, though, is the survival rate of seedlings to saplings. In site 2025 Cahir Woods, 25 saplings of *Ulmus procera* were found in one plot.

Table 73 Negative tree species regeneration recorded in two height classes in 91J0 plots in 2018.

	Acer campestre		***Acer pseudoplatanus***		***Fagus sylvatica***		***Ulmus procera***	
Height	<2m	≥2m	<2m	≥2m	<2m	≥2m	<2m	≥2m
Total no.	2	2	18	5	252	16	0	25
No. of plots	1	1	4	3	10	7	0	1
Median	2	2	5.5	1	11.5	2	0	25
Max. in 1 plot	2	2	6	3	85	4	0	25
Frequency (n=24 plots)	4.2	4.2	16.7	12.5	41.7	29.2	0	4.2

Rubus fruticosus: Cover and height

Table 74 summarises *Rubus fruticosus* cover and height data for the 24 plots surveyed. The majority of the plots had 1-<20% cover. However, higher covers were achieved, with site 1963 Cornalack achieving 65% cover in one plot. The maximum median height recorded was often

high, *e.g.* 120 cm. This is less of a concern in plots with a lower cover score, as tall patches of *R. fruticosus* frequently occur in natural light gaps, or trail over old dead wood and/or uprooted trees. Dense shade cast by the yew typically prevents proliferation of this species within this Annex I habitat type, regardless of site grazing levels.

Table 74 Summary of *Rubus fruticosus* cover and heights within plots.

Cover range	No. of plots	Max. median height in one plot (cm)	Min. median height in one plot (cm)
0	4	0	0
1-<20%	17	120	5
20-<40%	1	80	80
40-<60%	1	60	60
60-<80%	1	100	100
80-100%	0	0	0
Total	24	120	0

5.4.3 Pressures, threats and other activities

Prior to evaluating the Future Prospects parameter, the negative and positive impacts recorded for the 91J0 sites were examined. These are shown in Tables 75 and 76 respectively, together with the intensity (high, medium or low), percentage of the habitat affected, and total frequency for each of the activities. Neutral impacts are shown in Table 77. Neutral impacts were not considered when assessing the Future Prospects parameter.

5.4.3.1 Negative impacts

Negative impacts were recorded from all six 91J0 sites. I01 Invasive non-native species was the most frequent pressure, recorded from all six sites. This negative impact was of high intensity at two sites, medium intensity at one site and low intensity at three sites. The percentage of habitat affected was highest at sites 1986 Curraghchase (100% affected, mainly by *Fagus sylvatica*), 1594 Garryland (75% affected, mainly by *Fagus sylvatica*) and 2025 Cahir Woods (20% affected, by *Prunus laurocerasus, Prunus lusitanica* and regeneration of several non-native tree species).

The negative impact of B06 Grazing in forests/woodland was recorded from two sites (33%). Overgrazing by deer was medium intensity at 2021 Kylagowan and high intensity at 1291 Reenadina. At both sites, 100% of the habitat was affected. At site 1291 Reenadina, deer were present within a deer-fenced area, increasing the grazing intensity inside the fence compared to the adjacent unfenced area.

K04.03 Introduction of disease refers to the suspected presence of Ash Dieback disease at the sites. Ash Dieback affects *Fraxinus excelsior*, a common component of 91J0 woodland. It causes dieback of the ash crown, loss of leaves and can lead to tree death (Khela & Oldfield, 2018). Suspected Ash Dieback was recorded from two sites (33%): 1594 Garryland and 2025 Cahir Woods. It was low intensity at both sites and, at the time of survey, affected ≤3% of the habitat.

Table 75 Summary of the negative impacts recorded in the six 91J0 sites surveyed in 2018.

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
I01	Invasive non-native species	2	1	3	4	1	1	6
B06	Grazing in forests/ woodland	1	1				2	2
K04.03	Introduction of disease (microbial pathogens)			2	2			2
	Totals	**3**	**2**	**5**	**6**	**1**	**3**	

5.4.3.2 Positive impacts

Positive impacts were recorded from three 91J0 sites (50%). B02.01.01 Forest replanting (native trees) was the most frequent positive impact recorded, noted at three sites. This consisted of planting *Taxus baccata* adjacent to 91J0 with the aim of expanding the existing Annex I woodland (at sites 1986 Curraghchase and 2025 Cahir Woods) and planting native woodland on former clear-fell adjacent to 91J0 woodland (at site 2021 Kylagowan). The recording of B04 Use of biocides, hormones and chemicals refers to the recent spraying of *Prunus laurocerasus* (noted at site 1986 Curraghchase).

Table 76 Summary of the positive impacts recorded in the six 91J0 sites surveyed in 2018.

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
B02.01.01	Forest replanting (native trees)			3	3			3
B04	Use of biocides, hormones and chemicals (forestry)			1	1			1
	Totals	**0**	**0**	**4**	**4**	**0**	**0**	

5.4.3.3 Neutral impacts

Neutral impacts were recorded from five 91J0 sites (83%). B02.02 Forestry clearance was recorded from site 2021 Kylagowan, referring to the neutral impact of an adjacent conifer clear-fell. B06 Grazing in forests/woodland and B07 Forestry activities not referred to above were recorded at 2025 Cahir Woods. These refer to the neutral impact of a grazer and ivy cutting. D01.01 Paths, tracks, cycling tracks were recorded at site 1986 Curraghchase. G05.09 Fences refers to the deer fence at site 1291 Reenadina, which was scored as neutral rather than positive as grazers were present inside the fenced area. J02.04.01 Flooding refers to the prolonged flood event at 1594 Garryland, which resulted in the death of several yew trees and subsequent loss of area. This impact was scored neutral, as it was attributed to a natural cycle in the adjacent Annex I habitat (3180 Turloughs). There is currently no conclusive evidence to suggest it was related to an anthropogenic impact.

