

Bord na Móna
biodiversity
action plan 2010–2015

Cover:

Whooper Swans at Lough
Boora, Derrycastle Wetlands
and Oweninny cutaway bog

Below:

Bee on Devil's Bit
Scabious flower



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Foreword

Bord na Móna is a majority state-owned company that celebrated its 75th anniversary in 2009. For most of this period the main objective of Bord na Móna has been to develop the bogs of Ireland for the production of fuel and energy peat in order to provide an indigenous energy source for the people of Ireland. It has also operated a horticultural peat business since its early days, mostly serving export markets. In recent decades the company has diversified and expanded to embrace renewable energy and environmental products and resource recovery services, in turn creating a growing and dynamic company that can continue to sustain itself into the future. This future is vividly encapsulated in the company's vision: a new contract with nature.

Among other things biodiversity will have a significant role in the realisation of this unique vision. There have undoubtedly been both gains and losses to the stock of biodiversity on Bord na Móna's lands over the decades as the company's operations progressively altered the terrain. However the company believes that it has played its part in peatland conservation in Ireland whilst at the same time striving to carry out its fundamental mandate. Bogs acquired by Bord na Móna that were deemed to be of significant nature conservation interest were returned to the State between the 1980s and 1990s as representative examples of the country's unique peatland ecosystems; most now belong to the current network of nature conservation sites in Ireland.

A key influence on the future peatland biodiversity of the Midlands will be the long-term management plan for the Bord na Móna bogs. Most of the bogs are currently being managed to some degree for peat production while significant areas have already been rehabilitated. Peat is a finite resource however, and over the next 20 years or so it is envisaged that large areas of the operational Bord na Móna bogs will become exhausted of commercial peat while no new bogs will be brought into production. The most obvious question is what will happen to these extensive peat production areas when they are no longer required to produce peat? While this question cannot be answered at this point for every one of these bogs, the company has started to plan for their post-operational phase. The process will include an assessment of the peatland areas to ensure the optimum use of this

important national resource. Future uses will include a number of alternatives including appropriate commercial uses, renewable energy and amenity/tourism. However, biodiversity considerations will continue to be an important element in the process of determining the future of the peatlands.

In the meantime this Biodiversity Action Plan outlines those specific projects and activities that the company has in train in the medium term. It is lively and colourful, just like biodiversity and Bord na Móna is pleased to present it.

Thanks to all, those within Bord na Móna and outside the company, who have contributed to this publication and to the success of the biodiversity projects described in this Biodiversity Action Plan.

Gabriel D'Arcy
CEO Bord na Móna
May 2010



Below:

Photograph of panels from
the Heartland exhibition
to mark Bord na Mona's
75th anniversary





Landsat image of Ireland
showing Bord na Móna
bogs outlined in yellow

1. Introduction

Biodiversity¹ is everywhere, from gardens and hedgerows on our doorsteps, to woodlands and wetlands, rivers and coastlines, birds in trees, fish in rivers and bats in the roof. Biodiversity both is all life on earth and supports all life on earth; as humans we depend on biodiversity for clean air and water, healthy soils, food, building materials, and medicines. The effects of both the local and global environment on human health are increasingly recognised; not least in the awakening realisation that global climate change may affect our health and well-being. These potential changes in climate will also impact on global diversity as species and habitats may be forced to adapt to new and unfamiliar climate regimes. Some will adapt more successfully than others, while the close relationships between plants and animals over millions of years created through evolution may be altered. The conservation of biodiversity and natural heritage is therefore an integral part of good environmental management and essential to continued survival of human beings on Earth.

Bord na Móna is a significant landowner in Ireland, with the concentration of the company lands centred on the Midland counties of Longford, Westmeath, Meath, Roscommon, East Galway, Offaly, Kildare, Laois and Tipperary. This includes up to 80,000 ha of peatland² and associated areas used for workshops and depots, most of it comprising former **Raised Bogs** in the Midlands with outliers in Mayo, Donegal and Kerry that comprise former **Atlantic Blanket Bog** areas (see satellite image opposite).

Bord na Móna undertakes its activities cognisant of the natural environment and manages all of its peat production bogs according to best practice under **Integrated Pollution Prevention Control Licenses** issued and regulated by the EPA³. Once peat production ceases (currently active on up to 65,000ha of bog) the former peat production areas are termed cutaway bog. It is the **cutaway bogs** that will largely dominate the Bord na Móna bogs into the future as peat production is phased out and, as part of **rehabilitation** of those cutaway bogs under the watchful eye of the EPA, new landscapes will emerge over time to complement the existing natural peatland habitat networks. The fringe areas on

the edges of the former peat production units as well as remaining bog remnants will also serve to create ecological corridors between fragmented and isolated habitats thereby sustaining viable habitats and species populations into the future, as well extending the range of wetland and woodland **ecosystems** within the Irish landscape.

Over the past two years Bord na Móna has formalised its Corporate Biodiversity Objective which aims to strengthen the role of Bord na Móna in enhancing biodiversity and to create awareness of the values of cutaway bogs through wise-use management for biodiversity. As part of this Corporate Objective and to coincide with the 2010 International Year of Biodiversity, Bord na Móna is publishing this Biodiversity Action Plan. The document is seen as a first step in developing a vision for biodiversity on Bord na Móna bogs.

Recognising that Bord na Móna has a responsibility in terms of managing its bogs into the future and that potentially large areas of former peat production areas will revert to biodiversity-rich systems, the broad aims of Bord na Móna in terms of biodiversity developed under its Corporate Biodiversity Objective are to:

- Promote and enhance the conservation of biodiversity regimes of local, national, European and international importance within Bord na Móna ownership
- Raise awareness of and encourage involvement in the conservation of biodiversity within Bord na Móna and the wider community
- Facilitate the establishment of a framework for sustainable planning and development of the Bord na Móna bogs for biodiversity and other appropriate potential after-uses
- Highlight both the role Bord na Móna has played to date in biodiversity enhancement by outlining existing biodiversity projects and also how Bord na Móna will continue to develop its role in terms of enhancing biodiversity at local, regional, national and European levels (outlined in Section 3 of this document)
- Outline the objectives and actions that form the basis of this Biodiversity Action Plan in order to achieve the aims outlined above (outlined in Section 4 of this document).

¹ Words and phrases that are highlighted in the text are included in the Glossary (Appendix II)

² Bog types are outlined in Appendix II

³ Abbreviations for organisations and a full list of consultees are outlined in Appendix I



Above:
Cygnet at Lough Boora

Opposite:
Large White butterfly
on Cuckoo flower

2. Biodiversity

2.1 Why biodiversity is important to all of us

The term biodiversity is formed by the union of two words: *biological* and *diversity*, and refers to the different forms and inter-relationships of all living things on earth – plants, animals, fungi and micro-organisms. As human beings we are included as living creatures. However, we also play an important part in how biodiversity is valued and duly conserved and managed in a sustainable way. Biodiversity is perhaps a newer term to describe what was traditionally referred to as nature, natural heritage, wildlife and the environment around us. It recognizes genetic diversity within species as an important and significant value, the ecosystems and habitats of which they form part, and also highlights the interdependence and interconnectedness of all living things – otherwise known as the web of life.

Biodiversity is sometimes viewed only as an aesthetic feature, such as an attractive landscape or a beautiful flower, but biodiversity is made up of the trees that clean the air, the worms that enrich the soil, the reeds that filter the water and the seeds that feed us and our animals. Drainage of bogs and wetlands for peat production, changes in farming practices, arterial drainage projects, woodland clearance and in more recent years the outward sprawl of urban and town settlements as a result of the building boom, have all led

to habitat loss and fragmentation, resulting in reduced and declining populations of wild species and loss of biodiversity. It is not surprising that a number of species have already become extinct in Ireland, but the challenge now is to bring biodiversity back to the fore in terms of forging sustainable communities and landscapes for future generations.

Loss or removal of any species can upset the balance of nature, sometimes with far-reaching unexpected and subtle effects. For example: without bees to pollinate plants, we would not be able to produce most of our food crops, and native wild plants that rely on bees for pollination would face almost certain extinction.

“Biodiversity underpins ecosystem services. Bees can’t pollinate, nor can trees store carbon, if they have all died. Diverse systems are better at capturing carbon, storing water and preserving fisheries. Just how diverse an ecosystem has to be in order to supply the goods and services needed by man is a matter of debate – a debate made harder by the fact that many species may have uses that man has not yet found.” The Economist, 2008

Increasingly, it has become apparent that the Bord na Móna bogs present opportunities for enhancement of biodiversity, in particular through the rehabilitation of the cutaway bogs and management of bog fringe areas. Once peat production ceases, natural colonisation rapidly proceeds on the cutaway bogs and a whole array of diverse habitats and species emerge, some of which are considered rare and restricted in distribution in Ireland. This leads to an overall enhancement of biodiversity which to some degree can compensate for previous habitat loss.





Above:
Peacock butterfly at Littleton

Opposite:
Grey Heron at Lough Boora

It is recognised that the outcome of industrial peat production and subsequent natural colonisation of cutaway bogs by flora and fauna is very different to that of the original bogs that existed pre-industrial development in the 1940s. However, conservation of the remaining best examples of bogs such as Clara Bog in Co. Offaly and the extensive Glenamoy Bog complex in Co. Mayo, under the **Natura 2000** (SAC and SPA) and **NHA** network, coupled with the rehabilitation of the cutaway bogs, represents a positive outcome in terms of a wide range of biodiversity.

