



# PLANFORBIO NEWS

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## WELCOME

Welcome to the 13th issue of the PLANFORBIO Research Programme Newsletter. This newsletter has been produced regularly since this research programme got underway in 2007. The PLANFORBIO programme will draw to a conclusion at the end of 2013, having significantly progressed our understanding of the biodiversity in Ireland's forests and ways in which management can be used to enhance biodiversity and ensure sustainable growth of the Irish forestry sector.

Since 2007 the findings of this research have been disseminated widely and to date include six completed PhD theses and nine MSc theses. Seventy three presentations have been made at scientific conferences nationally and internationally, with 34 papers published in scientific journals and several more to follow. Further information on all publications can be found in the publications sections of the programme website.

The findings of this work will be used to enhance the ability of our forest industry to simultaneously deliver on environmental and economic services. This issue features news on these findings including new research on the biodiversity consequences of afforestation and the role of planted tree species in forest biodiversity value. We also report on the environmental consequences of deer management measures and the potential importance of our plantation forests as an alternative habitat for vulnerable plant and animal species.

## The Great Spotted Woodpecker returns to Ireland's forests

Mark Wilson



Great Spotted Woodpecker resident in Ireland.  
Photo by Richard Mills

The Great Spotted Woodpecker (*Dendrocopos major*), previously extinct in Ireland, has recently returned to our forests. Many species of woodpecker are widespread throughout Europe, but they have been extinct from Ireland for more than 800 hundred years due to the lack of suitable forest habitat. During this time Great Spotted Woodpeckers have been irregular visitors, but have not bred here. They have occurred mainly during winter when 'eruptions' of populations on mainland Europe can bring continental birds to Ireland. However, in recent decades, sightings of woodpeckers have become more frequent, particularly during the breeding season. The first confirmation of breeding by this species in Ireland was in 2009 and numbers appear to have been increasing steadily since then, with more than 20 nest sites confirmed in 2011.

Woodpeckers are found predominantly in Oak woodlands, where they feed on insects from deadwood, and on tree seeds and bird's eggs. They are a keystone woodland species which, in ecological terms, means that they have a disproportionately large effect on the communities in which they occur. This is because they are 'woodland engineers' and several animal species benefit from the crevices and holes that they excavate in dead wood. Their population expansion in Ireland will eventually increase the availability of nest sites for secondary hole nesting species, populations of which may be limited at present by a lack of suitable nest sites. However, their presence may also negatively affect some bird populations, as they are one of the few species reported to prey on

tits breeding in nest boxes. The effects of woodpeckers on tits may, in turn, influence the populations of other species that compete with, prey on or are preyed upon by tits. The complex nature of these 'cascading' interactions between different species means that the likely consequences of woodpecker expansion for Irish woodland ecosystems will not be understood without targeted study.

The re-colonisation of Ireland by Great Spotted Woodpeckers is a historic event which is coincident with to the expansion of broadleaved plantings in recent times. Another important contributing factor is the dramatic increase of the British population (now four times more numerous than 50 years ago) from which this colonising population was founded. The addition of woodpeckers to Ireland's avifauna is welcome news at a time when a number of bird species are declining in Ireland, and confirms that forest expansion can be balanced with conservation objectives.



## Long-term exclusion of large herbivores can reduce the floristic diversity of semi-natural oak woods

Miles Newman

Semi-natural woodlands are relict ecosystems of global importance for biodiversity, which are threatened through a range of human induced changes including overgrazing by large herbivores such as deer. Fencing to conserve biodiversity is increasingly used as a management tool, and so the long-term impacts of large herbivore removal on biodiversity require investigation.



Forest enclosure showing dense holly regeneration and community change within the enclosure, 39 years since fencing in Killarney National Park. Photo by Miles Newman

A recent study at TCD used an existing network of 7 long-term experimental deer enclosures to investigate the effect of large herbivore removal on vegetation over time. The experimental enclosures were located within EU-level protected oak woodlands in three National Parks in Ireland, and were surveyed periodically for up to 41 years.

Significant changes in the ground flora communities and an increase in the homogeneity of plant communities were observed to result from the total removal of large herbivores from oak woodland ecosystems. These differences were largely driven by increasing abundance of the great woodrush and decreasing abundance of bracken with increased time since the establishment of enclosures.

