# Results of a monitoring survey of yew woodland

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# Results of a monitoring survey of yew woodland


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Cover photos: Regenerating yew at Curraghchase, Co. Limerick. © J. Cross., NPWS.


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# Contents

## Executive Summary

This document reports on the first year of a monitoring survey which assesses the structure and functions and future prospects of a woodland type listed in Annex I of the EU Habitats Directive: 91J0 *Taxus baccata* woods of the British Isles (otherwise known as yew woodland). Five yew woodlands were monitored in 2011. In each site, 2-4 monitoring plots measuring 20m x 20m were used to gather structure and functions assessment data on the following parameters: indicator species, cover of individual woodland layers, canopy height, presence of non-native species, stand structure, regeneration and dead wood. 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) and red (unfavourable – bad) depending on the outcome of the two parts of the assessment. One site received a green assessment, one site an amber assessment and three sites a red assessment. The main pressures were overgrazing and non-native species, both of which impacted the field layer and depressed regeneration. Grazing pressure is however declining and non-native species are being removed at two sites. Yew is also being planted as part of an EU LIFE programme at two sites.

The monitoring criteria are discussed and recommendations for future refinement of the methodology are made.

## Acknowledgements

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# Introduction

## Rationale for the survey

Annex I habitats are habitats of European importance that are listed under Annex I of the EU Habitats Directive (92/43/EEC). Under Article 17 of the Habitats Directive, all EU Member States which are signatories of the Directive have a legal obligation to report on the conservation status of the Annex I habitats that occur within their territories. These reports are produced every six years. The next round of reporting, covering the period 2007-2012, is due in 2013.

The Yew Monitoring Survey was undertaken in 2011 with a view to feeding in to the reporting requirements for 2013. This survey assesses the structure and functions and future prospects of The Annex I habitat "*Taxus baccata* woods of the British Isles" (habitat code: 91J0) (hereafter yew woodland).

## 91J0 Yew woodland

Yew woodland is a highly restricted habitat type in Ireland which occurs at a handful of sites on outcropping limestone with skeletal soils in the southwestern part of the country – Fig 1. The canopy in these stands is typically dominated by *Taxus baccata* with *Fraxinus excelsior, Corylus avellana* and *Ilex aquifolium* often frequent. The ground is generally covered by an extensive bryophyte carpet dominated by a few robust pleurocarpous species, e.g. *Thamnobryum alopecurum, Neckera crispa*. Where present, the field layer consists of the grass *Brachypodium sylvaticum,* herbs (e.g. *Viola riviniana/reichenbachiana, Potentilla sterilis)* and ferns (e.g. *Phyllitis scolopendrium*). This woodland type has been classified as a facies of the Corylo-Fraxinetum association by Kelly (1981) and shares many of the same species.

There is an anomalous site in a Coillte forest at Kylagowan, Pollnaknockaun SAC, Co. Galway, where yew occurs as the dominant species in the sub-canopy and shrub layers of a sessile oak (*Quercus petraea*) stand. Holly (*Ilex aquifolium*) is also present in the shrub layer and the herb layer is typical of sessile oak on more base-rich acidic soils, with *int. al., Blechnum spicant, Luzula sylvatica, Rubus fruticosus* and *Athyrium filix-femina*. Yew is fairly common throughout the woodlands and plantations in the vicinity.