Table 77 Summary of the neutral impacts recorded in the six 91J0 sites surveyed in 2018.

		Intensity			% habitat affected			
Impact code	**Impact description**	**High**	**Med**	**Low**	**≤25 %**	**26-75%**	**>75 %**	**No. of sites**
B02.02	Forestry clearance		1			1		1
B06	Grazing in forests/ woodland			1			1	1
B07	Forestry activities not referred to above			1	1			1
D01.01	Paths, tracks, cycling tracks			1	1			1
G05.09	Fences	1					1	1
J02.04.01	Flooding	1			1			1
	Totals	**2**	**1**	**3**	**3**	**1**	**2**	

5.4.4 Future Prospects

The Future Prospects assessments for the six 91J0 sites surveyed are shown in Table 78. The effects of negative and positive activities were considered in the context of each site's Area and Structure and Functions assessment to make an overall Future Prospects assessment for each site. Future Prospects over the next 12 years (two reporting periods) were assessed. One site (16.7%) received a green Future Prospects assessment, with five sites (83.3%) receiving an amber assessment.

Table 78 Summary of the Future Prospects (FP) of the six 91J0 sites surveyed in 2018.

Site no.	Site name	FP of Area	FP of S&F	FP of habitat	Rationale
1291	Reenadina	Green	Amber	Amber	People's Millennium Forest site and NPWS-managed site; effective control of grazers and continued control of invasive non-native species would improve Structure and Functions
1594	Garryland	Green	Amber	Amber	NPWS-managed site; management of non-native species would improve Structure and Functions
1963	Cornalack	Green	Green	Green	No significant negative impacts recorded; habitat appears to be expanding into adjacent juniper scrub
1986	Curraghchase	Green	Amber	Amber	Coillte EU LIFE site; positive impact of negative species control, yew was planted adjacent with the aim of expanding the existing 91J0 habitat
2021	Kylagowan	Green	Amber	Amber	Coillte-owned People's Millennium Forest site; native tree planting on adjacent clear-fell with scope for yew to expand into this area, management of grazers would improve Structure and Functions (although yew is regenerating at the site)
2025	Cahir Woods	Green	Amber	Amber	Coillte EU LIFE site; yew was planted adjacent with the aim of expanding the existing 91J0 habitat, management of invasive non-natives would improve Structure and Functions

5.4.5 Overall condition assessment

5.4.5.1 Polygon result

Table 79 shows the overall condition assessments for the six 91J0 sites surveyed in 2018, derived by combining the assessment results of Area, Structure and Functions and Future Prospects for each polygon. One site (16.7%), 1963 Cornalack, received a green assessment (Favourable), with the remaining five sites (83.3%) receiving a red assessment (Unfavourable – Bad) (Figure 27).

All six 91J0 sites are within the SAC network. Site 1963 Cornalack, which received a green assessment, is within an SAC that has 91J0 as a qualifying interest. Of the five sites with red assessments, 91J0 is a qualifying interest in four.

Table 79 Overall condition assessments for the six 91J0 sites surveyed in 2018. A dagger (†) after the SAC code indicates that 91J0 is a qualifying interest for the SAC.

Site no.	Site name	Area	S&F	FP	Overall Conservation Status	SAC
1291	Reenadina	Green	Red	Amber	Red	000365†
1594	Garryland	Green	Red	Amber	Red	000252†
1963	Cornalack	Green	Green	Green	Green	002241†
1986	Curraghchase	Green	Red	Amber	Red	000174†
2021	Kylagowan	Green	Red	Amber	Red	000319
2025	Cahir Woods	Green	Red	Amber	Red	002137†

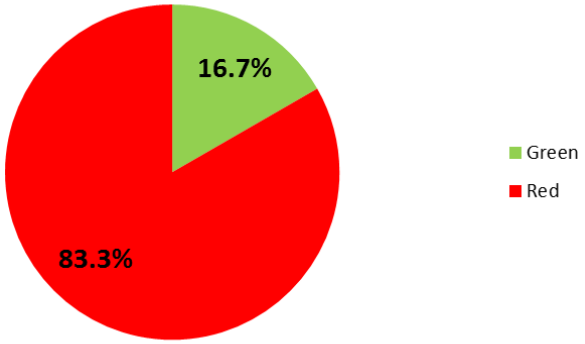

Figure 27 Proportion of polygons with overall assessments of green and red for six 91J0 woodlands surveyed in 2018.

5.4.5.2 National result

Using the results of the monitoring survey and external sources listed in the National Conservation Assessment (NCA) (NPWS, 2019), the Annex I woodland 91J0 received an overall national assessment of Unfavourable-Bad based on the information provided in Table 80.

Table 80 National Conservation Assessment (NCA) for the Annex I habitat 91J0. Adapted from NPWS (2019).

Parameter	Justification for assessment	National Assessment
Range	Stable, no loss recorded; more than 10% below the Favourable Reference Range.	**Unfavourable-Bad**
Area	Stable; current area is more than 10% below the Favourable Reference Area.	**Unfavourable-Bad**
Structure & Functions	Stable, no decline in condition since the last monitoring survey; more than 25% of habitat is in Unfavourable condition.	**Unfavourable-Bad**
Future Prospects	Pressures and threats such as non-native invasive species and overgrazing are causing deterioration in habitat quality.	**Unfavourable-Bad**
Overall NCA	Combining individual parameter results according to the evaluation matrix in Table 2.	**Unfavourable-Bad**
Trend	Overall trend in Conservation Status	**Stable**

5.5 Discussion

The National Conservation Assessment (NCA) of Unfavourable-Bad for the priority Annex I woodland 91J0 (NPWS, 2019) remains unchanged since the previous Article 17 report (NPWS, 2013).