Apart from providing space for restricted habitats and species that may be on the brink of extinction, the creation of new habitat complexes, and ultimately ecosystems, on the Bord na Móna bogs can potentially renew ecosystem services that in time can enhance our own living environment. Humankind benefits from a multitude of resources and processes that are supplied by natural and semi-natural ecosystems. These benefits are known as **ecosystem services** and some of the services that can be provided by the rehabilitated cutaway bogs include

provisioning services (food, energy); regulating services (carbon storage, water filtration and regulation); supporting services (nutrient dispersal and cycling) and cultural services (nature conservation, recreational and paleo-environmental preservation). The combined value of ecosystem services with the wider environment is often referred to as **natural capital**. Furthermore, the **regeneration** and/or **restoration** of ecosystems can be viewed as **restoring natural capital**.

Maintaining and sustaining biodiversity, through managing nature conservation areas and allowing space for habitats and species to establish on the Bord na Móna bogs, will allow us to reap the benefits in terms of essential ecosystem services on a national level while also demonstrating environmental responsibility on a global level.

2.2 International Agreements to Conserve Biodiversity

Recognising the values of biodiversity and the delicate balance of nature, world leaders at the 1992 Earth Summit in Rio de Janeiro agreed on a comprehensive strategy for **sustainable development** – meeting human needs while ensuring that we leave a healthy and viable world for future generations. One of the key agreements adopted at Rio was the Convention on Biological Diversity (CBD). The CBD – a pact between the vast majority of the world’s governments – sets out commitments for maintaining the world’s ecological underpinnings as humankind continues the business of economic development. The Convention established three main goals:

- Conservation of biological diversity,
- Sustainable use of the earth’s components,
- Fair and equitable sharing of the benefits from the use of genetic resources

In 2002, 10 years after the original convention in Rio, a Strategic Plan was developed in order to guide further implementation of the CBD by the UN at the national, regional and global levels. The purpose was to effectively halt the loss of biodiversity so as to secure the continuity of its beneficial uses through the conservation and sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources. The signing parties (168 to date) adopted a policy of halting biodiversity loss by 2010 otherwise known as *Countdown 2010*. The policy aimed to achieve a significant reduction of the current rate of biodiversity loss by 2010 and is currently being reviewed and updated to go beyond 2010.

The European Union has also outlined a strategy whereby its member states would aim to halt the loss of biodiversity by 2010 (this is being reviewed and updated).

The vision is that

“Biodiversity and ecosystem services – the world’s natural capital – are preserved and, insofar as possible, restored for their intrinsic value and so that they can continue to support economic prosperity and human well-being as well as avert catastrophic changes linked to biodiversity loss”.

(COM(2010) 4/4)



Below:

Rehabilitated cutaway bog
at Bangor, Co. Mayo



2.3 International Year of Biodiversity – 2010

The United Nations has declared 2010 to be the International Year of Biodiversity. It is described as “a celebration of life on earth and of the value of biodiversity for our lives. The world is invited to take action in 2010 to safeguard the variety of life on earth: biodiversity”.

The purpose of the International Year of Biodiversity (IYB) 2010 is to raise public awareness of the importance of biodiversity and the consequences of its loss. Further to the initial objectives outlined previously, the CBD has listed the following primary objectives of IYB:

- Enhance public awareness of the importance of conserving biodiversity and of the underlying threats to biodiversity;
- Raise awareness of the accomplishments to save biodiversity that have already been realised by communities and governments;
- Call on individuals, organisations and governments to take the immediate steps needed to halt the loss of biodiversity;
- Promote innovative solutions to reduce these threats;
- Start the dialogue among stakeholders for the steps to be taken in the post-2010 period.

Target groups identified by the CBD include: school age children; adult public; key economic sectors; government departments and agencies; local authorities, indigenous and local communities; the scientific community, including museums. The objectives will be adopted by all signing parties.



**Left:**

Mark McCorry (Bord na Móna) with his daughter at Abbeyleix Bog, April 2010
(Photo: Mark Clancy, Laois Partnership)

Opposite:

Lapwing and Golden Plover take to the sky at the Lough Boora Parklands

2.4 Bord na Móna Biodiversity Action Plan

It can be seen from the previous section that biodiversity and its conservation is clearly viewed as being of global importance. We all must play a role in achieving the targets set out by the CBD and where we begin to act locally, the effects spread to regional, national and international levels. Ireland signed the CBD in 1992, it was ratified in 1996⁴ and subsequently implemented by the Irish Government, which set about developing a National Biodiversity Plan (2002) which is currently being reviewed and updated. The National Biodiversity Plan sets out the general framework for implementing the CBD in Ireland – its preparation and delivery is carried out by the National Parks and Wildlife Service (under the auspices of the Department of Environment, Heritage and Local Government). It is designed to ensure that national and international targets for the conservation of biodiversity can be achieved at national level while county biodiversity plans developed by local authorities (such as Offaly, Kildare, Longford, Roscommon, Laois and

Galway Biodiversity Action Plans) and local biodiversity plans address regional and local priorities.

The value of bogs and the potential value of the cutaway bogs in terms of national biodiversity was highlighted in the 2002 National Biodiversity Plan.

A sound knowledge base is necessary in identifying the key areas that will have to be developed to allow for wise planning of the Bord na Móna bogs as peat production is phased out. While industrial peat production will continue for a number of years, it is essential that we begin to plan now for the future. This Biodiversity Action Plan is viewed as an important step in setting out the work that has been completed to date within the Bord na Móna bogs, the lessons that have been learned already in terms of practical management and successes relating to biodiversity enhancement, and how we will proceed to plan the future of biodiversity within the Bord na Móna bogs.

¹ Full detail of international, European and national legislation relating to biodiversity management and conservation are outlined in Appendix III



Bog cotton display
on the Bord na Móna
cutaway bogs

3. Biodiversity of the Bord na Móna Bogs

Bord na Móna owns up to 80,000ha of bogland and associated areas in Ireland. Active peat production accounts for up to 65% of this area and comprises mixed uses such as access areas, workshops, railway lines, peat production fields, and stockpiles. The remainder comprises rehabilitated and naturally colonising cutaway bog areas (10%); the rehabilitated Oweninny bogs and wind farm (8%); fringe areas on the edge of bogs (12%) and Coillte leased plantation areas (4%). There are established commercial developments at Drehid, Co Kildare and Derryarkin, Co. Westmeath and cultural areas such as the **Sculpture in the Parklands** initiative at Boora in Co. Offaly, however to date these areas account for less than 3% of the total land holding.

The cutaway bogs will essentially form the core area of land within Bord na Móna when peat production ceases – up to 80% of the total land holding. The cutaway bogs areas will be fringed with cutover bog and bog remnants, fragments of woodland, and workshop areas all linked by a corridor of former railway beds that are presently used to transport peat across the network of Bord na Móna bogs that runs from East Galway to East Kildare. While all areas of the Bord na Móna bogs will have biodiversity value, cutaway bogs will present the most significant opportunity for potential expansion of biodiversity within the Irish Midlands landscape.

3.1 Cutaway Bogs: the range of after-use options

3.1.1

Commercial Growing Trials

It was originally envisaged as Bord na Móna began to drain and develop the bogs, that in time and as peat layers were removed, the cutaway bogs that remained would present wide ranging opportunities in terms of creating improved land from bogland which was viewed at the time as wasteland and marginal. It was hoped that these cutaway bogs would serve as vast new lands capable of development for commercial after-uses such as cultivation of trees, vegetables and tillage crops, and places to fatten cattle on good agricultural grasslands. This led to the establishment of a number of commercial and agricultural crop trials between the 1970s and 1980s. While there was some limited success in terms of the output and viability of these after-use options, the cutaway bogs did not fulfill those commercial expectations.

The cutaway bogs exhibit variable character in terms of peat type and depth, nutrient level and drainage and this has led to difficulties in establishing large scale areas of commercial crops: even where crops establish the resulting growth can be very variable. One clear factor affecting potential after-use is the drainage system of a bog. Most of the Mountdillon (Longford and Roscommon counties) and Blackwater (East Galway and West Offaly) bogs are artificially drained through pumping in order to lower the water-table sufficiently to harvest peat, with some of the Littleton (Tipperary), Lullymore (Kildare), Boora (Offaly) and Derryfadda (Roscommon) bogs also pumped. These areas will naturally revert to wetlands as pumps are turned off once peat production ceases and water tables rise again to more natural levels. Water levels in these areas will prohibit alternative after-uses such as forestry or commercial crops.



Tillage crops, forestry and agricultural grasslands are not likely to form an extensive part of the future vision for the cutaway bogs as they are not considered to be commercially sustainable. In terms of rehabilitation and environmental stabilisation of the cutaway bogs, natural colonisation is viewed as the most sustainable option.

Up to 1,500ha of cutaway bog was however, developed successfully as agricultural grassland, and to the most part this has been sold to local farmers. Some of these grasslands are adjacent to Bord na Móna bogs and have proven of great value in terms of winter feeding areas for Lapwing (*Vanellus vanellus*), Curlew (*Numenius arquata*), Golden Plover (*Pluvialis apricaria*) and Whooper Swan (*Cygnus cygnus*).