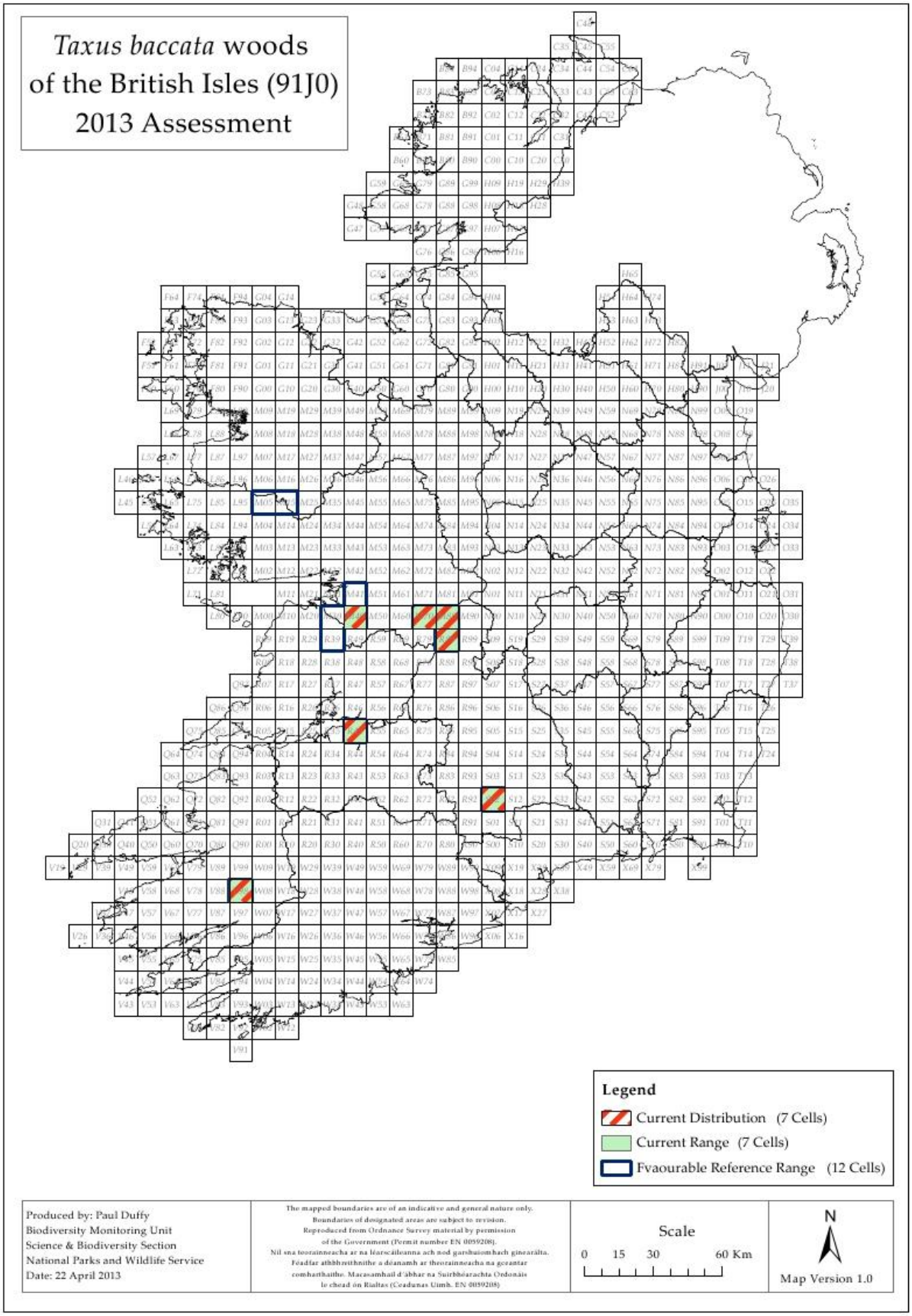


Fig 1. Distribution of yew woodlands within Ireland.

The definition for 91J0 * *Taxus baccata* woods of the British Isles presented in the Interpretation Manual (European Commission 2007) is very brief but is based largely on British stands of this type. 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 whilst 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* sens. lat. 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 whilst British stands are known to develop from scrub dominated by *Crataegus monogyna* and *Juniperus communis*.

## Assessment and monitoring of Annex I habitats

Evans and Arvela (2011) present an evaluation matrix for assessing the conservation status of Annex I habitats. A modified version of this matrix is given in Table 1.

Table 1: Summary matrix of the parameters and conditions required to assess the conservation status of habitats (modified from Evans and Arvela (2011))

| **Parameter** | **Green** | **Amber** | **Red** |
|---|---|---|---|
| Range | Stable/increasing | >0% - <1% decline/year | ≥1% decline in range /year over specified period |
| Area | Stable/increasing | >0% - <1% decline/year | ≥1% decline in area /year over specified period |
| Structure & Functions | Habitat structure in good condition & functioning normally; typical species present | Any combination other than those described under green or red | >25% of habitat has structure, function or species composition in unfavourable condition |
| Future Prospects | Excellent, no significant impact from threats expected. Long-term viability assured | Between green and red | Bad, severe impact from threats expected; habitat expected to decline or disappear |
| Overall assessment of conservation status | All green | One or more amber but no red | One or more red |

In some EU literature, the categories "favourable", "unfavourable – inadequate" and "unfavourable – bad" are used in place of "green", "amber" and "red". This survey assesses just two of the above parameters: structure and functions, and future prospects. Therefore, it is only possible at this time to give a preliminary assessment of the habitat status. Any reduction in area at these sites in future surveys will be assessed accordingly. The survey methodology follows the approach of the sand dune survey by Ryle *et al*. (2009), grasslands survey by Martin *et al*. (2007, 2008) and upland habitats survey by Perrin *et al*. (2009) in using monitoring stops to assess the status of structure and functions. Future prospects of sites are assessed on the basis of the occurrence and severity of impacts recorded in the Annex I habitats.

## Scope of the project

The remit of the project was to monitor and assess structure and functions and future prospects within five Annex I woodland sites. The 2007 report (NPWS 2007) erroneously refers to 10 sites (10km squares). In fact there were only five true yew woodlands (see Table 2). Of the other five sites mentioned in the 2007 report one (on the Tipperary/Laois border) was an error, two are yew-rich stands of mixed high forest (Dromana, Kylenamelly), one (Shanbally) is a scattering of trees in a (recently felled) conifer plantation and one (Castletaylor) is a former clear-felled conifer stand on limestone pavement which is being restored by Coillte as a yew woodland but does not yet have a continuous canopy. Coillte have also planted yew in a number of other sites as part of their LIFE Project 'Restoring Priority Woodland Habitats in Ireland', which already contained a certain amount of yew. Those at Attyslaney and Clonbur do not merit classification as yew woodland (Table 3). In addition, there is the site at Kylagowan referred to above.