This research highlights the role that large herbivores play in driving the plant species composition in these oak woods. This has implications for the management of semi-natural broad-leaved woodlands and future policy measures should focus on managing large herbivores as part of the overall biodiversity objectives. Large herbivore management practices, such as culling, should be used to achieve desired levels. These culling programmes should focus on reducing or maintaining the large herbivore population at levels which are in line with biodiversity objectives. Where appropriate culling is not achievable fencing should be considered. Fencing however should be conducted on a short-term basis only (e.g. <12 years) as, ungrazed woodland vegetation communities will become homogeneous and impoverished with extended periods of enclosure. The use of non-permanent moveable deer fences would allow targeted management of priority area for large herbivore removal.

Further information can be found in: Newman et al. In press. Exclusion of large herbivores: Long-term changes within the plant community. Forest Ecology and Management.

## Implications of climate change for forest biodiversity conservation

Nova Sharkey

While forests offer the opportunity to mitigate against climate change through their capacity for significant carbon sequestration, they are themselves vulnerable to the consequences of climate change. Forest management practice and policy is continually evolving in response to changing management objectives. The United Nations Forum on Forests (UNFF) defines sustainable forest management as 'a dynamic and evolving concept aiming to maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generations' and forest management must now respond to the threats posed by climate change.

Over the coming century the Irish climate is likely to become drier in the summer and hotter (up to 4°C) with increased risk of extreme weather events such as storms and floods which potentially threaten both the economic and ecological benefits that forests currently provide. Healthy ecosystems are more resilient to a changing climate and the design of adaptive forest management strategies that incorporate climate change scenarios is essential to the sustainable management of forests to protect biodiversity and ecosystem services into the future. Changes in climate may lead to changes in species distribution and community composition and forest ecosystems are particularly sensitive to climate change due to the long life span of trees. Climate change impacts will vary spatially and be related to local forest management practices including tree species.

A recent study at Trinity College Dublin as part of the PLANFORBIO research programme was among the first to look at the potential impact of climate change on the distribution of species characteristic of woodlands, and to assess the implications for the conservation of woodlands in Ireland. Using a range of species distribution modelling techniques for plant, bird and butterfly species in Ireland this research found that between 50% and 100% of species studied were projected to decline in range, in response to climate change, by 2055. The largest range contraction was projected for the Ringlet butterfly, which was projected to lose almost half of its current distribution area. These results have significant implications for the future of woodlands in Ireland. Conservation management plans for these habitats need greater focus on potential climate change impacts in order to ensure these communities' long-term survival.



Distribution map for the Ringlet butterfly showing the projected change in distribution under future climate change.

Further information can be found in: Sharkey et al. In press. Climate change impacts on woodland species: implications for conservation of woodland habitats in Ireland. Biology & Environment.



# Are mixed forest plantations the solution for a sustainable forestry sector?

Sandra Irwin

Truly natural forests typically consist of many different tree species of many different ages. By contrast, forests planted for timber production typically consist of just one, often exotic, tree species of just one age. These even-aged monoculture forest plantations are the easiest and cheapest forest type to plant and harvest and thus came to dominate our forest estate in response to the urgent need for timber during the early twentieth century. Although possibly favourable from an economic viewpoint, these forests are generally undesirable from an ecological standpoint and poorly managed forests have, in the past, had a negative impact on biodiversity. Diversity is considered to be the primary indicator of ecosystem sustainability. So changes in forest management objectives to ensure growth of the forestry sector in a manner that is both sustainable and does not negatively impact the environment have prompted interest in the use of mixed-species forests to increase biodiversity.

In mixed forests each tree species has slightly different physiological requirements allowing the maximum use of site diversity. These forests have higher vertical and structural diversity and provide a greater variety of habitats for wildlife than their monoculture counterparts. Careful selection of tree species is required to ensure combinations of trees that use environmental resources efficiently and provide maximum benefits for biodiversity while, at the same time, are economically favourable.