3.1.2

Other commercial developments

There have been a number of other commercial developments of the cutaway bogs such as: the development of the first wind farm in Ireland at the Oweninny Works in Mayo in the early 1990s; the peat deposition area at Srahmore, Bangor, Co. Mayo; the landfill site and composting facility at Drehid, Co. Kildare; and the sand and gravel development at Derryarkin near Rochfortbridge in County Westmeath. These developments comprise less than 2% of the total Bord na Móna bog area to date. In addition there are a number of large scale wind farm projects proposed for suitable areas of the cutaway bogs at the design and planning stage of development. The cutaway bogs generally present an attractive site for wind farms as the wind regime can be very favourable and there is little risk in terms of peat stability issues encountered on vulnerable upland peatland sites. Wind farms, renewable energy and other appropriate commercial developments will continue to be considered where viable within the Bord na Móna bog areas. Any proposed development projects will generally require site specific rehabilitation plans to account for changes in the use of the site. All proposed developments will pass through the appropriate EIA process as well as taking cognisance of the requirements under the EU Habitats Directive in terms of Appropriate Assessment. Best practice will be employed in terms of mitigating potential impacts on biodiversity and promoting biodiversity enhancement where possible.

Opposite:

Scots Pine at Lullymore Bog

Below (top to bottom):

Lough Boora Mesolithic site; Bellacorick Wind Farm; Seed Crops on cutaway bog at Mountdillon; Grey Partridge at Boora.





Above:
Laccaria sp. growing
on cutaway bog

Opposite:
Sphagnum squarrosum,
bog moss, regenerating
on cutaway bog at Bellacorick

3.2 Rehabilitation, Natural Colonisation and Biodiversity of the Cutaway Bogs

3.2.1

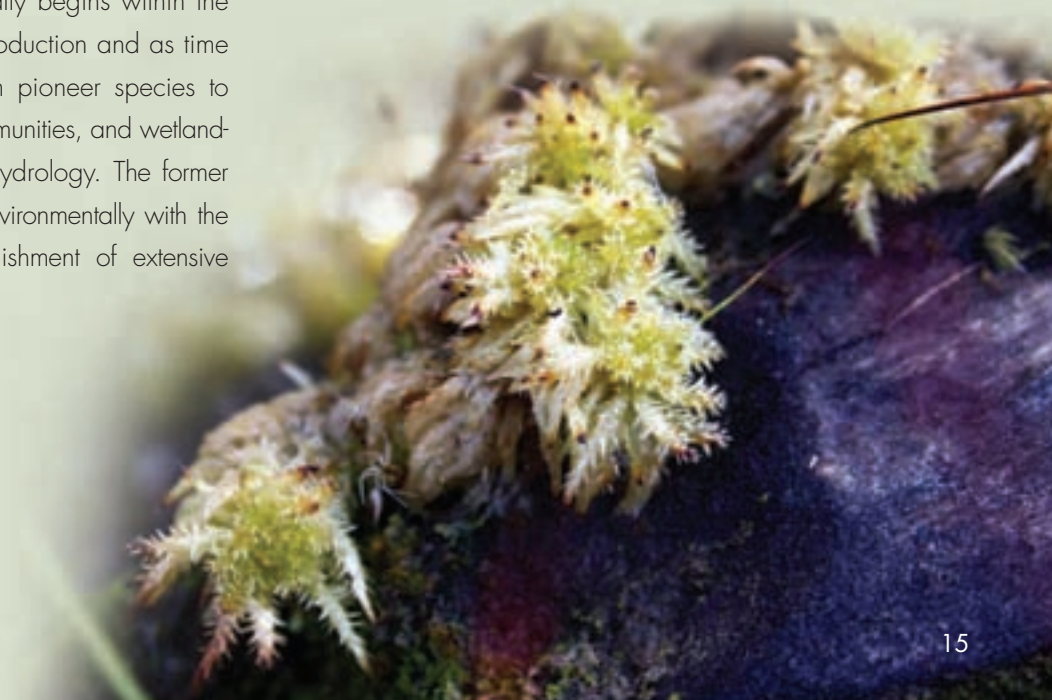
Rehabilitation of the cutaway bogs

Bord na Móna peat production activities are carried out under nine Integrated Pollution Prevention Control Licenses that are issued and regulated by the EPA. These licenses were issued in 2000 and cover activities in the Shannon, Oweninny and Owenmore, Barrow, Nore, Suir, Boyne and Liffey River catchments. Each license contains 14 conditions covering all of our activities in relation to peat extraction, including emissions to air, water and land. The licenses ensure that all Bord na Móna operations are carried out according to best practice which in turn serves to protect biodiversity in the wider context. One of the conditions, Condition 10, specifically relates to post-production rehabilitation of the cutaway bogs. Essentially the main criterion in rehabilitation is the stabilisation of the former peat production area. This has been shown to be largely achieved by natural colonisation.

Cutaway bog emerges from large peat production complexes on a piecemeal basis and until such time as an extensive area of cutaway can be isolated from production use, natural colonisation generally proceeds and results in stabilisation of the bare peat surface by species such as rushes and sedges. The natural colonisation process generally begins within the first year that an area is taken out of production and as time progresses the vegetation trend is from pioneer species to more complex poor fen or grassland communities, and wetland-scrub mosaics according to the local hydrology. The former bare peat fields are thereby stabilised environmentally with the added benefit of spontaneous re-establishment of extensive areas of biodiversity.

Once an area of cutaway bog can be isolated from the peat production process, it has generally at this stage reverted to some type of semi-natural habitat and space for flora and fauna. The baseline condition at that point dictates any further rehabilitation work required to stabilise the peat and/or enhance the biodiversity value of the site. The steady revegetation of the cutaway bogs through natural processes is a key element in stabilisation of the peat fields and fundamental to the licensing requirements set out for rehabilitation of the cutaway bogs by the EPA.

It should be noted that the plant communities re-establishing on the cutaway bogs are very different from that which predated industrial development of the bogs and survey work to date has shown that there is very little natural colonisation by peat-forming species such as *Sphagnum* outside of the cutaway bogs in Mayo. This occurs only where conditions are appropriate (acidic and waterlogged peat conditions) and may be enhanced through manual spread of *Sphagnum*. The regeneration of *Sphagnum* may be possible in the future where peat production on the Midlands bogs does not remove entirely the acidic peat layers such as in the bogs that are harvested for the upper moss peat layers only.



Oweninny



Attymon



Derryfadda



Bord na Móna Bog Groups



Littleton



Cúil na Móna



Mountdillon



Mostrim



Ballivor



Blackwater



Boora



Derrygreenagh



Ballydermot and Kilberry





THE ROLE OF SPHAGNUM IN BOG GROWTH AND DEVELOPMENT

Plants colonising peatland surfaces, particularly those of ombrotrophic peatlands, must tolerate low nutrient supply, relatively low pH and waterlogged soils. Bog plants must survive almost exclusively on the sparse supply of nutrients in rain and have developed a range of adaptations to survive in these nutrient challenged habitats. Some exhibit a form of carnivory (insect eating Sundew and Bladderwort species) while others simply reduce loss of nutrients through the leaves (Heather) or recycle nutrients from leaves from year to year (Bog Cotton).

The bog mosses (*Sphagnum*) form an important part of the vegetation of Irish peatlands, particularly the bogs. As a former fen peatland grows up from the surrounding influence of minerotrophic waters, bog mosses colonise the peat surfaces and subsequently proceed to create an environment that makes the peat inhospitable to a majority of other plants and animals. *Sphagnum* plants make their environment more acidic and also maintains surface water logging by means of their high water storage capacities forming tightly packed carpets on the surface, creating hummocks and lawns and continually growing upwards forming thick layers of peat.

In the rehabilitation of damaged peatlands, the encouragement of the establishment of *Sphagnum*-dominated vegetation is considered an important step towards the restoration of peat-forming conditions. For example, peat companies in North America have adopted a post-industrial management strategy that involves the inoculation of cutaway peat surfaces with *Sphagnum* fragments to accelerate the return of the system to a peat-forming one. In Ireland however, in most instances industrial peat production lowers the peat to below the influence of minerotrophic waters, essentially returning the bog to an earlier stage of fen development. In general, the conditions favour establishment of reedbed, poor fen and Birch woodland. Opportunities for restoration of *Sphagnum* species will be developed if and where they arise on the industrial cutaway bogs in the future.

3.2.2

Baseline Ecology Survey of the Cutaway Bogs

While a number of ecology studies have been carried out on the cutaway bogs (Appendix VII), in 2009 Bord na Móna established a programme to carry out a comprehensive baseline ecology survey of all of its bog areas. This survey incorporates all land-use types within Bord na Móna bogs including cutaway bogs, bog remnants and fringe areas and any areas that will in the future be potentially valuable areas for biodiversity. The survey will form the basis for the establishment of rehabilitation plans under Condition 10 of IPPC Licensing for each bog area when peat production is phased out. The ecology survey will generate the necessary information to inform decisions in terms of local and regional biodiversity potential of bog areas, while allowing for the planning and creation of a network of sites that can be linked through linear habitats such as railway lines and access track-ways.