Table 2: List of yew stands

| Site | County | Area (ha) | Grid ref | Comments |
|---|---|---|---|---|
| Cornalack | Tipperary | 3.38 | M84200 00111 | One stand on pavement/old quarry (mentioned in 2007 report) |
| Curraghchase | Limerick | 3.26 | R41073 50613 | One stand on a rocky knoll (mentioned in 2007 report) |
| Cahir Park | Tipperary | 1.12 | S05241 22533 | One small stand on a steep slope (mentioned in 2007 report) |
| Coole/Garryland | Galway | 0.73 | M41927 03921 | Several scattered small stands (mentioned in 2007 report) |
| Killarney National Park | Kerry | 71.79 | V95629 85988 | Two large stands (Reenadina) and several small stands (Monk's Wood, Dundag Point, Ross Island) (mentioned in 2007 report). |
| Kylagowan | Galway | 2.93 | M75221 01285 | Sessile oak stand with understorey of yew. This is an unusual site on acidic substrate. It was not included in the 2007 report. |
| Dromana | Waterford | - | W09300 094700 | Yew-rich stand of mixed woodland |
| Kylenamelly | Galway | - | R80400 97200 | Yew-rich stand of native woodland |
| Castletaylor | Galway | - | M45400 15000 | Yew-rich area of recently clear-felled conifers with additional planting |

Table 3: List of sites forming part of the Coillte LIFE Project 'Restoring Priority Woodland Habitats in Ireland'

| Site | County | Grid ref | Area (ha) | Comments |
|---|---|---|---|---|
| Curraghchase | Limerick | R41073 50613 | 5.8 | Exotics removed and yew planted |
| Cahir Park | Tipperary | S05241 22533 | 9.0 | Exotics removed and yew planted |
| Castletaylor | Galway | M45500 15000 | 12.0 | Yew-rich area of recently clear-felled conifers |
| Attyslaney | Clare | R39860 99730 | 7.0 | Exotics removed and yew planted |
| Clonbur | Galway | M10900 56570 | 12.0 | Confer stand felled and replanted with yew |
| | | Total | **45.8** | |

# Methodology

## Site selection

Sites monitored in 2011 are listed in Table 4.

Table 4: Site locations

| Site | County | Grid ref | Comments |
|---|---|---|---|
| Cornalack | Tipperary | M84200 00111 | One stand on pavement/old quarry |
| Curraghchase | Limerick | R41073 50613 | One stand on a rocky knoll |
| Cahir Park | Tipperary | S05241 22533 | One small stand on a steep slope |
| Coole/Garryland | Galway | M41927 03921 | Several scattered small stands |
| Kylagowan | Galway | M75221 01285 | One stand on slope on acidic soil |
| Reenadina | Kerry | V95629 85988 | Two large and several small stands |

## Monitoring plots

Survey work was carried out between 18th July and 6th October 2011. On arrival at the site an initial assessment of the woodland was made as to whether it conformed to the appropriate Annex I woodland type. For sites that passed this initial assessment, detailed assessments were then carried out at two to four monitoring plots within each site, each plot measuring 20 m x 20 m. The presence of *Taxus baccata* was mandatory within each plot. Plots were selected throughout the site to encompass local variation but to avoid woodland edges and large tracks. A hand-held GPS (Garmin eTrex) was used to record the grid reference of each plot.

A general survey was taken at Kylagowan in February 2013.

## Structure and functions data

The methodology employed for the monitoring and conservation assessment was modified from Perrin *et al*. (2008).

Data sheets are given in Appendix I. Within each plot, the following structure and functions data were recorded:

### *Species*

- Presence of positive indicator species.
- Presence of negative indicator species (i.e. any non-native species).
-

### *Woodland structure*

- Median canopy height in metres.
- 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 occurring 2 - 4 metres above ground.
- Total native dwarf shrub/field layer cover as percentage of plot.
- Median height in cm 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%.

### *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; bark stripping.

### *Free regeneration (i.e. regeneration where diameter at breast height (dbh) <7 cm)*

- Number of saplings[1] >2 m tall of each negative tree species. Number of seedlings[2] <2 m tall of each negative tree species. Occurrence of free regeneration of negative shrub and herbaceous invasive species regardless of height.
- Number of *Taxus* saplings >2 m tall.
- Number of saplings >2 m tall of each non-target native tree species.

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.

### *Basal regeneration*

Basal shoots >2 m tall arising from a larger trunk >7 cm diameter 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.

### *Size class (target tree species only)*

The dbh of target trees 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; size class 4 = ≥40 cm.

[1] The term "sapling" is used in this report to refer to regenerating trees having a dbh less than 7 cm and measuring 2 m or more in height.