Research from the PLANFORBIO programme shows there is little benefit for ground-dwelling spiders and beetles of mixed tree plantations either where the secondary tree species in the mix is a conifer (Scots pine) or a broadleaved (oak) species. These invertebrate species, however, do not rely on vertical structural diversity within the forest and so these findings must be interpreted with caution. By contrast a slight positive effect for birds was reported where a native tree species was included in non-native conifer (Norway spruce) plantations. New research from Sweden that used the Swedish National Forest Inventory to examine the importance of mixed tree plantations for tree growth, carbon storage, berry production, food for wildlife, occurrence of dead wood, and biological diversity, demonstrated that all six services were positively related to the number of tree species. For example, the proportion of spruce was positively related to tree growth and the proportion of pine to berry production, while carbon storage was found in plots with more birch. The findings of this research from Sweden show that both forestry and nature conservation stand to gain by promoting a greater variety of tree types. Further research is therefore required to adequately describe the influence of mixed uneven-aged plantations on forest dwelling species, ecological services and timber yield in Ireland.

Less than eight per cent of the productive forest land in Ireland supports mixed forests at present. The Irish Forest Biodiversity Guidelines recommend planting a mixture of tree species, to enhance plantation biodiversity and international forest policy increasingly promotes the establishment of mixed stands. However, in terms of the length of a commercial forest rotation, this practice is relatively new in Ireland and little is known about the potential for these forests to contribute to Irish forest biodiversity objectives. Further gaps remain in our knowledge of tree-species combinations that satisfy both environmental and economic objectives simultaneously. Research in this area will become increasingly possible as the mixed tree species plantations in our forest estate increase in age and will be essential to support management of these new types of forests.



Mixed Norway spruce and Scots pine forest plantation in Co. Roscommon. Photo by Linda Coote.

Further information can be found in:

Barsoum et al. In press. Ground-dwelling spider (Araneae) and carabid beetle (Coleoptera: Carabidae) community assemblages in mixed and monoculture stands of oak (*Quercus robur* L./*Quercus petraea* (Matt.) Liebl.) and Scots pine (*Pinus sylvestris* L.). *Forest Ecology and Management*.

Oxbrough et al. 2012. Can mixed species stands enhance arthropod diversity in plantation forests? *Forest Ecology and Management*, 270: 11-18.

Sweeney et al. 2010. The influence of a native tree species mix component on bird communities in non-native coniferous plantations in Ireland. *Bird Study*, 57: 483-494

## Effective forest management can boost plantation biodiversity

Linda Coote

Research from the PLANFORBIO programme was featured in an article in the European Commission DG Environment News Alert Service "Science for Environment Policy" in 2013. A publication by Linda Coote of Trinity College Dublin in *Forest Ecology and Management* was the focus of the article. This publication reported that good forest management and careful choice of site can transform tree plantations into refuges for woodland plant diversity. Plantations of native species on or near historic woodland and those with adequate light levels below the tree canopy were found to support more plant species. Forests with good drainage, reduced canopy cover and moderate grazing were found to support the greatest biodiversity. These findings are widely applicable to countries outside of Ireland also and clearly demonstrate how targeted management can be used to improve the biodiversity value of forest plantations.

Further information can be found in: Coote et al. 2012. Can plantation forests support plant species and communities of semi-natural woodland? *Forest Ecology and Management*, 283: 86-95.



# Special issue of Forest Ecology and Management on mechanisms and predictors of ecological change in managed forests

Members of the PLANFORBIO research team who organised the international IUFRO conference on biodiversity in forest ecosystems and landscapes at University College Cork in 2012 were invited to be guest editors on a special issue of the journal *Forest Ecology and Management* containing a selection of papers from the conference which will be published in early 2014. The conference brought together researchers from a wide range of disciplines to address currently relevant topics for forest biodiversity policy and practice. Sustainable forest management is grounded in several international agreements and supports the maintenance and enhancement of biodiversity. It relies on evidence based research to underpin associated policies and practices. Studies that identify mechanisms of ecological change in forest habitats over time and predictors appropriate to determining the impact of management practices are particularly helpful in this regard. The special journal issue presents a selection of papers from the conference which exemplify the use of observational and experimental research approaches to identify mechanisms of ecological change in forests. The importance of studies focussing on specific mechanisms and the need for expansive research using larger and long-term datasets in providing a sound basis for forest management and policy was highlighted.