The survey of the Bord na Móna bogs is being carried out according to the guidelines set out by The Heritage Council in conjunction with the National Parks and Wildlife Services and largely focuses on developing habitat maps for each bog area, with observations of fauna and other biodiversity features also included. In most instances the habitats are considered rudimentary forms of those recognised habitats within The Heritage Council classification; nonetheless, over time it is expected that they will develop more complex character and similarities to established reference habitats. Other active surveys are ongoing for bird species.

As the survey has been underway since September 2009, a number of bog areas have already been described and mapped. Baseline conditions have been described for up to 10,000ha of bog to date with habitat maps generated using GIS. While considerable areas of these bogs are still involved



in peat production to some degree, the ecology survey delivers a picture of the current status of the cutaway areas within active production bogs and also provides a knowledge base as to how the vegetation will develop as more extensive areas emerge from production over the coming years. As highlighted already, the survey data is fundamental to forming the basis for the future rehabilitation plans required under Condition 10 of IPPC Licensing to ensure the environmental stabilisation of each bog area following cessation of peat production.

3.2.2.1 Habitat Diversity of the Cutaway Bogs

In terms of the vegetation types establishing on the cutaway bogs, pioneer communities establish relatively quickly, often within months of peat production ceasing. Over time the pioneer communities become more diverse and the resulting vegetation ranges from species-poor pioneer stands to embryonic peatland communities, reed-beds, rich and poor fen, wet and dry grassland, heathland, scrub and woodland communities. The ecology survey has shown that 25+ plant communities have been recorded on the cutaway bog areas to date and as many communities are recorded on the fringe areas surrounding the Bord na Móna bogs (see List of Habitats in Appendix IV). The habitats can be broken into a number of broad categories:

Pioneer Vegetation: this largely comprises sedges, reeds, rushes and/or grassland species depending on pH, peat depth and drainage. The pioneer colonisation phase usually comprises mono-dominant species stands which have shown to develop more complex vegetation within a 5–10 year timeframe given no active management or disturbance.

Open Water: this is a common feature resulting where drainage within a production area breaks down whether naturally or by creation of dams/bunds or drain blocking. Open water is generally slower to colonise and the main species are emergent aquatics such as Common Reed (*Phragmites australis*) and Bulrush

(*Typha latifolia*) at the edges of open water that may spread throughout the area over time. This open water and emergent vegetation is probably very similar to the vegetation that was present after the last ice-age 10,000 years ago when there were extensive lakes across the Irish Midlands that would form the basins within which the great bogs would develop. Over time and following changes in climate these lakes began to terrestrialise and once the bog-mosses (*Sphagnum* spp) colonised these areas, peat-formation began in earnest.

Poor Fen: this is a very common habitat throughout the cutaway bogs and generally forms the intermittent phase between pioneer and more complex vegetation mosaics. The main species are Soft Rush (*Juncus effusus*) and Bog Cotton (*Eriophorum angustifolium*), usually with a relatively species-poor ground layer. Where these areas become wetter either through drain blocking or natural **rewetting**, more complex wetland communities form. Where they remain relatively dry, Birch (*Betula pubescens*) scrub emerges usually leading to a more closed Birch woodland community.

Rich Fen: this is relatively less frequent in occurrence and develops where there are mineral rich springs present with a bog such as at Oughter bog and patches of Clongawney Bog, both part of the Boora complex in Offaly. The species present are Black Bog Rush (*Schoenus nigricans*) and Saw Sedge (*Cladium mariscus*) with a ground layer of brown mosses.

Above: Reed-bed at Turraun and Birch woodland at Clera Island Bog

Opposite: Rich fen at Lullymore and Bulrush at Clonsast

Overleaf

Left: Crane Fly and Meadow Pipit

Right: Irish Hare and Marsh Fritillary butterfly

(Photo: Jesmond Harding, BCI)



Embryonic Peatland Communities: commercial peat production involves almost complete removal of peat, often exposing underlying alkaline subsoils. In most instances to date on the Midlands cutaway bogs the high pH prohibits **restoration** of conditions for peat-forming *Sphagnum* species. Suitable sites may be presented in the future where the total volume of commercial peat is not extracted below the acidic peat layers. However, conditions are appropriate on the cutaway Atlantic blanket bogs and this has led to spontaneous establishment of peat-forming vegetation on the cutaway following targeted rehabilitation to restore suitable water table for typical bog species including Sundews (*Drosera* spp.), and Bladderwort (*Utricularia* spp.) in pools and waterlogged drains.

Reed-Bed and Tall-Herb Swamps: these are generally associated with drainage ditches and open water. In some places they may form dense stands but they are generally sparsely growing within a complex of other habitat types. In areas where the bogs are artificially drained, particularly along the River Suck and River Shannon, there will be a greater potential for reed-bed establishment in the future.

Grassland: there are relatively few areas of grassland, usually occurring on drier mineral ridges under the bog exposed by peat production. Where alkaline soils are exposed, these grassland areas can develop orchid-rich and herb-rich communities.

Dry Heathland: this habitat generally establishes in close proximity to grassland areas on shallow peat. The vegetation is largely dominated by Ling Heather (*Calluna vulgaris*) with a ground layer of typical heathland mosses such as *Pleurozium schreberi* and *Hymenophyllum* spp.

Birch Scrub: this is one of the more common habitats and will vary depending on local drainage and soils. Generally where a bog is gravity drained, Birch woodland establishes. These areas become colonised with pines such as Scots Pine (*Pinus sylvestris*), Lodgepole Pine (*Pinus contorta*) and to a lesser extent Yew (*Taxus baccata*), and native broadleaf species

such as Willow (*Salix* spp.), Oak (*Quercus* spp.) and Rowan (*Sorbus aucuparia*). In time these areas will become more developed woodland habitats. Bord na Móna has initiated two **Native Woodland Scheme** projects on cutaway bogs where Birch and Pine woodland are emerging with potential for Oak establishment. In these areas there was specific removal of Lodgepole Pine which is a non-native species. It is likely that the cutaway bogs will develop extensive areas of native woodland in the long-term where the bogs are gravity drained.

3.2.2.2 Species Diversity of the Cutaway Bogs

Fauna: While the habitats recorded to date on the Bord na Móna bogs are to a greater or lesser extent comprised of relatively common species, there are a number of species of high conservation value that are using the cutaway bogs. These include species listed on Annex II of the European Union Habitats Directive (e.g. Otter (*Lutra lutra*) and Marsh Fritillary Butterfly (*Euphydryas aurinia*)) and Annex I of the EU Birds Directive (e.g. Golden Plover, and Kingfisher (*Alcedo atthis*)). Fauna that have been recorded on the Bord na Móna bogs that are listed under Annex II of the EU Habitats Directive are outlined in Table 2 of Appendix V. It is noted that while there are several published records for faunal species on the Bord na Móna bogs, the surveys have focused largely on the Boora bogs and data for invertebrates, amphibians, fish and bat species is relatively limited. As further data becomes available through the Bord na Móna ecology survey and surveys carried out by others such as BirdWatch Ireland on behalf of Bord na Móna, a wider picture of species diversity will emerge over the range of the Bord na Móna bogs.

Mammals: A number of mammal species are recorded on the cutaway bogs including commoner species such as Fox (*Vulpes vulpes*), Badger (*Meles meles*), Hare (*Lepus timidus hibernicus*), Rabbit (*Oryctolagus cuniculus*), rodent species including Pygmy Shrew (*Sorex minutus*), and non-native species such as Fallow Deer (*Dama dama*) and Grey Squirrel (*Sciurus*



carolinensis). Less common are Red Squirrel (*Sciurus vulgaris*), Otter and Red Deer (*Cervus elaphus*). Pine Marten (*Martes martes*) tracks are relatively common throughout the bogs surveyed to date.

Woodlands, scrub, hedgerows, treelines, sheltered water bodies and watercourses of the Bord na Móna bogs are ideal habitats for Bat species. Those already recorded from the cutaway bogs include Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*P. pygmaeus pipistrelle*) and Leisler's Bat (*Nyctalus leisleri*). Other species can be expected to occur occasionally including Daubenton's (*Myotis daubentonii*), Natterer's (*M. nattereri*), Whiskered/Brandt's (*M. mystacinus*/*M. brandtii*), Brown Long-eared (*Plecotus auritus*) and Lesser Horseshoe Bats (*Rhinolophus hipposideros*). The tenth known Irish bat species; Nathusius' Pipistrelle (*P. nathusii*) may also occur near larger water bodies if woodland is adjacent.