[2] The term "seedling" is used in this report to refer to regenerating trees having a dbh less than 7 cm and measuring less than 2 m in height.

### *Dead wood*

Dead wood with a diameter of 10 cm or greater was recorded in four categories: old senescent trees (some dead limbs or other signs of damage present); standing dead; fallen dead (including large, fallen tree branches); rotten stumps (cut/broken trunks of 1 m or less, not counting stumps with basal resprouts). Three size classes were recorded: 10-<15 cm, 15-<20 cm and ≥20 cm, although the focus for assessment was on the ≥20 cm class. Dead wood was recorded regardless of whether the tree was a target, non-target native or non-native species.

## Structure and functions assessment

Assessments were made at a number of levels: individual-plot, multiple-plot and site levels. The criteria assessed for each woodland type are shown in Tables 5 and 6. Of the 11 criteria assessed at the individual-plot level, nine had to reach their target to achieve a pass. Of the four criteria assessed at the 4-plot level, three had to reach their target to achieve a pass. For the overall site level assessment, a green (favourable) assessment result could be achieved only if all plots passed at the individual-plot and 4-plot levels (i.e. five passes achieved). One failure out of the five was allowed for a site to receive an amber (unfavourable – inadequate) assessment. More than one failure resulted in a red (unfavourable – bad) assessment. For sites with less than four plots a subjective approach was used to assess structure & functions.

Table 5: Assessment criteria at the individual-plot level

| **Assessment criterion** | **91J0 target for pass** |
|---|---|
| Positive indicator species | At least 1 target species<br>At least 6 positive species |
| Negative species cover | ≤ 10% cover of plot |
| Negative species regeneration | Absent |
| Median canopy height | ≥ 10 m |
| Total canopy cover | ≥ 30% of plot |
| Proportion of target species in canopy | ≥ 50% of canopy |
| Native shrub layer cover | ≥ 20% of plot |
| Native dwarf shrub/field layer cover | ≥ 20% of plot |
| Native dwarf shrub/field layer height | ≥ 20 cm |
| Bryophyte cover | ≥ 4% |
| Grazing pressure | All 4 indicators absent |

Table 6: Assessment criteria at the 4-plot level

| | **91J0 target for pass** |
|---|---|
| Size class distribution | Each size class present |
| Target species regeneration | 1+ sapling >2 m in at least 1 plot |
| Other native tree regeneration | 1+ sapling >2 m tall in 2 or more plots |
| Old trees & dead wood | At least 3 from any category (dbh ≥20 cm) |

## Future prospects data

The future prospects assessment relates to the likely development and maintenance of the Annex I woodland habitat in favourable condition for the foreseeable future (Ellmauer 2010). The "foreseeable future" is suggested by Ellmauer to be two reporting phases, i.e. 12 years. However, this time-frame is more applicable to habitats subject to more rapid, short-term changes and turnover of species, such as grassland or dune habitats, than to woodlands, for which a medium to long-term view is more appropriate, i.e. 20-50 years. In order to assess future prospects, pressures, threats and impacts throughout the site were recorded according to the list given by Ssymank (2011). The following details were recorded for each impact: the effect of the impact (positive, negative or neutral) and the source of the impact (from inside or outside the site).

## Future prospects assessment

The assessment of the woodland'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.

## Trends

Current and future trends were assigned using expert judgement and knowledge of the site.

## Overall site assessment

If either structure and functions or future prospects were assessed as red, the overall assessment result for the site was red. Both attributes had to be green for a site to receive a green assessment. Any other combination resulted in an amber assessment.

# Results

## Site Results

The distribution of yew woodland is shown in Fig 1

See Tables 7 and 8 for plot and multiple plot level results respectively. Activities impacting each site are listed in Table 9.

### *Cornalack*

*Site description*

Wooded limestone pavement on the north-east shore of Lough Derg partly within an abandoned quarry. This site is unusual in that abundant yew regeneration is occurring within an adjacent juniper formation and there is evidence to suggest that yew is slowly replacing juniper as the latter is shaded out by the former. In the small mature yew stand, which reaches 8-12 m in height, ash is constant within the canopy and holly is the principal understorey species with some rowan and occasional purging buckthorn and spindle. Ivy is the principal species of the herb layer with small amounts of other species listed above. Bryophyte cover ranges from 50% to 80%. There is no active management and no sign of grazing.

*Assessment results*

All plots passed. Low potential impact from non-natives.

Structure & Functions – Green

A healthy yew woodland with good prospects.

Future Prospects – Green

## *Cahir Park*

*Site description*

A narrow stand of yew woodland, c.500m X 50m, along the steep western flank of a limestone knoll. The yew is about 15m tall and is accompanied a little ash. Holly, hazel and elder form a thin shrub layer. Under deep shade the herb layer is poorly developed with a thin covering of ivy but where there is lateral light from the margins stands of low bramble have developed. The bryophyte layer is poorly developed.

