A SUMMARY OF THE NATIONAL SURVEY OF NATIVE WOODLANDS.

INTRODUCTION

The National Survey of Native Woodlands, funded jointly by the National Parks and Wildlife Service and the Forest Service, was undertaken between 2003 and 2008. Additional data was incorporated from a preliminary survey undertaken in 2001, a survey of selected alluvial woodlands undertaken in 2000 and a few other recently surveyed sites. The survey was undertaken by Botanical, Environmental and Conservation Consultants Ltd (BEC Consultants).

The final report[1] is divided into two volumes. Volume I contains the main report; Volume II the classification. Together they contain over 240 pages of text, diagrams and tables. There is also an Access Database of all site and relevé data collected and a GIS showing the distribution of native woodlands, woodland types and relevés. Volumes I and II are to be found on the NPWS website but the database and GIS are only available on request to Naomi Kingston (NPWS 7, Ely Place, Dublin 2 Naomi.KINGSTON@environ.ie)

This document provides a brief summary of the survey and the principal findings. The conclusions are those of the survey team and no attempt is made to interpret or analyse the results. Readers are advised to examine the full report before using the information and the report should be fully cited in any references.

METHODS

The main survey was based on the Forest Service 1998 Forest Inventory Planning System (FIPS), a GIS database using satellite imagery and aerial photos taken between 1993-1997. All areas of native and mixed (native with some alien conifers) woodland were identified and a subjective stratified sampling system, based on predetermined criteria ("arbitary but without pre-conceived bias"), was used for the survey. A total of 1320 sites were surveyed. Sites had to conform to the following criteria:

- Area >1ha
- Canopy height > 5m (>4m in wetlands)
- Canopy cover > 30%
- Minimum canopy cover of native tree species 50% (A list of species is provided in Appendix 1, Volume I).
- Minimum width of stands 40m (20m along watercourses and lake shores).

For each site the following information was collected:

- List of plant species, including bryophytes and certain lichens
- Site location, altitude, slope, aspect, topographical location
- Area
- Site boundary
- Hydrological features
- Past and present land use
- Stand structure
- Natural regeneration
- Vegetation communities (based on Fossitt 2000[2])
- Invasive species
- Adjacent land use

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[1] Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K and Delaney, A. (2008) National Survey of Native Woodlands 2003-2008. A report submitted to the National Parks and Wildlife Service, Dublin.
[2] Fossitt, J.A. A guide to habitats in Ireland. Heritage Council.

- Grazing intensity
- Merchantable timber
- Dead wood
- Human artefacts

1667 relevés or quadrats (10m x 10m) (sample areas for describing vegetation) were recorded, at least one per vegetation type per site. The following information was collected:
- Species presence and cover, using the Domin Scale
- Diameter and height of trees > 7cm diameter breast height (dbh). A total of 30 trees per relevé were recorded and where there were insufficient within the relevé the plot size was increased.
- Crown position
- Merchantable timber, including estimated log length and defects
- Soil pH, loss on ignition and total phosphorus
- A record of certain lichens

The woodland structure in each relevé was sketched and each relevé was photographed.

The vegetation data was analysed using a suite of complementary statistical techniques (Hierachical, polythetic, agglomerative cluster analysis; Indicator Species Analysis; Multi-response permutation procedure).

Each site was assessed for its conservation and threat status using a series of criteria to calculate a score for each site. Criteria for the conservation status included area, species and habitat diversity, regeneration, etc.: those for the threat status included invasive species, grazing, clearance and other damaging activities, etc.

In addition to the above a list of seed stands of native species was supplied to COFORD.

RESULTS

Data on the 1320 sites surveyed are presented and analysed.

Area
- The total area of mixed (native with some alien conifers) and native broadleaf woodland (including stands of yew) based on FIPS is estimated at 82,321ha. However, the more recent National Forest Inventory, undertaken by the Forest Service in the period 2004-2006 gives an area of 132,990ha[3]. (**NB**. For the purposes of this survey Scots pine is not considered native.)
- The area of native woodland is highly fragmented and most stands are small: 50% of sites surveyed are <6ha and only 3.3% exceeded 50ha.
- The counties with the highest density of native woodland are Waterford (3.8% of the surface area), Offaly (3.4%) and Wicklow (3.07%). Carlow, Louth and Dublin have the least native woodland.

Site situation
28% of sites occur in valleys, 22% on hillsides, 13% on bogs (including cutaway) and 12% on lakeshores.

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[3] [Comment: The difference may be attributable to survey methodology, a genuine increase in area or both. However, it is almost certain that the area has increased in the intervening period, both from planting and from natural regeneration].

Invasive species

The most frequently occurring invasive species are as follows[4]:

- Trees: sycamore (73.2 % of sites) and beech (69.0%). Beech seedlings and saplings are much less common than sycamore. Conversely, mature beech is more common than sycamore.
- Shrubs: rhododendron (24.7%) and laurel (21.5%).
- Herbs: Himalayan balsam (1.4%) and giant hogweed (0.4%) – both principally in alluvial woodlands.