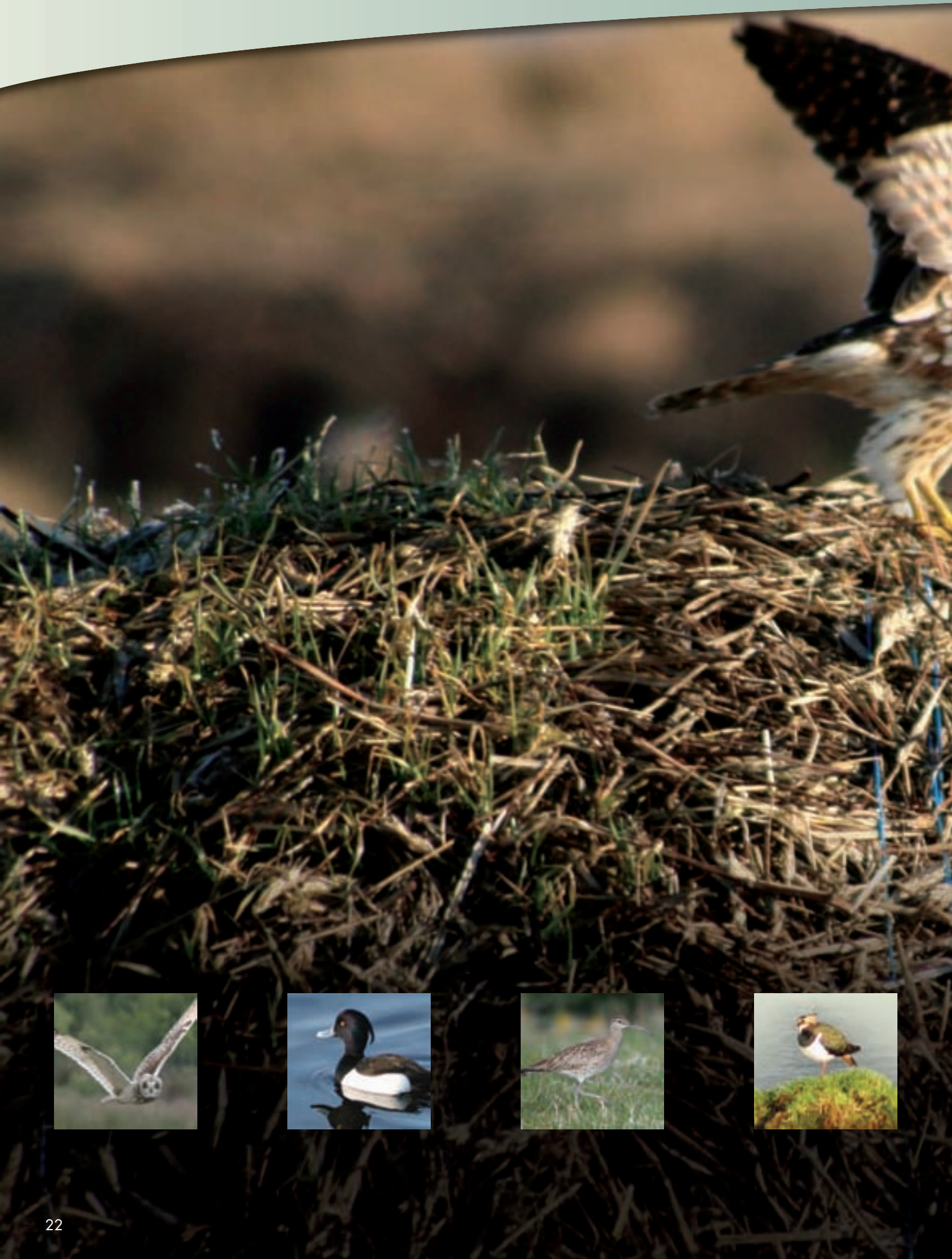
Red Squirrels are declining nationally due mainly to the spread of the Grey Squirrel. Commonly found in woodlands, including commercial conifer plantations – there have been records of Red Squirrel at the Lough Boora site in County Offaly.

Otter is a protected species under European Union legislation mainly because numbers have declined sharply in other parts of Europe. The Irish population is therefore particularly important. Otters depend on healthy fish populations and the presence of suitable vegetation cover along the riverbank in which they make their burrows or 'holts'. The Bord na Móna bogs are very suitable for Otter as the wetland mosaic provides suitable feeding areas, particularly where there are streams and rivers inter-connecting between sites.

Red Deer have been recorded at the Oweninny bogs in Mayo; probably introduced to North West Mayo in the late 1990s for hunting. They are now widespread throughout the wider area.

Marsh Fritillary Butterfly: There are two sites in Kildare that are host to Marsh Fritillary. The Irish Peatland Conservation Council (IPCC) manage a site in Lullymore the ownership of

which was transferred by Bord na Móna in 2005. There is a further site nearby at Lullybeg, Lullymore which is managed by Butterfly Conservation Ireland. This cutaway bog area covers a relatively small area (approx. 8ha) and boasts an impressive insect fauna with rare butterflies and moths. Pride of place is the rare and increasingly endangered Marsh Fritillary Butterfly. This beautiful butterfly has a chequered wing pattern resembling a stained glass window and feeds on Devil's-bit Scabious (*Succisa pratensis*) which is abundant at Lullybeg. The Marsh Fritillary maintains a healthy and expanding population on the Lullybeg site but elsewhere in Ireland it is in danger of extinction, as in Britain and the rest of Europe. The decline is linked to loss of suitable habitat. The Lullybeg site is managed by members of Butterfly Conservation Ireland who employ a number of targeted management practices such as scrub removal and managed grazing by cattle to maintain suitable habitat conditions for the breeding butterflies. A total of 20 butterfly species with an overall total of 974 adult butterflies were counted in 2009. The species recorded include Green-veined White (*Pieris nai*), Large White (*Pieris brassicae*), Small White (*Pieris rapae*), Réal's Wood White (*Leptidea reali*), Orange-Tip (*Anthocharis cardamines*), Brimstone (*Gonepteryx rhamni gravesi*), Common Blue (*Polyommatus icarus*), Small Copper (*Lycaena phlaeas*), Dingy Skippers (*Erynnis tages*), Ringlet (*Aphantopus hyperantus*), Wall Brown (*Lasiommata megera*), Speckled Wood (*Parage aegeria*), Meadow Brown (*Maniola jurtina iernes*), Small Heath (*Coenonympha pamphilus*), Red Admiral (*Vanessa atalanta*), Small Tortoiseshell (*Aglais urticae*), Painted Lady (*Cynthia cardui*), Peacock (*Inachis io*), Marsh Fritillary (*Euphydryas aurinia*) and Dark Green Fritillary (*Mesoacidalia aglaia*) (B.C.I. 2009). The Wall Brown Butterfly which has suffered a rapid and significant contraction of its distribution still occurs in Lullymore/ Lullybeg (B.C.I records). There has been a further record of Marsh Fritillary at Doire Bhile wetland in Tipperary.





Birds: The cutaway bogs are proving to be very valuable areas for a range of bird species. The most documented is the Grey Partridge (*Perdix perdix*) project at Lough Boora, where the numbers of birds have increased from 26 to 436 through a successful and intensive management programme undertaken by the National Parks and Wildlife Service with assistance from Bord na Móna over the last ten years.

The cutaway bogs have also been highlighted by BirdWatch Ireland as some of the top sites in the Midlands to view birds. In winter months the main attractions to the bogs are Whooper Swans, Lapwing and Golden Plover. Survey records by BirdWatch Ireland for winter 2009 show Whooper Swan was probably the most important species (both on a national and international level) recorded using the cutaway bog, with an estimated 245 individuals using the larger Boora area. Numbers recorded in 2010 exceeded 900 for Whooper Swans using the Bord na Móna East Galway bogs along the River Shannon. Large numbers of Golden Plover (2,000) and Lapwing (717) were also recorded in the BirdWatch Ireland 2009 survey at Boora, along with six species of duck, a further five species of wader and other water-birds such as grebes and rails. This extensive 2009 survey also recorded many wetland birds, with Snipe (*Gallinago gallinago*) particularly widespread. Many of these species are of conservation concern, highlighting the importance of wetlands present on the cutaways to threatened birds.

The number of breeding waders on the cutaway bogs recorded in 2009 further emphasises their importance for this group of species, all of which are of conservation concern in Ireland due to loss of suitable breeding habitat. The open landscape and wetland areas are considered to be particularly important for the success of wader species. However, further detailed studies on the breeding ecology of these species, including identification of nest predators and specific habitat needs is required to ensure that the breeding wader population is maintained.

Main picture: Merlin at Lough Boora

Opposite: Short-eared Owl, Tufted Duck, Whimbrel and Lapwing on the Bord na Móna bogs

The cutaways have a distinctive breeding bird community, including several species of conservation concern that are becoming increasingly scarce in the wider countryside (including Skylark (*Alauda arvensis*), Snipe, Tufted Duck (*Aythya fuligula*), Little Grebe (*Tachybaptus ruficollis*), Lapwing and Black-headed Gull (*Larus ridibundus*)). Again, the wetland habitats and open nature of the landscape are probably important for maintaining this special bird community. Drinagh Bog in West Offaly has been selected as a potential site to evaluate the success of management options to enhance breeding wader numbers. A project is currently being developed between Bord na Móna and BirdWatch Ireland to monitor the impacts of potential management options such as controlled water levels, scrub clearance and surface manipulations to enhance potential breeding sites for waders within the Drinagh cutaway bog area.

Surveys carried out on the Oweninny Boglands in Mayo by BirdWatch Ireland in 2009 highlighted the first record of breeding Ringed Plover (*Charadrius hiaticula*) on western cutaway bogs (Copland 2010). Red Grouse (*Lagopus lagopus hibernicus*) and wintering Golden Plover have also been recorded at the site. Those bird species recorded on the Bord na Móna property are outlined in Table 3 of Appendix V. A further bird survey by BirdWatch Ireland of the East Offaly Bord na Móna bogs has been initiated for 2010.