Within this NCA, the Area parameter is Unfavourable-Bad with a stable trend. No anthropogenic losses of this habitat were recorded by the Woodland Monitoring Surveys in 2011 and 2018. The current area of this habitat is considered insufficient to ensure long-term viability (*i.e*. more than 10% below the Favourable Reference Area). Planting initiatives such as those undertaken by the Coillte LIFE Restoring Priority Woodland Project 2006-2009 (LIFE05 NAT/IRL/000182) are vital in the conservation of this habitat. Due to the slow growth rate of *Taxus baccata,* newly established yew woodlands cannot yet be classed as gains in Annex I habitat area; however, they represent future gains if managed appropriately. This reinforces the need to protect the existing resource from habitat loss and degradation.

The Structure and Functions parameter was assessed as Unfavourable-Bad with a stable trend. Only one site received a green Structure and Functions assessment, with the remainder receiving red. The most frequent criteria to fail the Structure and Functions assessment at the individual-plot level were negative species regeneration, negative species cover, native shrub layer cover, and native field layer cover and height. The most frequent criteria to fail at the four-plot level were *Taxus baccata* regeneration (*i.e*. no regeneration at the sapling stage within the plots) and *Taxus baccata* size class distribution (*i.e*. lack of diversity in tree girth).

The two sites that failed based on *Taxus baccata* size class distribution were sites 2021 Kylagowan, which lacked *Taxus baccata* trees in the medium size class, and 2025 Cahir woods, which lacked *Taxus baccata* trees in the small size class. The lack of small *Taxus baccata* at 2025 Cahir woods could be due to competition with non-native species, with the shrubs *Prunus laurocerasus* and *Prunus lusitanica* present in the undergrowth, as well as numerous regenerating non-native trees (*Acer pseudoplatanus, Acer campestre* and *Fagus sylvatica*). Only one site, 1291 Reenadina in Killarney National Park, failed on lack of regeneration of other native species. A small experimental grazing exclosure at this site looks markedly different from the surrounding deer-grazed yew woodland, with frequent *Corylus avellana* and *Ilex aquifolium* inside the exclosure, as well as a more vigorous native field layer. All 91J0 sites surveyed had sufficient dead wood.

The Future Prospects parameter was assessed as Unfavourable-Bad. This is primarily due to the negative impacts of invasive non-native species (100% of sites) and overgrazing by deer (33% of sites). The most frequent invasive species within this habitat were *Acer pseudoplatanus, Fagus sylvatica*, *Prunus laurocerasus* and *Clematis vitalba*. Non-native species negatively impact the field layer by casting dense shade, while also impacting the regeneration potential of the woodland. Heavy deer grazing was recorded from two sites, 1291 Reenadina and 2021 Kylagowan. Effective management of these negative impacts is required to improve the Structure and Functions and Future Prospects of this habitat.

Ash Dieback disease was detected from two sites: 1594 Garryland and 2025 Cahir Woods. Careful management is needed to ensure that light gaps created by dieback are colonised by native species rather than the invasive non-native species which are prevalent at these sites.

Positive restoration initiatives include the Charter of Commitment to the People's Millennium Forests. This is a pledge by Coillte to continue to maintain and conserve the 12 People's Millennium Forests sites in its ownership (Coillte, 2018). One of these sites supports 91J0 habitat, namely site 2021 Kylagowan. Site 1291 Reenadina, also a People's Millennium Forests site, is in the ownership of NPWS.

Sites 1986 Curraghchase and 2025 Cahir Woods were part of the Coillte LIFE Restoring Priority Woodland Project 2006-2009. A range of management measures are supported in the After-LIFE Conservation Plan (Herbert, 2009). During the current survey, control of *Prunus laurocerasus* was recorded from site 1986 Curraghchase, with no active management

measures recorded from site 2025 Cahir Woods. As part of Coillte LIFE, yew was planted adjacent to sites 1986 Curraghchase and 2025 Cahir Woods with the aim of expanding the existing Annex I habitat. Planting of yew also took place at Clonbur, Co Galway (12 ha), Attyslany, Co Clare (7 ha) and Castletaylor, Co Galway (12 ha) (Coillte, 2009). A follow-up of the Coillte LIFE plantings by Fuller (2015) found the planted yew was growing well at Curraghchase, Cahir Woods and Attyslany. Yew was recorded at the other two sites, Clonbur and Castletaylor, but appeared to be less abundant. However, at the latter sites, dense scrub and a lack of marker posts to denote yew planting locations may have resulted in under-recording.

Another relevant initiative was the launch of The Irish Deer Management Forum in 2015. This group set out a series of management actions in the document *Deer Management in Ireland: A Framework for Action*. The aim of this Framework was to manage deer responsibly in order to minimise their impact on agriculture, woodlands and other habitats of conservation value (Annett, 2015).