There are numerous exotic species present, particularly cherry laurel. The site is managed by Coillte, who have felled the woodland on the deeper soil on top of the knoll and planted yew as part of the Coillte LIFE Project 'Restoring Priority Woodland Habitats in Ireland'. If the transplants survive the yew woodland will be considerably expanded. However, there is a luxuriant growth of herbaceous vegetation which may smother the young plants.

*Assessment results*

One plot failed due to poorly developed field and moss layer cover and the presence of regenerating non-native trees and shrubs. The non-native species are being removed in the vicinity, which should reduce the seed source of these species.

Structure & Functions – Amber improving

The removal of non-native species and planting of Yew within the site is likely to improve the short term prospects at this site.

Future Prospects – Amber improving

## *Curraghchase*

*Site description*

A mixed stand of yew and beech on the top and sides of a rocky knoll. The canopy, which averages 15-18 m, is dominated by yew with large beech emergents and occasional oak (*Quercus robur*). There is considerable regeneration of yew in light gaps, most of the young plants having developed from layering of low-hanging branches. Other woody species include ash, hazel, holly, cherry laurel and elm, forming a thin shrub layer. The field layer is poorly developed under deep shade and consists largely of ivy with a scattering of other species. In light gaps bramble is abundant. Like Cahir Park, this site is managed by Coillte as part of the LIFE Project. Beech trees have been thinned, laurel largely removed and cuttings of yew planted into adjacent ground.

*Assessment results*

Despite the removal of non-native species and the planting of yew all plots failed due to the poorly developed field and shrub layer and the presence of regenerating non-native species. However, on-going management should lead to further improvements.

Structure & Functions – Red improving

The removal of cherry laurel is a positive development. Areas have been replanted with yew and this site is significant for the number of saplings developing from natural regeneration (mostly layering) throughout the site. This site is likely to continue to improve; there is however an issue with the dumping of household waste that should be addressed.

Future Prospects – Red improving

### *Garryland*

*Site description*

Pockets of yew woodland occur on limestone pavement which outcrops within an extensive area of mixed deciduous woodland. The canopy averages c.13m and is dominated by yew with some ash, oak (*Q. robur*) and beech. Both the shrub layer and the herb layer are very poorly developed or almost absent. The bryophyte layer is well developed. There is a small amount of regeneration at this site and yew is widely scattered through the mixed deciduous ash-oak-beech woodland. The site is part of an extensive nature reserve.

*Assessment results*

Two plots failed due to the dense canopy of both yew and beech and the very poorly developed shrub and field layers. Therefore Structure & Functions were assessed as Amber as opposed to Red. No active management occurs at this site and it is unlikely that any change in conditions has occurred at this site for a considerable period of time.

Structure & Functions – Amber stable

There is as small amount of yew regeneration adjacent to these stands. However, the shrub and field layer are unlikely to develop further without a more open canopy. Removal of selected beech trees would open up the canopy and encourage shrub and field layer development.

Future Prospects – Amber stable

## *Reenadina*

*Site description*

This is the largest yew woodland in the country covering an area of c.25ha. It lies within the Killarney National Park and it has been intensively researched over the past 40 years. It occurs on limestone pavement and limestone outcrops.

This woodland is a complex of pure yew, mixed yew and hazel and mixed yew and ash. Exclosures were erected in 2001 around 2 large blocks of yew to control grazing by deer which have done considerable damage to the site over the past few decades. There are smaller exclosures within these which are over 40 years old. Like stands elsewhere, the shrub layer of hazel and holly is poorly developed and the herbaceous layer is thin and species poor. However, where grazing has been successfully excluded holly and bramble have developed a relatively good cover. Invasive exotic species, such as *Rhododendron ponticum, Clematis vitalba* and *Cotoneaster* spp., occur throughout the area but the first of these has been removed in the vicinity of the stands in recent years.

*Assessment results*

All plots failed due heavy grazing pressure, poorly developed shrub and field layer cover and lack of regeneration. Although grazing pressure has declined in the recent past and there is evidence of the shrub and field layer recovering at some of the plots, overgrazing is still a problem in the North Wood where the deer appear to be trapped inside the exclosure.

Structure & Functions – Red improving

It is likely that the reduced grazing pressure will improve the woodland structure. However, it is unlikely that yew will be able to regenerate under its own dense canopy.

Future Prospects – Red improving

## *Kylagowan*

*Site description*

This wood is anomalous in that it is basically an open stand of sessile oak (*Quercus petraea*) with a secondary canopy and shrub layer dominated by yew. There is also holly in the shrub layer. The dwarf shrub and field layers are very poorly developed because of severe overgrazing, the principal species being *Vaccinium myrtillus*, *Luzula sylvatica* (locally dominant) and *Blechnum spicant*. The bryophyte layer is also sparse and is dominated by *Thuidium tamariscinum*. There is a range of size classes with some large old trees. There is also a range of dead wood. Yew is frequent in the surrounding woodlands and plantations.