Further information can be found in: Oxbrough et al. In press. Mechanisms and predictors of ecological change in managed forests: A selection of papers from the second international conference on biodiversity in forest ecosystems and landscapes. *Forest Ecology and Management*.

## First confirmed Irish record of a rare hybrid willow: *Salix x pontederiana* (*S. cinerea* x *S. purpurea*) Daniel Kelly

The western uplands of Co. Limerick are not the most exciting of Irish landscapes. Underlain by Upper Carboniferous sandstones & shales, the main habitats are blanket bog, wet grassland and conifer plantations. Here at Glengort, in the foothills of the Mullaghareirk Mountains, was one of our biodiversity survey sites: a young second-rotation Sitka spruce plantation, thickly laced with brambles.



Photo: Linda Coote

Linda Coote and Karen Moore, researchers at Trinity College Dublin, stoically fought their way in to record the vegetation in three sample plots. As Karen recalls "one visit it was very rainy - I remember sheltering like stock in a field with our backs turned to the driving relentless rain while having lunch. Lots of midges in our tea"

In one plot, an unusual and puzzling willow was encountered. *Salix* (which includes willows, sallies and osiers) is the largest genus of trees and shrubs in the Irish flora; their identification is notoriously difficult,

partly because of the frequency of hybrids. This specimen was a shrub with leaves broadest above the middle, their undersides greyish with scattered rust-coloured hairs; all these are characteristic features of common sally (*Salix cinerea* subspecies *oleifolia*), but the leaves in our specimen were too narrow to fit the common species.

The specimen was sent to Desmond Meikle (Fermanagh-born graduate of TCD, and leading expert on willows). He and Mrs J. Webb identified the specimen as *Salix x pontederiana*, the hybrid between *S. cinerea* and the purple osier, *S. purpurea*. We have searched the herbaria of TCD and of the National Herbarium at Glasnevin and found no matching material, and we find no prior published record of this hybrid from Ireland.

How did it get there? Whilst *Salix purpurea* and *S. x forbyana* (thought to be a triple cross between *S. cinerea*, *S. purpurea* and *S. viminalis*) have been widely planted as osiers for basket-making, there appears to be no record of *S. x pontederiana* being planted. *S. cinerea* subsp. *oleifolia* is a common self-sown shrub or small tree in Co. Limerick and throughout Ireland, and was present in quantity at the site. *S. purpurea* was not noted in the immediate vicinity; however, it has been recorded a few kilometres away by Sylvia Reynolds, planted at the edge of forestry along with other *Salix* species. It seems probable that our find is a spontaneous hybrid, that arose through pollen from a male *S. purpurea* drifting to the stigma of a female *S. cinerea* in the vicinity of our site.



*Salix x pontederiana* (formerly called *S. x sordida*). Illustration in Meikle, R.D. (1984). Willows and poplars of Great Britain & Ireland. Botanical Society of the British Isles, London.

A fuller account of this discovery can be found in: Kelly et al. 2013. *Salix x pontederiana* Willdenow (*S. cinerea* Linnaeus x *S. purpurea* Linnaeus): a hybrid willow confirmed for Ireland. *Irish Naturalists' Journal*, 33: 59-60.



# The importance of site selection for biodiversity consequences of afforestation

Conor Graham

Ireland's estimated rate of forest growth is higher than that of any other country in Europe, currently increasing at almost 2% of existing cover per annum. Similar to many other countries where forest area is rapidly expanding, extant forest cover is currently quite low (11%). Irish government policy aims to increase national forest cover to 17% by 2030, continuing one of the most rapid on-going land-use changes in Europe. Ireland is representative of many regions around the world where the conversion of agricultural land to forests are a major concern for biodiversity conservation. Site selection for afforestation is one of the main challenges in managing the conflict between biodiversity conservation and human activities. Management of this conflict depends on scientific evidence of the impact of afforestation in different habitats to inform the selection of suitable sites for forest expansion.

In the context of environmental considerations the impacts of afforestation on biodiversity are of great importance. These impacts are influenced by many factors including the planted tree species, the intensity at which the plantation is managed and crucially, the preceding land-use type. For many decades, commercial afforestation was confined largely to Ireland's upland peat soil habitats for economic reasons. However, increases in the importance of the uplands for conservation, amenity and wind energy, combined with agricultural reforms and an increased interest in planting diverse mixtures of conifers and broadleaved trees, has meant that afforestation is increasingly taking place at lower elevations.