5.6 Conclusions and recommendations

- The total mapped area for priority 91J0 habitat as reported in the National Conservation Assessment document is 0.83 km^2. The six monitoring sites cover 0.27 km² (32.7% of the national resource).
- Five of the monitoring sites had 100% of their 91J0 habitat surveyed. Due to the extent of the 91J0 habitat at site 1291 Reenadina, only the monitoring polygon of 15.5 ha was surveyed (*i.e*. 20.0% of the 91J0 habitat in Killarney National Park).
- The impacts highlighted in this report need to be addressed if progress is to be made towards attaining Favourable status. The main negative impacts on 91J0 are invasive non-native species and deer grazing.
- Improving the conservation status of this Annex I habitat is highly dependent on active conservation measures. Updated Conservation Management Plans should be developed for all six 91J0 sites. Refer to Table 78 for site-specific recommendations.
- No upper cover/height limit was set for *Rubus fruticosus* during the current survey. Ecologically, this species can proliferate under a wide range of conditions, *e.g*. undergrazing, increased light levels and/or presence of a deer fence. The presence of vigorous *R. fruticosus* growth can typically be captured by existing Structure and Functions criteria (*e.g*. canopy cover). Placing an upper limit on the height of the field layer would penalise sites with large numbers of tall seedlings (≤2 m). It is recommended that future monitoring surveys continue to record the cover and height of *R. fruticosus* within plots, as it will provide valuable data to assess how plots develop over time. However, it is not proposed for this to become an assessment criterion.
- It is recommended that the frequency of *Fraxinus excelsior* within the monitoring polygon is recorded by future monitoring surveys (*e.g*. under the headings: Absent, Rare, Occasional, Locally frequent, Frequent, Abundant).

6 General conclusions and recommendations

Three of the Annex I woodlands, namely 91A0 Old sessile oak woods and two priority woodlands, 91E0 *Alluvial forests and 91J0 *Yew woods, received an overall national assessment of Unfavourable-Bad. The priority Annex I woodland 91D0 *Bog woodland received an overall national assessment of Favourable.

Preventing further loss of these habitats is imperative, as the national land cover of three Annex I woodlands (91A0, 91E0, 91J0) is currently considered insufficient to ensure their long-term viability. Within the last two reporting periods, anthropogenic activities that have resulted in area losses of these Annex I woodlands include agricultural intensification (91A0, 91E0), road schemes (91A0, 91D0), river drainage schemes (91E0), quarrying (91A0), construction (91A0, 91E0) and golf course developments (91A0). Some of these losses occurred within Special Areas of Conservation (SACs) (NPWS, 2019). While Notifiable Action consent and the Appropriate Assessment procedure are used to ensure actions/developments have no adverse impact on protected habitats within SACs, protection for Annex I habitats outside of SACs is available through the Environmental Liability Regulations (SI 547 of 2008), which came into force in Ireland in 2009. These Regulations aim to prevent and remediate environmental damage to protected habitats and species (EPA, 2011). If this legislation were fully enforced, then area losses, such as those outlined above, or activities that damage the Structure and Functions of Annex I woodlands could be prevented. There are likely to be considerable areas of unmapped Annex I woodland. The remaining resource needs to be identified and mapped so that appropriate measures can be undertaken to ensure its protection.

Some of the monitoring sites are currently within SACs that do not list the target Annex I habitat as a qualifying interest. These SACs should be examined with a view to including these habitats on their list of qualifying interests, to accord the habitat the highest level of protection. Several of the monitoring sites that received an overall condition assessment of red are within an SAC (*i.e*. eleven 91A0 sites, four 91E0 sites and five 91J0 sites), and in most cases the woodland is a qualifying interest. The improvement of the conservation status of these sites requires examination of the SAC's site-specific conservation objectives and the implementation of measures to achieve them. The overall conservation status of a site can quickly improve once good management practices are implemented, as this improves both the Structure and Functions and the Future Prospects of the habitat. Delaying management makes the task of improving the condition of the habitat even more difficult (*e.g*. infestation levels of non-native species can quickly increase).

Planting and restoration initiatives are vital to improve the conservation status of Annex I woodlands. This is highly dependent on active conservation measures by both public and private landowners. Where possible, planting initiatives should focus on extending extant stands, as habitat fragmentation is a serious issue and a national strategy is required to address this. Also, degraded examples of these Annex I habitats should be identified and prioritised for restoration. Greater promotion and uptake of the Native Woodland Conservation/ Establishment Schemes is required. Higher premiums should be offered for Annex I woodland habitats under the scheme.

Incentives for conserving and restoring these habitats within the Irish agricultural landscape are urgently required to prevent further loss and deterioration of habitat quality. The Common Agricultural Policy (CAP) post-2020, if correctly reformed and implemented, has the potential to play a key role in improving the overall conservation status of these Annex I woodlands (*e.g*. providing financial reward to landowners for conserving and/or actively restoring natural habitats on their land).

Considerable potential exists for converting conifer plantations to Annex I woodland. This can be achieved through a number of different methods, such as the traditional clearfell-and-replant method, as supported under the Native Woodland Conservation Scheme. Natural regeneration can be a viable alternative to restocking. It has the added advantage of harnessing natural ecological processes and ensuring local provenance. A project monitoring

natural regeneration on clearfells at the People's Millennium Forests has shown that young native woodland can be re-established within 20 years in the presence of a suitable seed source. These young woodlands show future Annex I woodland potential (91A0, 91E0) with regard to the presence of positive indicator trees and ground flora (Daly *et al.,* 2019). Alternatively, the Continuous Cover Forestry (CCF) model could be adopted. Rather than clearfelling, this approach involves adopting management practices that gradually reduce non-native trees while simultaneously encouraging canopy development of existing native trees and native regeneration.

The impacts highlighted in this report need to be addressed if progress is to be made towards attaining Favourable status. Invasive non-native species are a major pressure/threat and will continue to proliferate in the absence of effective management. A national strategy to manage invasive non-native species needs to be initiated, with Annex I woodland considered a priority.