*Assessment results*

This site is only assessed for overall status as no plots were taken. However, the wood would fail due to heavy grazing pressure, poorly developed shrub and field layer cover and lack of regeneration. Unusually, there are no non-native species present. However, if deer were controlled and the adjacent clear-felled land was appropriately managed, there is an opportunity here for the yew woodland to regenerate and expand.

Structure & Functions – Red

Future Prospects – Red

Table 7: Plot level assessment results

| Site | Plot | Non-target positive spp. | Total negative sp. cover | Negative sp. regeneration | Median canopy ht. | Total canopy cover | Percent cover *Taxus* in canopy | Native shrub layer cover | Native shrub/field layer cover | Native dwarf shrub/field layer height | Native dwarf | Bryophyte cover | Grazing pressure | Plot level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cornalack | 1 | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Fail | Pass | Pass | | **Pass** |
| Cornalack | 2 | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | | **Pass** |
| Cornalack | 3 | Pass | Pass | Pass | Fail | Pass | Pass | Pass | Pass | Pass | Pass | Pass | | **Pass** |
| Cahir Park | 1 | Pass | Pass | Pass | Pass | Pass | Pass | Fail | Pass | Pass | Pass | Pass | | **Pass** |
| Cahir Park | 2 | Pass | Pass | Fail | Pass | Pass | Pass | Fail | Pass | Pass | Fail | Pass | | **Fail** |
| Curraghchase | 1 | Fail | Fail | Fail | Pass | Pass | Pass | Fail | Fail | Pass | Pass | Pass | | **Fail** |
| Curraghchase | 2 | Pass | Fail | Fail | Pass | Pass | Pass | Fail | Pass | Pass | Pass | Pass | | **Fail** |
| Curraghchase | 3 | Pass | Fail | Fail | Pass | Pass | Fail | Fail | Pass | Pass | Pass | Pass | | **Fail** |
| Garryland | 1 | Pass | Pass | Fail | Pass | Pass | Pass | Pass | Fail | Pass | Pass | Pass | | **Pass** |
| Garryland | 2 | Pass | Pass | Fail | Pass | Pass | Pass | Pass | Fail | Pass | Pass | Pass | | **Pass** |
| Garryland | 3 | Pass | Fail | Fail | Pass | Pass | Pass | Fail | Fail | Fail | Pass | Pass | | **Fail** |
| Garryland | 4 | Pass | Pass | Fail | Pass | Pass | Pass | Fail | Fail | Fail | Pass | Pass | | **Fail** |
| Reenadina | 1 | Pass | Pass | Pass | Pass | Pass | Pass | Fail | Fail | Pass | Pass | Fail | | **Fail** |
| Reenadina | 2 | Pass | Pass | Pass | Pass | Pass | Pass | Fail | Fail | Pass | Pass | Fail | | **Fail** |
| Reenadina | 3 | Fail | Pass | Pass | Pass | Pass | Pass | Fail | Fail | Pass | Pass | Fail | | **Fail** |
| Reenadina | 4 | Pass | Pass | Pass | Pass | Pass | Pass | Fail | Fail | Pass | Pass | Pass | | **Fail** |

Table 8: Multiple plot level assessment results

| Site | Yew size class | Yew regeneration | Non-target species regeneration | Dead wood |
|---|---|---|---|---|
| Cornalack | Pass | Pass | Pass | Pass |
| Cahir Park | Fail | Fail | Pass | Pass |
| Curraghchase | Fail | Pass | Pass | Pass |
| Garryland | Pass | Fail | Pass | Fail |
| Reenadina | Pass | Fail | Fail | Pass |

Table 9: List of activities impacting sites surveyed

| Site | Activity code | Activity description | Intensity | Influence | Source | Trend |
|---|---|---|---|---|---|---|
| Cornalack | I01 | invasive non-native species | low | neutral | inside | unknown |
| Curraghchase | E03.01 | disposal of household/ recreational facility waste | low | negative | inside | unknown |
| Curraghchase | I01 | invasive non-native species | high | negative | inside | declining |
| Curraghchase | B02.03 | removal of forest undergrowth | high | positive | inside | improving |
| Curraghchase | B02.06 | thinning of tree layer | medium | positive | inside | improving |
| Curraghchase | B02.01.01 | forest replanting (native trees) | high | positive | inside | improving |
| Cahir Woods | B02.03 | removal of forest undergrowth | low | positive | inside | improving |
| Cahir Woods | B02.01.01 | forest replanting (native trees) | low | positive | outside | improving |
| Cahir Woods | I01 | invasive non-native species | low | negative | inside | improving |
| Cahir Woods | I01 | invasive non-native species | medium | negative | outside | improving |
| Reenadina | B06 | grazing in forests/ woodland | high | negative | inside | improving |
| Reenadina | I01 | invasive non-native species | low | negative | inside | declining |
| Reenadina | B02.03 | removal of forest undergrowth | low | positive | inside | improving |
| Reenadina | B06 | grazing in forests/ woodland | low | positive | outside | improving |

## Overall condition assessment

Two sites were assessed as Amber, three as Red and one as Green (Table 10). In general there is an improving trend in the overall status of yew woodland.