Flora: While the habitats of the cutaway bogs are largely dominated by relatively common Irish plant species, there are some rare species or species with restricted distribution finding the cutaway bogs a suitable habitat to expand their populations. A wider survey is likely to reveal more species but some of the known species are Wintergreen (*Pyrola rotundifolia*) and Blue Fleabane (*Erigeron acer*). The more common species do however create great spectacles at different times of the year – Bog Cotton (*Eriophorum* spp.) is abundant on the cutaways in May and its white fluffy seed-heads can create an entirely new landscape while in full bloom across the Midlands, while there is a fantastic display of orchids to be seen at Finnamores and Lough Boora in April and May. One of the more lovely species is Marsh Helleborine (*Epipactis palustris*) but there are also more abundant Marsh Orchids (*Dactylorhiza* spp) and Butterfly Orchid (*Platanthera bifolia*). Similarly, Heather (*Calluna vulgaris*) in September is so abundant on bog remnants as to turn the bog purple. It is an evocative display as it heralds the turning of the year. Those flora species that have been recorded on the Bord na Móna bogs that are of nature conservation importance are outlined in Table 2 of Appendix V.



Invasive Species: Invasive species are species that have been introduced, generally by human intervention, outside their natural range and whose establishment and spread can threaten native ecosystem structure, function and delivery of services. Once introduced, control, management and eradication where possible of invasive species can be very difficult and costly; therefore early detection and reactive measures are desirable.

Some of the most notable invasive species in Ireland are the Zebra Mussel (*Dreissena polymorpha*) and Japanese Knotweed (*Fallopia japonica*). The National Biodiversity Data Centre has listed eight species of high concern in Ireland. To date none of these high concern invasive species have been recorded on Bord na Móna bogs. The main non-native flora species recorded are Lodgepole Pine, Sitka Spruce and *Rhododendron ponticum*. The former species have been recorded colonising cutaway bog and dry bog remnants on fringes. Pine species were extensively planted in the 1980s and often the planting focused on bog areas. Management has not yet become problematic and the spread of these pines will be monitored. *Rhododendron* has been recorded on a number of cutaway bog areas, with occasional plants on cutover bog. The most obvious example is Abbeyleigh Bog along the edge of the former railway line. Management of these three species is not viewed as problematic to date, however the situation will be monitored. Further non-native fauna species have been recorded on the cutaway bogs and their management will have to be part of a nationwide policy and management approach: species of relevance are Grey Squirrel and non-native Deer species.

Right:
Rhododendron at
Abbeyleigh Bog

Opposite:
Mute Swans at
Blackwater



Above:
Dew on grass at
Derrygreenagh

Opposite:
Thomas Egan (Bord na Móna) and
Duncan Stewart (RTÉ) September
2008; Little Egret at Boora

3.3 Biodiversity of the wider Bord na Móna Bogs

3.3.1

Areas Designated for Nature Conservation

Between the 1980s and 1990s, Bord na Móna transferred all known areas of nature conservation value in its ownership, such as Pollardstown Fen in Co. Kildare and Clara Bog, Co. Offaly to the National Parks and Wildlife Services for nature conservation. Those areas were handed over to demonstrate Bord na Móna's recognition of the value of those sites as well a commitment not to develop any new bog areas. These bogs are now recognised as probably the best remaining examples of their type in Ireland. Most of the areas that were transferred are classified as Natura 2000 sites and protected under national and/or European legislation.

There is still a small area of overlap between Bord na Móna and nature conservation designated areas, such as Bellacorick Flush SAC in Mayo and Towns Park Bog NHA near Daingean in County Offaly; and areas of overlap with SAC and SPAs along the River Suck and the River Shannon. In many of these areas the habitats are recognised as being of value under Annex I of the EU Habitats Directive⁵. Habitats that have been recorded on Bord na Móna bogs that are listed under Annex I are outlined in Table 1 of Appendix V.

3.3.2

Areas outside active peat production: fringe areas and connecting corridors

Not only are there habitats of ecological value emerging on the cutaway areas, the baseline ecology survey includes fringe areas that were never part of the active peat production area, and a number of habitats of value have been recorded in these areas including: remnants of more extensive former bog areas (bog remnants); marginal cutover bog areas with a mosaic of micro-habitats such as Birch woodland, heathland and grassland; riparian zones and scrub lined track-ways and boundaries. In general there are connecting corridors between most of the bog areas via track-ways, railway lines and riparian zones. These potential 'biodiversity highways' provide a valuable link for flora and fauna to move between areas and also provide a connection to habitats within and/or beyond the Bord na Móna bogs. Good examples are use of the riparian zones and cutaway bogs by Otter and probably a number of Bat species who forage along riparian and scrub corridors, making the most of the ecological network of sites that facilitates wider ranges and space for foraging, breeding and protection.

While wildlife corridors are essential for sustained populations of flora and fauna, the component habitats within fringe areas and areas undeveloped for peat production are often of significant



⁵ See Appendix III for detail of relevant EU Directives

value themselves. Abbeyleix Bog is one such example where a former Raised Bog was ditched by Bord na Móna in the 1980s for peat production with no further development works carried out. The habitat was classified as degraded Raised Bog and in 2009 a large-scale drain-blocking programme was co-funded by Bord na Móna and National Parks and Wildlife Service to restore the bog to active Raised Bog. Sites like this are limited within Bord na Móna ownership but there are some potential areas that could be restored such as Clera Island Bog in South Roscommon (see Appendix VI). Small bog remnants on fringe areas are valuable habitats that act as reservoirs of typical peatland species in areas where peatlands have largely been altered for peat and turf production. A good example of this is the area of Lodge Bog in Co. Kildare which was transferred from Bord na Móna to the Irish Peatland Conservation Council in 2005. The area largely comprised a ditched bog remnant: the 25ha site has subsequently been restored by the IPCC and

serves as a valuable educational facility to demonstrate how drain blocking and *Sphagnum* spreading can be used to restore peat-forming conditions on a raised bog remnant to degraded raised bog habitat. Other examples of valuable sites are mineral islands found within larger bog areas such as those in Clongawney, Mountlucas, Mountdillon and Kilberry. These mineral islands are refuges for Old Woodland habitat and represent precious remnants of a woodland cover that once extended across the island of Ireland.

Areas that have been identified as being of Biodiversity value within the Bord na Móna bogs are listed in Appendix VI (see also IPCC *Conservation Plan 2020* for the wider network of peatland biodiversity sites). While these areas can be small in scale, this list will be added to as the ecology survey develops further, and the potential for a network of inter-connecting sites established.





3.4 Practical Rehabilitation

While natural colonisation to a greater extent leads to the creation of rich biodiversity areas on the Bord na Móna bogs, there is scope to develop areas for specific targeted aims. For example, in areas that are currently drained, blocking ditches and/or main outfalls, or turning off pumps will lead to almost immediate development of wetland habitats. Similarly, if a cutaway bog remains dry it will develop woodland habitat if site conditions are right, while further planting with native species could speed up the woodland maturation process.

The rehabilitation management tools used by Bord na Móna are outlined briefly here. While they are used in varying degrees depending on the starting condition of any bog area, the selection of rehabilitation tools will be determined by the aims and objectives of each of the site specific rehabilitation plans developed for each bog area. The best examples to date that demonstrate the use of these rehabilitation tools within the Bord na Móna bogs are the rehabilitation works carried out at the Lough Boora Parklands in Co. Offaly and the Oweninny Bogs in County Mayo. In both instances, different rehabilitation management tools were applied to achieve specific site aims and objectives. For example field drain blocking was a key measure employed at the Oweninny bogs, and served to slow down the movement of water across the entire cutaway bog area and restore conditions to favour regeneration of bog moss. Lake creation has been a common feature in the Lough Boora Parklands and other community project areas, usually carried out in conjunction with the specific aims of a local community group for amenity use.

In terms of the actual work that has been carried out to rehabilitate bogs, the rehabilitation measures fall into a number of broad categories:

Hydrological management: this involves targeted field drain blocking, dam construction and/or main outfall blocking to create larger water bodies. For example, at Abbeyleix Bog drains were blocked to restore water levels appropriate for peatforming conditions to be re-instated. This was viewed as key to restoring active Raised Bog habitat. Outfall blocking can also create large areas of water such as the wetland areas at Drinagh. These are relatively simple and effective measures but generally require pre-rehabilitation work surveys to determine the potential impacts of drain blocking both within the bog area and in adjoining lands. For lake creation, such as at Finnermore Lake in the Lough Boora Parklands, an area of cutaway may be excavated to deepen the water body to be created: this is usually combined with a local amenity project.