Past and present land use

There is some indication of human activity at over 90% of sites. This includes: livestock grazing, planting - both old and recent, coppicing or felling, amenity use and dumping. The highest incidence of felling is in Donegal (often associated with construction). Planting is most frequent in those counties with a history of planting, e.g. Kildare.

Grazing

Heavy grazing occurs in only 12% of sites, while no apparent grazing is recorded in 37% of sites. Cattle and deer are the most frequent grazers, the former in the lowlands, especially Clare, and the latter in the uplands, principally Wicklow and Kerry.

Hydrological features

These occur in 77% of sites. The most common are rivers and streams (54%), areas subject to seasonal flooding (45%), lakes and pools (28%). There are distinct regional variations.

Human artefacts

Banks and ditches, sometimes together, are the most common man-made features, occurring in over 50% of the sites. Distinct regional variations are apparent, with banks being particularly common in the southeast and ditches in some midland counties and Louth. Walls are more common in the west.

Stand structure

Nearly 68,000 stems on 47, 400 trees were measured for height and dbh from 73 taxa. The most frequently recorded species are common birch (*Betula pubescens*), ash (*Fraxinus excelsior*) and hazel (*Corylus avellana*). In terms of basal area, sessile oak (*Quercus petraea*), pedunculate oak (*Q. robur*), ash and birch are the most important species. The tallest trees are sessile oak – average height 17.0m, pedunculate oak (15.1m) and ash (14.3m). Size frequency curves show a steady decline in diameter classes for oak, i.e. there is a broad range of age/size classes, but steep declines for other species suggesting a more rapid turnover.

Merchantable timber

Of the 68,000 stems measured only 3.8% have stems of merchantable size (MS), i.e. dbh >40cm. Of those, 60% are oak and in fact 20% of all oaks are of merchantable size. 12% of merchantable trees are ash although only 3% of all ash are over 40cm dbh. Only 60% of stems of MS are of merchantable quality due to various defects, e.g. forking.

Dead wood

There is an abundance of fine and coarse woody debris while uprooted trees, snags and snapped trees are rare or absent.

Regeneration

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[4] It should be noted that woodlands with a high occurrence of invasive species would have been rejected for survey, so these figures tend to underestimate their abundance.

Regeneration of ash is by far the most frequently observed, reflecting the abundance of the species and the prolific seed output. Holly, sycamore and birch are the next most abundant species. Of the commoner tree species, alder and hazel have low rates of regeneration from seed. Oak regeneration is relatively poor but there appears to be a lower mortality rate relative to ash and other species.

Species richness (vascular plants only)
Species richness increases with area and with age of the wood. Woodlands which were present on the first edition OS maps have a mean of 10 species more than sites which were absent on the first edition OS maps.

Species frequency
The most frequently occurring species are those that display a wide ecological amplitude, i.e. they are tolerant of a wide range of habitat conditions. Others are frequent within specific woodland types. The most frequent species overall are:

Trees: Hawthorn (*Crataegus monogyna*)
        Ash (*Fraxinus excelsior*)
        Holly (*Ilex aquifolium*)
Other woody species:
        Bramble (*Rubus fruticosus* agg.) (The most frequently occurring species of higher plant)
        Ivy (*Hedera helix*)
        Honeysuckle (*Lonicera periclymenum*)
Herbs: Herb-robert (*Geranium robertianum*)
        Creeping buttercup (*Ranunculus repens*)
        Meadowsweet (*Filipendula ulmaria*)
Ferns: Broad buckler-fern (*Dryopteris dilatata*)
        Scaly male-fern (*D. affinis*)
        Bracken (*Pteridium aquilinum*)

Vegetation types
The analyses identified 4 main groups of woodland based on floristic data only. Environmental data has been used to interpret the groups which represent combinations of two strong environmental (soil) gradients: acidic–basic and organic-mineral soils. There is also a strong correlation with moisture gradients. Each group is named according to the two best vascular indicator species, using a tree and a herbaceous species. A list of 10 indicator species is provided for each group. Each group is sub-divided into several types. A description, examples of typical sites, affinities with other vegetation classifications (Fossitt, NVC-Rodwell, Annex 1 of the Habitats Directive, Braun-Blanquet and Tüxen and Corine), a distribution map and sketch of the stand structure are provided. A synoptic table showing the classification for each group provides details of the species and their abundance.

The 4 groups are:

- **Oak – Woodrush (*Quercus petraea – Luzula sylvatica*) group.** 3 types. Woodlands of acidic, well-drained podzols or brown earth soils, on sandstones, schists, slates and granites, in the uplands and lowlands. Sessile oak dominates the canopy and holly characteristically forms the shrub layer. Woodrush often dominates the woodland floor, locally in mosaic with bilberry (*Vaccinium myrtillus*). Hard fern (*Blechnum spicant*) is frequent, often with other ferns. On more base-rich sites ash and hazel (*Corylus avellana*) occur and bluebell (*Hyacinthoides non-scripta*) may dominate the herb layer. In very humid habitats bryophytes, lichens and ferns, often as epiphytes, are abundant. These woodlands are concentrated in the Old Red Sandstone regions of the south and southwest, in Wicklow and locally in Connemara/Mayo, Donegal and elsewhere.