Soon to be published research at University College Cork used a paired chronosequence approach to investigate whether the impacts on biodiversity of establishing non-native conifer plantations were influenced by preceding land-use. The response of bird diversity to afforestation was assessed in agriculturally improved grassland (high management intensity), wet grassland (intermediate management intensity) and peatland (low management intensity).

The responses of bird communities to afforestation varied markedly between pre-afforestation habitats. Bird assemblages in peatland sites, where the previous land-use intensity was lowest, were negatively impacted by forest plantations, due to the displacement of open habitat species of conservation importance. Contrastingly, afforestation of intensively managed grassland sites benefitted birds due to the increase in vegetation structural complexity.

These findings suggest that the consequences of afforestation for biodiversity can be influenced by careful site selection and are related to biodiversity value the preceding land-use type. Bird assemblages of habitats managed at relatively low intensity are more negatively

impacted by land-use change than those of intensively managed habitats. Furthermore plantations that are established in landscapes dominated by intensively managed agriculture can increase landscape scale biodiversity. However, afforestation of natural or semi-natural areas is more likely to have a negative impact on environmental and conservation objectives.



Forest study site at Kilbraugh, Co. Laoise before planting in 2002 and after planting in 2010.

## BIRD DIVERSITY AND AFFORESTATION PLANNING

Conservation of threatened species is required by European and Irish laws and sustainable forest expansion that is compatible with conservation requires support from scientific studies of the ecological response to afforestation. Prof. John O'Halloran at University College Cork is leading a new project, which recently received funding from the Dept. of Agriculture Food and the Marine, to identify the risks posed by afforestation to bird species in Ireland. The aim of this research is to inform strategic planning of forest development in Ireland, and to improve our ability to maintain and improve the conservation status of priority habitats and species. The study will focus on a range of habitats and species protected by the EU Birds and Habitats Directives. It will address the interaction of forests and forest management with these habitats and species and identify opportunities and constraints for forestry expansion in a manner that is compatible with biodiversity conservation. This project will employ one post-doctoral research, one post-graduate student and one part-time research assistant.



# Forest bird diversity features at Ornithological Research Conference

The 6th Irish Ornithological Research Conference was held at University College Cork on November 23rd. More than 150 delegates from Ireland and the UK attended this event where talks were delivered by leading ornithological research scientists. The conference heard how some of Ireland's most iconic bird species are now in dramatic decline, with one-in-eight facing an extinction threat. 18 bird species in Ireland were on the 'red' or potentially endangered list. That number has now increased to 25, despite the greatest conservation effort in Irish history, and ornithologists fear that, without continued and expanded efforts, a number of vulnerable species may vanish totally from Ireland in the near future.

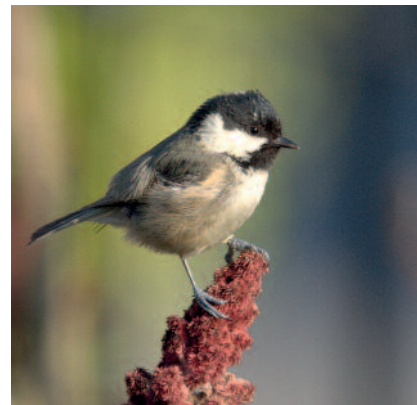
Against this backdrop Professor John O'Halloran delivered the findings of recent research at University College Cork on the role of forestry plantations in the provision of alternative habitats for Ireland's resident bird species, including those of conservation concern. Where planning and management of plantation forests targets biodiversity conservation, research has shown that it is possible to improve their value for bird species in Ireland. These findings are discussed in further detail on page 5 of this newsletter.