Planting and/or addition of fertilisers: to a greater extent natural colonisation is the best method in terms of stabilising bare peat surfaces. In some instances however cutaway bog areas are slow to colonise naturally. Application of a once-off fertiliser treatment can accelerate revegetation in these instances. Other trials have been carried out by National Parks and Wildlife Service using fertilisers with seed crops to enhance bird usage at Boora and Mountdillon. These trials were primarily for Grey Partridge at Lough Boora and small farmland birds in Mountdillon and currently cover relatively small areas, but may become more extensive where sites are determined suitable for

Above Right:
Damselfly on
Bog Cotton

Opposite:
Abbeyleix Bog after drain
blocking in September 2009

management to conserve endangered species such as Corncrake and/or Grey Partridge. It should be noted that the cutaway bogs present a unique scenario where the bogs are free of agricultural chemicals and biodiversity can develop naturally at any site. Fertilisers will only be used in situations where peat stabilisation through natural colonisation requires nutrient input to progress pioneer colonisation. Long-term fertiliser use is not considered as a desirable or sustainable management option.

Reedbed creation: this is viewed as a potential management option to rehabilitate cutaway bogs that are currently artificially drained during peat production. Trials using rhizomes of Common Reed were established in 2010 at Blackwater Bog and further trials will be established using Reed Canary Grass (*Phalaris arundinacea*) as a potential nurse crop for reed and swamp species to accelerate revegetation. This is a relatively new management approach for Bord na Móna, yet viewed as essential for bogs along the Suck and Shannon.

Grazing and/or scrub clearance: These are standardised measures used to manage habitats for species diversity and targeted species projects. An example is the scrub clearance employed by the Butterfly Conservation Ireland group at Lullybeg and the further potential use of cattle grazing to control vegetation structure to maintain Marsh Fritillary habitat. The use of these methods will be investigated where the effects are deemed cost-effective and necessary for particular habitats and/or species.

Disturbance of substrate: simple yet effective management may include repeated disturbance of ground where bare peat is actually required for breeding waders, and/or to reduce the development of rush and scrub habitat.

Woodland management: Bord na Móna has two projects under the Native Woodland Scheme and these involved planting of Oak and Scots Pine, fertilizing the transplants, fencing planted areas for deer and rabbit, removal of non-native species and encouragement of natural regeneration.

The application of some of these rehabilitation management tools is outlined in Appendix VI.



*This Page:
Land Sat image of Ireland
showing distribution of Bord
na Móna Bogs in Ireland*

3.5 Overview of the Bord na Móna Biodiversity Projects to date

A considerable amount of work has already been carried out in relation to natural heritage and biodiversity across areas of the Bord na Móna bogs, particularly on what can be termed the older cutaway bogs where peat production has led to almost complete depletion of peat resources and extensive cutaway bog areas that have required active rehabilitation planning. As outlined in previous sections, most of this work has evolved over the last 30 years from initially crop production and agriculture driven after-uses, such as grassland and conifer plantations (for example Lough Boora Parklands), to allowing natural processes to steer the vegetation succession on cutaway bogs. The scale of the projects ranges from extensive to relatively small areas on the edges of bogs (see Appendix VI) that are still active in industrial peat production. However, overall the range of conditions presented provides the baseline on which to plan for the future development and spread of biodiversity areas as more areas become cutaway over the next 20 or so years.

SUMMARY LIST OF BORD NA MÓNA 'BIODIVERSITY' PROJECTS

Lough Boora Parklands (3,000ha)

An integrated land-use management plan incorporating:

- Amenity and biodiversity (Finnamores, Boora Lakes, Cloghan, Model airplane area, Walkways, etc.)
- Wetlands (Turraun, Tumduff, Lough Boora, Derries)
- Grey Partridge Project
- Clongawny and Turraun Native Woodland Scheme
- Grassland (commercial) and Forestry trials

Oweninny Bogs (6,500ha) incorporating:

- Rehabilitated acidic wetland
- Atlantic blanket bog remnants
- Restored Atlantic blanket bog (O'Boyle's Bog)
- Potential walkways Initiative (Crossmolina Development Group)

Other areas (approx 1,000ha):

- Abbeyleix (Killamuck) Bog restoration, Co Laois
- Doire Bhile wetlands (Littleton Works), Co. Tipperary
- Derryounce Walkway (Clonsast Works), Co. Offaly
- Derryarkin wetland (Derrygreenagh Works), Co. Westmeath
- Ballycon Wetland (Clonsast Works), Co. Offaly
- Lullymore Wetlands (Lullymore Works), Co. Kildare
- Lullybeg Butterfly Conservation Ireland Site, Co. Kildare
- Mountdillon Biodiversity project: crop trials (project with National Parks and Wildlife Service), Cos Longford and Roscommon
- Lismanny Bog Project, Co. Galway
- Glenties Walkway, Co. Donegal

Opposite:

Oak planted as part of the Native Woodland Scheme, Clongawney bog



3.5.1

Lough Boora Parklands, Co. Offaly

The Boora Bog complex in Co. Offaly is one of the oldest areas of commercial production in which large tracts of cutaway emerged. In 1994 a group of local Bord na Móna workers formed the Lough Boora Parklands Group who produced an integrated land use plan for the Boora cutaways. The key elements of the plan embraced environmental and socio-economic concerns and working with Bord na Móna an extensive and richly diverse parklands area evolved, that now extends to 3,000ha. The Parklands is now recognised as a key feature within Offaly under the Offaly County Development Plan and includes: Amenity areas (Finnamores, Boora Lakes, Cloghan, model airplane area, walkways, etc.); a nationally and internationally recognised outdoor sculpture park; established biodiversity areas (Turraun, Tumduff, Lough Boora, and Derries); and a nationally important area for the last remaining population of Grey Partridge in Ireland.

While the Lough Boora Parklands is a focal area for showcasing different types of after-use of cutaway bogs, it also represents an extensive area of space within which habitats and species have taken over from the former industrial peat production landscape. This illustrates the power of natural colonisation to create biodiversity spaces, albeit with some targeted management such as drain blocking to enhance wetland features and/or planting to enhance woodland development. The Lough Boora Parklands is still evolving and recent years have seen the continuation of long-term bird surveys by BirdWatch Ireland to monitor use of the areas by species such as Whooper Swan, Lapwing, and a range of wetland birds. Coupled with these biodiversity focus aspects, there is scope at the site for amenity and recently a cycle path has been established within a small part of the area.

The fact that several thousand visitors come to the Parklands throughout the year illustrates how core areas can be selected and managed for target species and habitats (such as the National Parks and Wildlife Services Grey Partridge managed area), while other areas can be zoned for integrated uses such as amenity and biodiversity.

3.5.2

Oweninny Bogs, Co. Mayo

The Mayo bogs presented a unique opportunity for Bord na Móna – peat production ceased at the site in 2003 and after 50 years of peat production, an extensive programme of rehabilitation work was implemented across an area of 6,500ha. This is the largest example of a peatland rehabilitation programme in Europe and involved a comprehensive practical approach that included drain blocking to rewet the bogs and promote the re-establishment of peat-forming vegetation and typical peatland species such as bog mosses and bog cottons. The rehabilitation programme is seen as compatible with the development of an extensive wind farm to replace the existing wind farm at Bellacorick – this will be a significant development in terms of combining rehabilitation for biodiversity with a large scale ‘green energy’ project. The wind farm has passed through the EIA and planning processes and planning permission was granted in 2003, work is expected to commence soon. While the rehabilitation work was largely completed in 2005, monitoring of the site continues and in 2009 a seasonal bird survey was carried out by BirdWatch Ireland. Bord na Móna will also be working in partnership with National Parks and Wildlife Service to monitor the biodiversity value of the site.



CARBON & PEATLANDS INFORMATION: CARBON RESTORE PROJECT

Peatlands can act as sources of atmospheric carbon or they can act to capture carbon depending on their condition. Thereby they may in the future play a role in climate change mitigation. This is more relevant from a global perspective as peatlands contain up to 30% of the global soil carbon. Drainage of peatlands and peat and turf production cause the release of carbon. Where peatlands are waterlogged and peat-forming conditions restored, former drained peatlands can revert to carbon sinks. An research study commenced in 2008 and will continue to run through 2010 funded by Bord na Móna. The study involves measuring the carbon emissions from an area of rehabilitated cutaway bog at Bellacorick. Measurements to date indicate that the rehabilitated former peat production bog may be reverting to a carbon sink, and that peat formation processes have been restored.

It is uncertain as to the extent whereby these conditions can be created across the Midlands cutaway bogs, if at all. For the most part, industrial peat production on the former raised bogs continues to the lower peat layers that are influenced by minerotrophic waters and not favourable to re-establishment of peat-forming mosses. However, the carbon data generated from the rehabilitated bogs in Mayo, along with other carbon studies ongoing on Irish peatlands will provide vital information in determining whether conditions will allow the creation of carbon sinks on Bord na Móna bogs into the future. The information may also feed into management options and decisions in relation to what habitats are developed on any site, for example is rewetting cutaway bogs better in terms of carbon sequestration than poor fen or woodland development? Or does rewetting lead to high emissions of methane? Will these methane emissions reduce over time? These questions remain unanswered to date.

3.5.3

Abbeyleix (Killamuck) Bog Restoration Project

Abbeyleix Bog, known locally as Killamuck Bog, is located just to the southern limits of Abbeyleix Heritage town in County Laois. The bog was initially drained for peat moss production in the 1980s, but was selected by Bord na Móna as an ideal site for restoration of active Raised Bog habitat. Bord na Móna began working with the local community members of Abbeyleix, who have a keen interest in the site and the potential to use the area for amenity and education, as well as recognising its intrinsic value as a nature and biodiversity reserve. Between March and June 2009 an extensive programme of drain blocking was completed in order to stop further drainage of the site and restore water levels for the re-instatement of peat forming vegetation.