These woodlands have close affinities to the EU Habitats Directive Annexed Habitat 'Oak woodland with holly and hard fern'.

- **Ash – Ivy (*Fraxinus excelsior – Hedera helix*) group.** 8 types.

  Ash and hazel woods on relatively dry, base-rich soils in the lowlands. Ash, often with pedunculate oak, forms the canopy and hazel dominates the shrub layer. They are often species-rich woodlands with a variety of shrubs, e.g. hawthorn (*Crataegus monogyna*), spindle (*Euonymus europeaus*), blackthorn (*Prunus spinosa*), and a rich and varied herbaceous layer frequently with a well-developed vernal flora, e.g. primrose (*Primula vulgaris*), anemone (*Anemone nemorosa*), bluebell, violet (*Viola* spp.). Other characteristic species include herb-robert, wood avens (*Geum urbanum*), wild arum (*Arum maculatum*), enchanter's nightshade (*Circaea lutetiana*), hart's tongue fern (*Phyllitis scolopendrium*). On rocky limestone sites the woodlands may be dominated by hazel with a luxuriant bryophyte flora on the rocks. Under a dense canopy and in old demesnes, the woodlands may be poor in species. These woodlands are widely distributed throughout the country on fertile soils but are concentrated in the lowlands and on limestone pavement.

  Two distinctive woodlands falling within this group are:
    - Yew–Carnation Sedge (*Taxus baccata–Carex flacca*) woods, dominated by yew with a very poorly developed shrub and herb flora but often with a luxuriant moss layer. This very rare woodland type is confined to a few limestone outcrops in the southwest.

      This woodland is equivalent to the EU Habitats Directive Annexed habitat 'Yew Woodland'.
    - Willow–Nettle (*Salix triandra–Urtica dioica*) woodland on alluvial islands and river banks on the lower reaches of lowland rivers.

      This woodland falls within the EU Habitats Directive Annexed Habitat 'Alluvial forests'.

- **Alder – Meadowsweet (*Alnus glutinosa – Filipendula ulmaria*) group**. 5 types.

  Species-rich woods dominated by alder, willow (mostly *Salix cinerea*) and ash on wet, base-rich, fertile, gleyed soils, which may be waterlogged and/or periodically flooded. There is considerable variation within this group depending on the hydrology. Alder is typically the dominant canopy species, often with ash, and sometimes willow, although more characteristically this last species forms the shrub layer. Locally, birch and occasionally hawthorn may dominate the shrub layer, e.g. around turloughs. The herbaceous layer is very varied and species-rich, depending on the hydrology and the shade. Typical species include remote sedge (*Carex remota*), meadowsweet (*Filipendula ulmaria*), marsh bedstraw (*Galium palustre*), angelica (*Angelica sylvestris*), mint (*Mentha aquatica*) and yellow flag (*Iris pseudacorus*). These woodlands are widespread but with a concentration in drumlin areas and along lowland river valleys of the south and east.

  Some of these woodlands fall within the EU Habitats Directive Annexed Habitat 'Alluvial forests'.

- **Birch – Purple moor-grass (*Betula pubescens – Molinia caerulea*) group**. 6 types.

  Woodlands dominated by birch on degraded or intact raised bogs, in peaty hollows and locally on mineral soils. These are mostly species-poor woodlands dominated by birch with a poorly developed shrub layer. The herb layer may be dominated by, e.g. bracken (*Pteridium aquilinum*), bramble (*Rubus fruticosus* agg.), bilberry (*Vaccinium myrtillus*), purple moor-grass (*Molinia caerulea*). A few stands have a dense growth of *Sphagnum* mosses in the ground layer. Birch woodlands are concentrated on the cutaway bogs of the midlands with occasional occurrences elsewhere, especially in the uplands, where

they may occur in peaty hollows or on abandoned grazing land. Many of these stands are relatively new woodlands, some of which may be successional to oak or ash woodlands. The woodland type with abundant *Sphagnum* mosses corresponds to the EU Habitats Directive Annexed Habitat 'Bog woodland'.

Conservation assessment
Most of the highest scoring sites lie in the west of the country with Donegal and Galway being particularly well represented. Many of these top sites are large and already designated as SACs or Nature Reserves. Nearly 44% of all sites surveyed have some kind of conservation designation. Many sites with a low score are small and have very low plant diversity. A table is presented in the report listing the conservation score for each site and there is also a list of the top sites not currently designated.

Threat assessment
The main threats are posed by invasive species, heavy grazing and damaging activities, e.g. non-native planting. Some highly threatened sites are of poor quality but some, including SACs and Nature Reserves, also have a high conservation assessment. No woodland scored as being under severe threat but it should be noted that sites of very poor quality, e.g. with an abundance of invasive alien species, were excluded from the survey so that this assessment may under-represent threats. A table is presented in the report listing the threat score for each site.

Discussion
This section presents a critique of existing classifications in relation to the classification proposed in the report. It also analyses the conservation status of Irish woodlands and makes proposals for how the data could be utilized in the designation of NHAs.

The report concludes with a comprehensive list of references, an Addendum outlining woodland habitat monitoring guidelines and 6 Appendices.

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