Table 10: Assessment overview of sites surveyed in 2011.

| Site name | County | Site level S&F | Site level FP | Overall assessment |
|---|---|---|---|---|
| Cornalack | Tipperary | Green | Green | Green |
| Cahir Park | Tipperary | *Amber*↑ | *Amber*↑ | *Amber*↑ |
| Curraghchase | Limerick | *RED*↑ | *Amber*↑ | *RED*↑ |
| Garryland | Galway | *Amber=* | *Amber=* | *Amber=* |
| Reenadina | Kerry | *RED*↑ | *Amber*↑ | *RED*↑ |
| Kylagowan | Galway | *RED* | RED | *RED* |

# Discussion

## Overall condition assessment

From the results, one site surveyed is in favourable conservation status, two are in unfavourable inadequate and three in unfavourable - bad conservation status. The failures are mainly due to the presence of non-native species and grazing pressure, both of which may be impacting woodland structure, and in particular, the regeneration potential of the woodland. In many cases future prospects is more favourable than structure & functions which indicates that current management effort is likely to improve the condition of some of these sites in the near future.

## Structure and functions

### *Individual-plot level criteria*

*Shrub layer and target species regeneration*

One of the problems noted for yew woodlands is insufficient regeneration of the shrub layer and target species. The lack of shrub layer and yew regeneration may be traceable back to overgrazing, past or present, or to infestations of invasive species, which have similar effects to overgrazing by suppressing native seedling regeneration. The removal of an invasive shrub frequently results in new cohorts of native regeneration quickly establishing in the same way as when overgrazing is controlled. Improved results for shrub layer cover may be expected in future monitoring cycles if grazing and invasive species (where present) are controlled and native seedling cohorts reach sapling size (2 m in height).

The lack of regeneration of yew under its own canopy is well documented, although the exact causes are not clear (Perrin 2003). It does, however, regenerate within other woodland communities, e.g. sessile oak woodland, and on open limestone pavement, e.g. eastern Burren. While yew may be a constituent of other woodland types, it might also be expected to develop pure stands on suitable substrates on the edge of, or some distance from, existing stands. This may be part of a cycle of yew woodland development, e.g. as a sere or an alternating community to another woodland type, e.g. ash woodland.

If sites continue to fail on these criteria after two or three monitoring cycles, then other unknown factors (e.g. edaphic) may be preventing establishment of the shrub layer or woodland may be developing elsewhere.

*Negative species*

While several non-native species are recorded from yew woodlands, beech and laurel are the principal problematic species. Removal of both species encourages the development of the shrub and herb layers provided the shade cast by yew itself is not too dense, which is often the case. However, although yew requires a relatively high level of light to regenerate it can survive under beech and observations suggest that beech may actually act as a nurse, facilitating yew regeneration in adjacent stands.

## *Multiple -plot level criteria*

*Tree size classes*

It was a requirement for each size class to be represented but most sites had a preponderance of larger (older?) trees. This suggests that the woodlands have reached a certain age structure. While a "reverse-J" structure is characteristic of some woodland types, with greater numbers of younger, smaller trees and smaller numbers of large, mature individuals, this is not always the case. A relatively uniform even-aged stand may develop as a result of, for example, a sudden change in landuse or natural disturbance. Thus, a healthy woodland need not, and frequently does not, have representation from every size class. The pattern within the yew woodlands therefore may not be a negative feature and this criterion may be too severe.

*Dead wood*

Dead wood measurement was in four classes: old senescent trees, standing dead, fallen dead and rotting stumps. Different type of invertebrates and fungi favour different types and sizes of dead wood habitat (Jonsson *et al*. 2005), with Kirby *et al*. (1998) noting that managed woodlands contained less fallen dead wood than unmanaged ones, and Sweeney *et al*. (2010) recognising the scarcity of large-diameter (>20 cm) dead wood in Irish woods in particular. Thus, while the cut-off diameter for assessing dead wood in the current survey was 20 cm, it may be more realistic for Irish woodlands to pitch this slightly lower, for example 15 cm diameter, if this threshold is found to be too severe. However, it should be noted that only one site failed on this criterion, so there are no indications from the current data that this criterion is unduly severe.

*General comment*

Yew occurs scattered through native woodland throughout the country but true yew woodland is largely restricted to shallow soils over limestone pavement or outcrops with the stand at Kylagowan on acidic soils an anomaly. The natural distribution and range of yew woodlands, therefore, would appear to be restricted to these sites and further expansion will be limited by the distribution of suitable substrates. There are extensive areas of suitable terrain in the eastern Burren in which yew is frequent, although currently there is little indication of yew woodland development, largely because of grazing pressure.