Darío Fernández-Bellón, a PhD student at UCC, presented data collected using stationary cameras to monitor Hen Harrier nests as part of the HENHARRIER project. The use of video technology is becoming increasingly useful in the study of bird breeding ecology and, in particular, in raptor research. For some kinds of data, the amount and quality of data that can be collected during a breeding season with even a small number of nest cameras far exceeds what could be collected by human observers. The use of cameras is the only way that we can collect some types of behavioural information on from nesting birds, and can provide fine scale detail on the timing of Hen Harrier nesting behaviours such as brooding, incubation and provisioning in relation to chick age and time of day. This information has several practical applications, allowing Hen Harrier fieldwork activities to be timed to maximise the chances of locating occupied territories and nest sites, and to minimise the risk of disturbance to breeding birds.

Further information can be found at [www.ucc.ie/en/corc2013](http://www.ucc.ie/en/corc2013)

*Coal tit: One of the most common birds in conifer plantations in Ireland.*

*Photo: Nick McCarthy*



*Hen Harrier: One of the few nationally rare bird species which breeds in young forest plantations in Ireland.*

Further information can be found in: O'Halloran et al. *In press*. Current Ornithological Research in Ireland: 6th Ornithological Research Conference, UCC, November 2013. Irish Birds.

## The biodiversity value of forest plantations: A multi-taxonomic evaluation

Research from the FORESTBIO project on the value of plantation forests in Ireland for biodiversity across a range of taxa, soon to be published in Biodiversity and Conservation, shows that in regions where little semi-natural woodland remains, the biodiversity supported by forest plantations is particularly important. This study compared the species diversity and community composition of plants, invertebrates and birds in Sitka spruce- and Norway spruce-dominated plantations, which have expanded significantly in recent decades in the study area in Ireland, with that of oak- and ash-dominated semi-natural woodlands in the same area. The results show that species richness in spruce plantations can be as high as semi-natural woodlands, but that the two forest types support different assemblages of species. In areas where non-native conifer plantations are the principle forest type, their role in the provision of habitat for biodiversity conservation should not be overlooked. Appropriate management should target the introduction of semi-natural woodland characteristics, and on the extension of existing semi-natural woodlands to maintain and enhance forest species diversity.

Further information can be found in: Irwin et al. *In press*. The value of plantation forests for plant, invertebrate and bird diversity and the potential for cross-taxon surrogacy. Biodiversity and Conservation



# INVASIVE SPECIES – THE WAY FORWARD!

Nick McCarthy

Invasive alien species (IAS) are one of the greatest threats to biodiversity, and the Convention on Biological Diversity reports that IAS are responsible for the decline in native biodiversity in almost every ecosystem. Most nations are struggling to control complex and costly invasive alien species problems and Ireland is no different. Here, *Rhododendron ponticum*, *Phytophthora* spp. and, most recently, *Chalara fraxinea* all pose threats to our native flora.

Introduced into Ireland in 1736 *Rhododendron* has since become established in some of our most scenic areas and is now almost impossible to control. Efforts to control this species, particularly in some of our valuable native woodlands, have been stepped up over the past half century but still we are no closer to a solution. Currently the cost of controlling *Rhododendron* is estimated at as much as €7,000 per hectare and, even then, there is no guarantee that it will not reinvade sites from which it has been eradicated.

So what have we learned from the experience with *Rhododendron*? It is clear that prevention and early detection are paramount to keeping IAS from causing serious problems. Prevention is the first line of defence against IAS and is also the most cost effective.

The first step is therefore to identify potential threats, possible susceptible sites and the probable pathways by which these threats could invade. As an island nation it should be possible to consolidate Ireland's borders to prevent invasion. Methods of preventing entry could be through better public information and education, better utilisation and adaption to Irish conditions of available Pest Risk Assessments, more stringent border controls and regulations, and the imposition of trade restrictions where possible threats are detected. Small measures can also be

implemented such as disinfectant baths at all ferry ports, and through better PR and information make people aware of the risks to bringing plant materials back into the country.

The second step is early detection which can be achieved through the use of sentinel forests and citizen science to rapidly identify threats and implement control measures. Sentinel forests are located close to possible entry points where an array of detectors and traps can be installed and regularly monitored for signs of invasion. With huge pressure on budgets and a severe shortage of manpower the future use of citizen science in the early detection of IAS in Ireland could be crucial. Even though early detection is highly dependent on the capacity of individuals to recognize alien species, through the provision of resources, proper training, encouragement, and workshops, we can further train not only our national professionals but also interested members of the public. However coupled with these citizen science monitors we need to use the considerable advances in technology for identification of these threats that have recently been developed such as DNA barcoding, thermocyclers and rapid identification techniques.