Overgrazing by deer is a serious pressure/threat for Annex I woodlands. An active national strategy to achieve sustainable deer grazing levels is urgently required. Co-ordinated local and/or regional deer management groups have an important role to play, especially in deer hotspots. Individual land managers can undertake passive deer control. According to Cross & Collins (2017), smaller fencing exclosures are more effective, with grazers less likely to break in, and these smaller structures are easier to maintain. Tree shelters to protect against deer damage are another measure that can be used when under-planting and/or planting in coupes to rejuvenate the stand.

Ash Dieback disease, first introduced to Ireland on imported material in 2012, is now fully established and has been identified from all counties in Ireland (COFORD, 2020). The full ecological implications of Ash Dieback disease on the priority 91E0 habitat and the priority 91J0 habitat have yet to be realised. Improved biosecurity measures are urgently required to prevent new pests and diseases from entering Ireland, with the 'Plant Health Biosecurity Strategy 2020-2025' by the Department of Agriculture, Food and the Marine an important step in this regard (DAFM, 2019). Good biosanitary protocols should become standard practice, particularly when travelling between sites. Vigilance, recognition and reporting are key to limiting the spread of new pests and diseases.

The threat of climate change will likely increase in importance. Tackling existing pressures will increase the resilience of these habitats. This reinforces the need to act now.

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Appendix I

Data recording sheets

91A0: Old Sessile Oak Woods

Site no:	**Recorders:**	**Slope:**
Grid ref: ±	**Mon. Stop: Photo**	**Aspect:**
Date:	**(Initials):**	**Altitude:**

91A0 Positive indicator species: (✓ if present)

Target species:		*Diplophyllum albicans*	
Quercus petraea		*Hylocomium brevirostre*	
Quercus x *rosacea*		*Mnium hornum*	
Other Woody:		*Plagiothecium undulatum*	
Betula pubescens		*Polytrichastrum formosum*	
Corylus avellana		*Pseudotaxiphyllum elegans*	
Ilex aquifolium		*Rhytidiadelphus loreus*	
Lonicera periclymenum		*Saccogyna viticulosa*	
Sorbus aucuparia		*Scapania gracilis*	
Vaccinium myrtillus			
Herbs & Ferns:			
Blechnum spicant			
Luzula sylvatica			
Oxalis acetosella			
Hyacinthoides non-scripta		***Other details required:***	
Polypodium sp.		Cover of *Rubus frut. (%)*	
Mosses & Liverworts:		Height of *Rubus frut. (cm)*	
Dicranum scoparium/D. majus			

Negative indicator species: (✓if present)*

Non-native trees:	
Acer pseudoplatanus	
Fagus sylvatica	
Other (specify):	
1.	
2.	
3.	
4.	
Non-native shrubs:	
Cotoneaster spp.	
Prunus laurocerasus	
Rhododendron ponticum	
Symphoricarpos albus	
Other (specify):	
1.	
2.	
3.	

** Scots pine counted as neutral rather than negative species; Isolated conifers not counted as negative but shouldn't be in plot*

All cover values to nearest 5%, or nearest 1% if < 5%

Median canopy ht (m):	
Total canopy cover (%):	
Total cover of *Quer petr* & *Quer* x *ros* (%):	
Total cover of negative species (%):	
Total native shrub layer (2-4m) cover (%):	
Total native dwarf shrub/field layer cover (%):	
Median ht of dwarf shrub/field layer (cm):	
Total bryophyte layer cover (%):	

Non-native tree free regen. (dbh <7cm)

Species	Ht < 2m	Ht ≥ 2m
TOTAL:		

***Non-native shrub regen. present?* (Y/N)**:

Evidence of grazing pressure

Topiary effect (Y/N):	
Browse line (Y/N):	
Abundant dung (Y/N):	
Severe bark stripping (Y/N):	

Tally other native saplings >2m tall within species

Species	*Tally*	Total
TOTAL:		

Tally* Quercus *sp. saplings >2m tall

TOTAL:	

Tally* Quercus *sp. stem DBH data within size classes

7-19.5cm dbh (small)		20-29.5cm dbh (medium1)		30-39.5cm dbh (medium2)		>40cm dbh (large)	
TOTAL:		TOTAL:		TOTAL:		TOTAL:	

Dead wood (Tally items ≥20cm only; species name not required)

Old / senescent		Standing dead (>1m tall)		Fallen dead		Rotten stump (<1m tall)	
Total:		Total:		Total:		Total:	

Assessment scores:

Criterion	Target	Result	Pass/Fail
Individual plot level			
Positive species	≥ 1 target species		
	≥ 6 positives, of which at least 2 must be bryos		
Negative species cover (not incl. isol'd conifers)	Total cover ≤ 10%		
Negative species regen.	Absent		
Median canopy ht.	≥11 m		
Total canopy cover	≥30% of plot		
Proportion of *Quercus* in canopy	≥50% of canopy		
Native shrub layer cover	10-75%		
Native dwarf shrub/field layer cover	≥20%		
Native dwarf shrub/field layer height	≥20 cm		
Bryophyte cover	≥4%		
Grazing pressure	No overgrazing		
4-plot level			
Target sp. dbh	At least one of each of the three† size classes present	Total stems: (a) 7-19.5cm (b) 20-29.5cm† (c) 30-39.5cm† (d) ≥40cm†	
Quercus sp. regeneration	≥1 sapling >2m tall*		
Other native tree sp. regeneration	≥1 sapling >2m tall in 2 or more plots*		
Old trees & dead wood	≥3 from any category with dbh ≥20cm	Old/senesc.: SDW**: FDW**: Stumps:	

***If no target or native saplings present, were light gaps present for regeneration to occur? (Y/N)**

** SDW=Standing dead wood; FDW=Fallen dead wood

† If wood is in upland situation (>150m), size classes are 7-19.5cm, 20-29.5cm, 30+ cm, so add (c)+(d) for 3rd size class total. If wood is not in upland situation (<150m), size classes are 7-19.5cm, 20-39.5cm, 40+ cm, so add (b)+(c) for 3rd size class total.