Recent activity by Coillte as part of the LIFE Project 'Restoring Priority Woodland Habitats in Ireland' has led to improvements in some sites and planting of small stands at several other potentially suitable sites (Table 3). It is too early to draw conclusions on the success or otherwise of these activities but if the trees survive they could potentially lead to a significant increase in the area of yew woodland in the country. Appropriate management at other sites could facilitate the development of yew dominated woodland, e.g. Dromana and Kylenamelly, or expansion of existing stands, e.g. Kylagowan.

# Recommendations

## Indicator species

Beech may facilitate yew regeneration in some sites by reducing competition from other more vigorous species. Future assessments should check whether it is valid to consider it as a negative species or not.

## Shrub layer and field layer cover

The poorly developed shrub and herb layers, even in the absence of grazing, suggest that the heavy shade cast by the yew canopy may be the cause and a natural feature of yew woodlands. The targets for these criteria may need to be reviewed.

## Tree size classes

This criterion may be too severe and may have to be revisited and adjusted in future monitoring.

## Regeneration

Absence of regeneration within the yew woodlands may be due to heavy shade. Consistent failure of this criterion may need to be re-examined in the light of regeneration in adjacent areas.

## Number of criterion failures allowed

Consideration should be given to increasing the number of criterion passes to the maximum, i.e. all 11 criteria required to pass at the individual-plot level, all four criteria to pass at the 4-plot level. There may be a need to broaden some of the thresholds to allow some latitude to prevent excessive failures, such as allowing one of the four grazing pressure indicators to be recorded. However, the current system could, in theory at least, allow a plot to pass even where there is extensive cover of a regenerating non-native species which is not yet affecting field layer cover. A fuller assessment of grazing, to include indicators of both undergrazing and overgrazing, would perhaps give a more holistic picture of the grazing situation in plots.

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# Appendix I: Data sheets

**91J0 Yew Woodland: Monitoring sheet**

**20x20m plots**

| | | | | | |
|---|---|---|---|---|---|
| **Site Name** | | **Date** | | **Photo numbers** | |
| **Grid ref** | | **Plot Number** | | **Slope** | |
| **Accuracy** | | **Recorders** | | **Aspect** | |

| **Positive indicator species** | ✓ | **Negative indicator species** | ✓ |
|---|---|---|---|
| Trees and woody species | | Non-native trees | |
| *Taxus baccata* | | *Fagus sylvatica* | |
| *Fraxinus excelsior* | | Other: | |
| Other woody | | | |
| *Corylus avellana* | | | |
| *Ilex aquifolium* | | | |
| *Lonicera periclymenum* | | | |
| *Quercus robur* | | | |
| *Sorbus aucuparia* | | Non Native Shrubs | |
| | | *Cotoneaster* spp. | |
| Herbs & ferns | | *Prunus laurocerasus* | |
| *Brachypodium sylvaticum* | | *Rhododendron ponticum* | |
| *Phyllitis scolopendrium* | | Other: | |
| *Potentilla sterilis* | | | |
| *Viola reich/riv* | | | |
| *Carex flacca* | | | |
| Mosses | | | |
| *Metzgeria furcata* | | | |
| *Isothecium myosuroides* | | | |
| *Thamnobryum alopecurum* | | | |
| *Fissidens dubius* | | | |
| *Neckera complanata* | | | |
| *Neckera crispa* | | | |

| **Woodland structure** | **Values** | **Grazing pressure** | **Y/N** |
|---|---|---|---|
| Median canopy height (m) | | Topiary effect | |
| Total canopy cover (%) | | Browse line | |
| Total cover of *Taxus* (%) | | Abundant dung | |
| Total cover of *Fraxinus* (%) | | Bark stripping | |
| Total cover of negative species (%) | | | |
| Total native shrub layer 2-4m (%) | | | |
| Total native field layer (%) | | | |
| Median height of field layer (cm) | | | |
| Total bryophyte cover (%) | | | |

| ***Taxus* tree species dbh** | **Result** | **Non-native tree regeneration (number)** | **Ht <2m** | **Ht >2m** |
|---|---|---|---|---|
| No. seedlings present <2m<br>No. >2m <7cm | | List species | | |
| No. of stems 7-19.5 cm | | | | |
| No. of stems 20-29.5 cm | | | | |
| No. of stems >30-39.5 cm | | | | |
| No. of stems >40 cm | | | | |
| **Native saplings >2m (No.)** | | | | |
| List species | | | | |
| | | | | |
| | | **Non-native shrub regeneration** | Y/N | |

**Dead wood dbh**

| **Old/Senescent** | **Count** | **Fallen dead** | **Count** |
|---|---|---|---|
| 10-14.5 cm | | 10-14.5 cm | |
| 15-19.5 cm | | 15-19.5 cm | |
| >20 cm | | >20 cm | |
| | | | |
| **Standing dead (>1m tall)** | | **Rotten stump (<1m)** | |
| 10-14.5 cm | | 10-14.5 cm | |
| 15-19.5 cm | | 15-19.5 cm | |
| >20 cm | | >20 cm | |