We also need to exploit the networks and organisations available to us within the EU and



*Rhododendron infested forests. Photos by Nick McCarthy*

beyond for information and alerts on new threats together with new techniques and methods of combatting these Invasive Alien Species. If we do not heed the lessons from previous invasive species such as *Rhododendron* and neither look at possible threats nor look to prevent and early detect, but instead wait for invasion and then attempt to control them, then the future of our forests and biodiversity will be in jeopardy!

## End of PLANFORBIO programme conference

Scientists, practitioners and policy makers from Ireland and Northern Ireland will convene in Portlaoise on Monday December 9th to review the recommendations of PLANORBIO, the largest sustainable forest management research programme ever undertaken in Ireland. Findings to be presented at the meeting will demonstrate that opportunities for biodiversity enhancement and maintenance, as required by EU directives and the UN Convention on Biological Diversity, can be maximised through appropriate forest management. Forest management recommendations from this programme span all stages of the forest cycle, including site selection, choice of tree species, landscape configuration and harvesting strategies. One of the main threats, not only to forest expansion, but to our existing forest estate, comes from pests and disease, and this programme also makes recommendations on rhododendron management. The final project recommendations for sustainable forestry will be based on the research findings, will reflect the input of practitioners and policy makers and will be published in the final project report.

# RARE AND ENDANGERED SPECIES IN OUR FORESTS

Sandra Irwin

When attempting to determine the environmental value of forest habitats for biodiversity conservation scientists typically rely on the ability of common species to accurately reflect the presence of rare animals. This is because identifying rare or endangered species is not easy as, by their very nature, they are difficult to find and so difficult to assess quantitatively. Nonetheless these species are often sampled during routine biodiversity studies and a new analysis of biodiversity data collected during the FORESTBIO project has revealed that forest plantations in Ireland do provide habitat for plant, invertebrate and bird species of conservation concern.

This study was the first to compare the role of plantation forests in supporting species of conservation concern with semi-natural woodlands in Ireland and revealed that forest plantations offer habitats to some nationally rare and threatened species. Surveys of ground vegetation, invertebrate (ground- and canopy-dwelling spiders and beetles) and bird diversity were carried out at 60 forest sites across Ireland. The forest types included 20 Sitka spruce second rotation plantations, 10 Norway spruce plantations, 10 mixed tree species plantations (Norway spruce with either Scots pine or oak) and 20 semi-natural woodlands (10 oak dominated and 10 ash dominated). Of the 266 plant species, 162 spider species, 159 beetle species and 36 bird species recorded 8, 9, 1 and 5 species of conservation concern, respectively, were recorded. Of the 23 species of conservation concern 15 were forest associated species. These included one new Irish plant record, one new Irish spider record and one new Irish beetle record. Fourteen of these species were found in semi-natural woodlands, highlighting the importance of the retention or restoration of these habitats for forest biodiversity. However, fifteen of the species of conservation importance were also recorded in plantation forests, many of them exclusively in plantations, demonstrating that the role of these forests in the provision of habitat for biodiversity conservation should not be overlooked. These

forests should therefore be planned and managed to optimise their potential to enhance national biodiversity. Biodiversity conservation measures should also target the expansion and restoration of semi-natural woodlands as these sites are important refuges for forest-associated species in intensively managed landscapes.

Further information can be found in: Irwin et al. In press. Do Irish forests provide habitat for species of conservation concern? *Biology & Environment*.

*Grasshopper warbler: A summer migrant and one of the few birds of conservation concern recorded in Irish forests during this study. Photo by Mark Wilson.*



*Anobium inexpectatum: A new beetle species record for Ireland found during this study. Photo by Frank Kohler.*

## PROJECT PARTNERS

**University College Cork**

Programme Leader and PI: Prof. John O'Halloran

**Trinity College Dublin**

PI: Dr. Daniel Kelly

**Waterford Institute of Technology**

PI: Dr. Nick McCarthy

**Coillte**

PI: Dr. Mick Keane

**Forest Research, UK**

PI: Dr. Nadia Barsoum