Additional notes:

91E0: Alluvial Woodland

Site no:		**Recorders:**	**Slope:**
Grid ref:	±	**Mon. Stop:**	**Aspect:**
Date:		**Photo (Initials):**	**Altitude:**

91E0 Positive indicator species: (✓ if present)

Target species:		*Carex remota*	
Alnus glutinosa		*Filipendula ulmaria*	
Fraxinus excelsior		*Galium palustre*	
Salix cinerea		*Iris pseudacorus*	
Other *Salix* sp. (specify):		*Lycopus europaeus*	
1.		*Mentha aquatica*	
2.		*Phalaris arundinacea*	
3.		*Ranunculus repens*	
4.		*Rumex sanguineus*	
5.		*Urtica dioica*	
Other Woody:		**Mosses & Liverworts:**	
Betula pubescens		*Calliergonella cuspidata*	
Crataegus monogyna		*Climacium dendroides*	
Solanum dulcamara		*Thamnobryum alopecurum*	
Viburnum opulus		***Other details required:***	
Herbs & Ferns:		Cover of *Urtica dioica* (%)	
Agrostis stolonifera		Cover of *Rubus frut*. (%)	
Angelica sylvestris		Height of *Rubus frut.* (cm)	

Negative indicator species: (✓if present)*

Non-native trees:	
Acer pseudoplatanus	
Fagus sylvatica	
Picea sitchensis	
Larix decidua	
Other (specify)	
1.	
2.	
3.	
Non-native shrubs:	
Cotoneaster spp.	
Prunus laurocerasus	
Rhododendron ponticum	
Symphoricarpos albus	
Cornus sericea	
Other (specify):	
1.	
2.	

** Scots pine counted as neutral rather than negative species*

All cover values to nearest 5%, or nearest 1% if < 5%

Median canopy ht (m):	
Total canopy cover (%):	
Total cover of target species (%):	
Total cover of negative species (%):	
Total native shrub layer (2-4m) cover (%):	
Total native dwarf shrub/field layer cover (%):	
Median ht of dwarf shrub/field layer (cm):	
Total bryophyte layer cover (%):	

Non-native <u>tree</u> free regen. (dbh <7cm)

Species	Ht < 2m	Ht ≥ 2m
Total:		

***Non-native <u>shrub</u> regen. present* (Y/N):**

Tally <u>basal</u> regeneration >2m tall from collapsed Salix trunks only

<7cm dbh		*>7cm dbh*	
Total:		Total:	

Evidence of grazing pressure

Topiary effect (Y/N):	
Browse line (Y/N):	
Abundant dung (Y/N):	
Severe bark stripping (Y/N):	
Trampling (Y/N):	

Tally <u>free</u> target saplings >2m tall within species

Species	*Tally*	*Total:*
TOTAL:		

Tally other native saplings >2m tall within species

Species	*Tally*	*Total:*
TOTAL:		

Tally target species stem DBH data within size classes (For Salix, only count rooted trunks, not basal regen)

Species	7-19.5cm dbh (small)		20-29.5cm dbh (medium)		>30 cm dbh (large)	
TOTAL:						

Dead wood (Tally items <u>≥</u> 20cm only; species name not required)

Old / senescent		Standing dead		Fallen dead		Rotten stump	
Total:		Total:		Total:		Total:	

Assessment scores:

Criterion	Target	Result	Pass/Fail
Individual plot level			
Positive species	≥ 1 target species		
	≥ 6 positive species		
Negative species cover	Total cover ≤ 10%		
Negative species regen.	Absent		
Median canopy ht.	≥7m		
Total canopy cover	≥30% of plot		
Proportion of target species in canopy	≥50% of canopy		
Native shrub layer cover	10-75%		
Native dwarf shrub/field layer cover	≥20%		
Native dwarf shrub/field layer height	≥20 cm		
Bryophyte cover	≥4%		
Grazing pressure	No overgrazing		
Urtica dioica cover	<75%		
4-plot level			
Target sp. dbh	At least one of each of the three size classes present	Total stems: 7-19.5 cm: 20-29.5 cm: ≥30cm:	
Target sp. free regeneration	≥1 sapling >2m tall*		
Other native tree species free regeneration	≥1 sapling >2m tall in 2 or more plots*		
Old trees & dead wood	≥3 from any category with dbh≥20cm	Old/senesc.: SDW**: FDW**: Stumps:	

*** If no target or native saplings present, were light gaps present for regeneration to occur? (Y/N)**

**SDW=Standing dead wood; FDW=Fallen dead wood

Additional notes:

91D0: Bog Woodland

Site no:		**Recorders:**	**Slope:**
Grid ref:	±	**Mon. Stop: Photo**	**Aspect:**
Date:		**(Initials):**	**Altitude:**

91D0 Positive indicator species: (✓ if present)

Target species:		**Mosses:**	
Betula pubescens		*Polytrichum commune*	
Other trees:		*Sphagnum fimbriatum*	
Salix aurita		*Sphagnum fallax*	
Salix cinerea		*Sphagnum palustre*	
S. x multinervis		*Hylocomium splendens*	
Dwarf shrubs, herbs & ferns:		*Aulacomnium palustre*	
Dryopteris dilatata			
Dryopteris carthusiana			
Carex rostrata			
Juncus effusus			
Molinia caerulea			
Vaccinium oxycoccos			
Empetrum nigrum			
Vaccinium myrtillus			
Epilobium palustre		***Other details required:***	
Calluna vulgaris		*Cover of Urtica dioica (%)*	
Potentilla erecta		*Cover of *Pinu sylv (%)*	

Negative indicator species: (% Cover)

Pteridium aquilinum	
Rubus fruticosus agg.	
Height (cm) of *Rubus frut.* agg.	
Non-native trees:	
Acer pseudoplatanus	
Fagus sylvatica	
Other conifers (specify):	
1.	
2.	
Non-native shrubs:	
Rhododendron ponticum	
Other (specify):	
1.	
2.	

**Pinus sylvestris counted as neutral rather than negative species*

All cover values to nearest 5%, or nearest 1% if < 5%

Median canopy ht (m) (only measure trees>4m):	
Total canopy cover (%) (trees>4m):	
Total cover of *Betu pube* (%) in canopy (trees>4m):	
Total cover of open shrub layer (trees 1-3.9m):	
Median ht (m) of open shrub layer (trees 1-3.9m)	
Total cover of negative species (%):	
Total dwarf shrub layer cover (%):	
Total *Calluna vulgaris* cover (%)	
Total *Sphagnum* cover (%)	
Total bryophyte layer cover (%):	

Tally other native saplings >2m tall/dbh <7cm within species (incl. Pinus sylvestris)

Species	*Tally*	*Total:*
TOTAL:		

Evidence of grazing pressure

Topiary effect (Y/N):	
Browse line (Y/N):	
Abundant dung (Y/N):	
Severe bark stripping (Y/N):	

Non-native tree free regen. (dbh <7cm)

Species	Ht <2m	Ht ≥2m
TOTAL:		

Tally Betula pubescens saplings >1m tall with a dbh <5cm

TOTAL:	

Non-native shrub regen. present? (Y/N)

Absence/presence Betula pubescens stem DBH data within size classes (Please write Absent/Present)

5-9.5cm dbh (small)	10-19.5cm dbh (medium)	>20cm (large)

Absence/presence Pinus sylvestris stem DBH data within size classes (Please write Absent/Present)

7-19.5cm dbh (small)	20-29.5cm dbh (medium1)	30-39.5cm dbh (medium2)	≥40cm dbh (large)

Dead wood (Tally items ≥10cm only; species name not required)

Deadwood	Old / senescent		Standing dead (>1m tall)		Fallen dead	
In plot:						
Adjacent to plot:						
	Total:		Total:		Total:	

Assessment scores:

Criterion	Target	Result	Pass/Fail
Individual plot level			
Positive indicator species	Presence of *Betula pubescens*		
	Presence of *Sphagnum* sp.		
	≥5 other positive species		
Negative species cover	≤10% cover of plot		
Median canopy height	≥4 m		
Total canopy cover	≥30% of plot		
Proportion of *Betula* in canopy	≥50% of canopy		
Native dwarf shrub layer cover	<50% of plot		
Calluna cover	<40% of plot		
Sphagnum cover	≥25% of plot		
Total bryophyte cover	≥50% of plot		
4-plot level			
Betula pubescens dbh	At least one of each of the three size classes present	Total stems: (a) 5-9.5cm (b) 10-19.5cm (c) ≥20cm	
Betula pubescens regeneration	≥1 sapling ≥1 m tall in each plot*		
Old trees & dead wood	≥3 from any category with dbh ≥10cm in t plot	Old/senesc.: SDW**: FDW**:	

If no saplings present are light gaps present in the surrounding woodland polygon for regeneration to occur? (Y/N)

Circle the occurrence of Pinus sylvestris within the woodland polygon

Absent Rare Occasional Locally frequent Frequent Abundant

** SDW=Standing dead wood; FDW=Fallen dead wood

Additional notes:

91J0: Yew Woodland

Site no:	**Recorders:**	**Slope: Aspect:**
Grid ref:	**+ Mon. Stop:**	
Date:	**Photo (Initials):**	**Altitude:**

91J0 Positive indicator species: (✓ if present)

Target species:		**Mosses & Liverworts:**	
Taxus baccata		*Metzgeria furcata*	
		Isothecium myosuroides	
Other Woody:		*Thamnobryum alopecurum*	
Fraxinus excelsior		*Fissidens dubius*	
Corylus avellana		*Neckera complanata*	
Ilex aquifolium		*Neckera crispa*	
Lonicera periclymenum			
Quercus robur			
Sorbus aucuparia			
Herbs & Ferns:			
Brachypodium sylvaticum			
Asplenium scolopendrium			
Potentilla sterilis			
Viola reich/riviniana		***Other details required:***	
Carex flacca		Cover of *Rubus frut. (%)*	
		Height of *Rubus frut. (cm)*	

Negative indicator species: (✓if present)*

Non-native trees:	
Acer pseudoplatanus	
Fagus sylvatica	
Other (specify):	
1.	
2.	
3.	
4.	
Non-native shrubs:	
Cotoneaster spp.	
Prunus laurocerasus	
Rhododendron ponticum	
Symphoricarpos albus	
Other (specify):	
1.	
2.	
3.	

** Scots pine counted as neutral rather than negative species*

All cover values to nearest 5%, or nearest 1% if < 5%

Median canopy ht (m):	
Total canopy cover (%):	
Total cover of *Taxus* (%):	
Total cover of *Fraxinus* (%):	
Total cover of negative species (%):	
Total native shrub layer (2-4m) cover (%):	
Total native field layer cover (%):	
Median ht of field layer (cm):	
Total bryophyte layer cover (%):	

Non-native tree free regen. (dbh <7cm)

Species	Ht <2m	Ht >2m
TOTAL:		

Non-native <u>shrub</u> regen. present? **(Y/N)**:

Evidence of grazing pressure

Topiary effect (Y/N):	
Browse line (Y/N):	
Abundant dung (Y/N):	
Severe bark stripping (Y/N):	

Tally other native saplings >2m tall within species

Species	*Tally*	Total
TOTAL:		

Tally Taxus baccata seedlings and saplings (dbh <7cm)

Species	Ht <2m (seedling)	Ht ≥2m (sapling)
TOTAL:		

Tally Taxus baccata stem DBH data within size classes

7-19.5cm dbh (small)		20-29.5cm dbh (medium1)		30-39.5cm dbh (medium2)		>40cm dbh (large)	
TOTAL:		TOTAL:		TOTAL:		TOTAL:	

Dead wood (Tally items >20cm only; species name not required)

Old / senescent		Standing dead (>1m tall)		Fallen dead		Rotten stump (<1m tall)	
Total:		Total:		Total:		Total:	

Assessment scores:

Criterion	Target	Result	Pass/Fail
Individual plot level			
Positive species	Presence of target species		
	≥6 non-target positive species		
Negative species cover (not incl. isol'd conifers)	≤10% cover of plot		
Negative species regen.	Absent		
Median canopy ht.	≥10 m		
Total canopy cover	≥30% of plot		
Proportion of *Taxus* in canopy	≥50% of canopy		
Native shrub layer cover	10-75% of plot		
Native dwarf shrub/field layer cover	≥20% of plot		
Native dwarf shrub/field layer height	height ≥20 cm		
Bryophyte cover	≥4%		
Grazing pressure	All 4 overgrazing indicators absent		
4-plot level			
Taxus baccata dbh	At least one of each of the four size classes present	Total stems: (a) 7-19.5cm (b) 20-29.5cm (c) 30-39.5cm (d) ≥40cm†	
Taxus baccata regeneration	≥1 sapling >2m tall*		
Other native tree sp. regeneration	≥1 sapling >2m tall in 2 or more plots*		
Old trees & dead wood	≥3 from any category with dbh ≥20cm	Old/senesc.: SDW**: FDW**: Stumps:	

* ***If the required number of Taxus baccata and native saplings are not present, are light gaps present for regenerationto occur (in this instance, light gaps refers to openings in the yew canopy due to tree fall and/or a lighter canopy composed of deciduous trees such as oak and ash)? (Y/N)***

** SDW=Standing dead wood; FDW=Fallen dead wood

Additional notes:

Appendix II

Impact recording sheet

List impacting activites for Annex I woodland

Code	Description
B	**Sylviculture, forestry**
B01	Forest planting on open ground
B01.01	Forest planting on open ground (native trees)
B01.02	Planting on open ground (non-native trees)
B02	Forest and Plantation management & use
B02.01	Forest replanting
B02.01.01	Forest replanting (native trees)
B02.01.02	Forest replanting (non native trees)
B02.02	Forestry clearance
B02.03	Removal of forest undergrowth
B02.04	Removal of dead and dying trees
B02.05	Non- intensive timber production (leaving dead wood/ old trees untouched)
B02.06	Thinning of tree layer
B03	Forest exploitation without replanting or natural regrowth
B04	Use of biocides, hormones and chemicals (forestry)
B05	Use of fertilizers (forestry)
B06	Grazing in forests/ woodland
B07	Forestry activities not referred to above
C01	Mining and quarrying
D	**Transportation and service corridors**
D01	Roads, paths and railroads
D01.01	Paths, tracks, cycling tracks
D01.02	Roads, motorways
D01.03	Car parks and parking areas
E	**Urbanisation, residential and commercial development**
E01	Urbanised areas, human habitation
E02	Industrial or commercial areas
E03	Discharges
E03.01	Disposal of household / recreational facility waste
E03.02	Disposal of industrial waste
E03.03	Disposal of inert materials
E03.04	Other discharges
I	**Invasive, other problematic species and genes**
I01	Invasive non-native species
I02	Problematic native species
J	**Natural System modifications**
J01	Fire and fire suppression
J02	Human induced changes in hydraulic conditions
J02.01	Landfill, land reclamation and drying out, general
J02.01.02	Reclamation of land from sea, estuary or marsh
J02.01.03	Infilling of ditches, dykes, ponds, pools, marshes or pits
J02.02	Removal of sediments (mud...)
J02.03	Canalisation & water deviation
J02.04	Flooding modifications
J02.04.02	Lack of flooding
J02.07.01	Groundwater abstractions for agriculture
X	**No threats or pressures**

Site no:	**Annex habitat:**	**Recorders:**	**Date:**

Impacting activities affecting selected polygon

Impact Code	**Intensity**			**Effect**			**% Habitat**	**Source**	**Notes**
	High	Med	Low	Pos	Neu	Neg		Inside/Outside	

Impacting activities affecting adjacent Annex I habitat

Impact Code	**Intensity**			**Effect**			**% Habitat**	**Source**	**Notes**
	High	Med	Low	Pos	Neu	Neg		Inside/Outside	

List of the most likely impacts is recorded on reverse of this sheet. If impact not listed refer to main list provided and choose most suitable code.

% Habitat impacted: record to ≤1% or to nearest 5%

Summary of your opinion of site's Future Prospectsin the short-term (next 12 years:)

in the medium/long-term (next 50 years:)

Assessment result: Green/Amber/Red?

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