The restoration-rewetting project comprised a partnership between Bord na Móna, National Parks and Wildlife Service, the Irish Peatland Conservation Council, Laois Heritage (County Council) with the main drivers being the enthusiastic members of the local community. The local community has now undertaken to act as guardians of the bog and a lease agreement has been signed with Bord na Móna that facilitates the passing over of responsibility of management to the local community. Work will continue to enhance the site in terms of biodiversity, but it is also hoped to develop amenity and educational opportunities that will be sympathetic to the nature conservation values of the bog (the bog has been proposed for designation as a NHA). The bog is easily accessed along an old railway line which is being developed as a community walkway.

Left to right: Oweninny bogs: carbon monitoring site at Bellacorick; O'Boyle's Bog restoration at Sheskin; regenerating *Sphagnum* in pools on rehabilitated bog

3.5.4

Other Small-Scale Biodiversity and Community Amenity Projects

Smaller scale biodiversity focus projects include the wetland area recently established by Bord na Móna at Lullymore which lies adjacent the Marsh Fritillary site at Lullybeg. Another cutaway bog at Ballycon in East Offaly has been rehabilitated and is proving an important wetland site for wintering Whooper Swans. This site and the Lullymore wetland site will be monitored in 2010 by BirdWatch Ireland to establish breeding and wintering bird populations. Already this year Ballycon became a focal point as BirdWatch Ireland recorded the presence of a Crane (*Grus grus*) at the site. An area of Mountdillon Works has also been set aside for biodiversity. There are three focal areas: Derryarogue Island, Derraghan woodland and the naturally colonising cutaway bog in North West Lough Bannow. These areas were highlighted as being relatively rich in terms of local value for biodiversity following a study carried out with the North West Midlands National Parks and Wildlife Service staff. The National Parks and Wildlife Service has also established a small area with seed-crop trials on Derrycashal Bog in County Roscommon to

determine the potential to encourage the spread of farm birds on the cutaway bogs at Mountdillon. The trial was established during the summer of 2009 and as areas become available from peat production it is intended to extend the area of these trials.

There are a number of smaller projects established on the cutaway bogs where local communities have expressed interest in taking over the responsibility of managing small areas of cutaway as amenity-wetlands. There are well-established examples at Derrycastle, Portarlinton and Doire Bhile, Littleton. In both examples an area of re-colonised cutaway was enhanced to create amenity wetland and walkways. There has been a more recent record of Marsh Fritillary in Doire Bhile and the site will be monitored as part of a local school's project. These areas are managed under lease agreement and are particularly rich in biodiversity. Interest has also been expressed by communities in Donegal (Glenties), Mayo (Crossmolina Walkways Group), East Galway (Lismanny Bog), Roscommon (Mountdillon Walkways) and Kildare (Timahoe South Walkways) with a view to taking on local management of small areas of bog. Most of these projects are at a very early stage of development.

An overview of these biodiversity projects is presented in Appendix VI.

Left:
Bird hide at Lough Boora

3.6 Bord na Móna Bogs: Biodiversity Areas of the Future

When Bord na Móna effectively came into being 75 years ago, the bogs of Ireland were widely viewed as wastelands and marginal areas that should be developed where possible either for fuel or agriculture. While turf cutting has long been a part of Irish culture, the industrialisation of peat production did lead to a more systematic approach which inevitably resulted in the loss of extensive areas of *active* Raised Bog habitat in the Midlands. The loss of these core high bog areas led to declines in extent and distributions of typical peatland species such as Curlew, Red Grouse and other bog-foraging species such as Merlin (*Falco columbarius*) and Hen Harrier (*Circus cyaneus*). Perspectives towards the bogs began to change in the 1980s and this has led to the situation in Ireland where the best remaining examples of Raised Bog habitat have been designated for conservation as part of the Natura 2000 and the NHA network, a process which Bord na Móna also contributed to by transfer of a number of bog areas. The change in attitude to bogs and peatlands over the last 50 years, from being essentially marginal and unproductive lands to rich and valuable biodiversity areas has been significant in raising their status on the nature conservation agenda, in national and international terms.

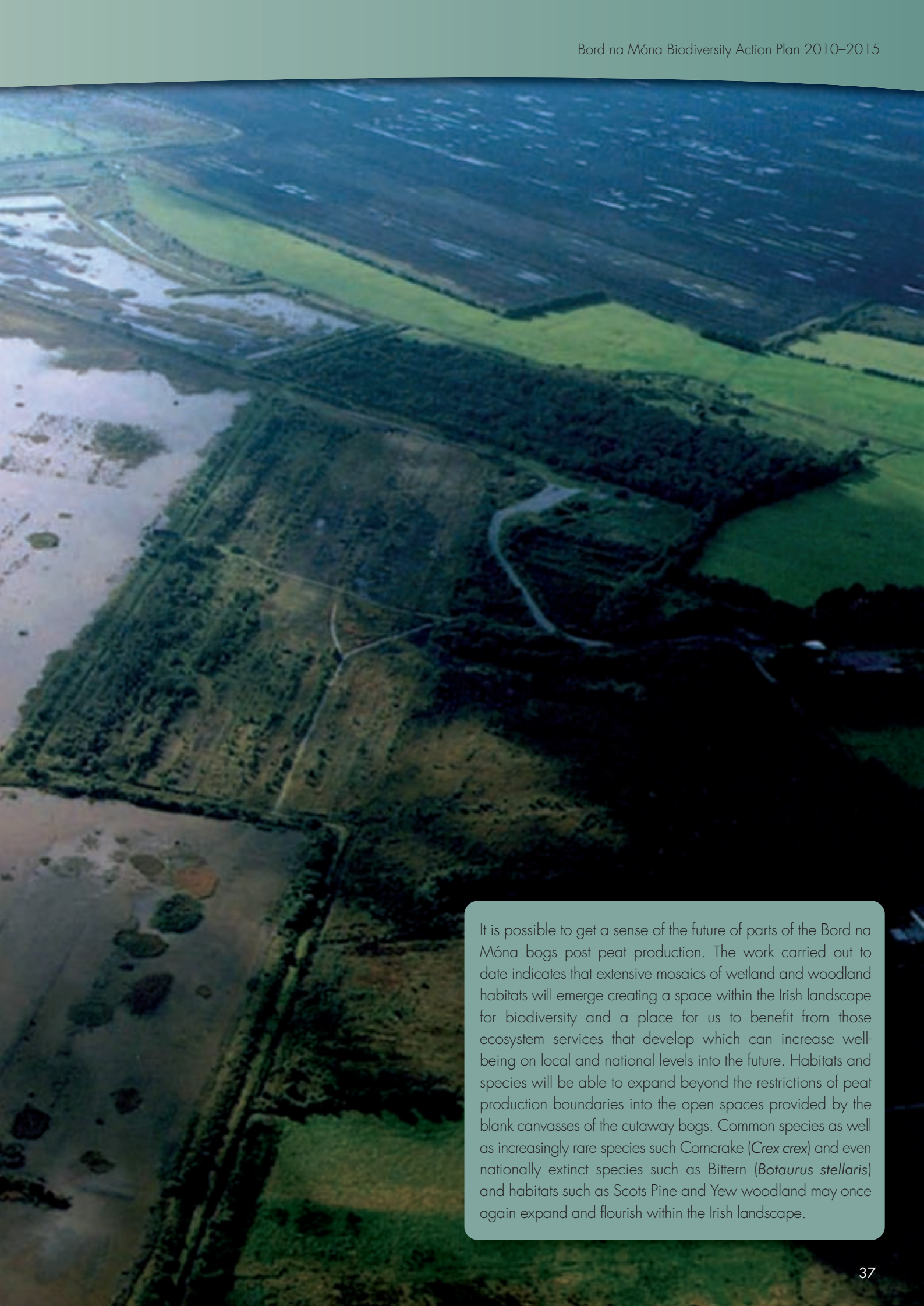
Bord na Móna continues to harvest peat from the Midlands bogs and this supplies energy to the national electricity grid, domestic fuel and horticultural peat. These activities are finite and cannot be sustained indefinitely as peat resources diminish. Once peat production ceases, the extensive areas that will then comprise cutaway bogs fringed by bog remnants, cutover bog and Birch woodland, all inter-connected by old railway beds and trackways, will rapidly develop as rich biodiversity areas, with assistance from Bord na Móna through the development of site-specific rehabilitation plans. These areas cannot be returned to their former bog habitat, as the development of the bogs occurred over millennia. It will be possible however to manage the Bord na Móna bogs to enhance and add value to the existing local, regional and national biodiversity resource as evidenced by the diversity of species and habitats already established on the Bord na Móna bogs highlighted in this document.

To date over 8,000ha of just under 80,000ha of Bord na Móna bogs has been identified as being of high biodiversity value and will be managed as such into the future (Appendix VI). While some of the biodiversity areas and projects described here are relatively small scale, they are generally located on the edge of active industrial production areas and this presents a limit on work that can be completed for now, but with potential to expand project sites into the future. As more and more areas come out of peat production and as the ecology survey continues, this list will be further added to. Given that up to 50% of the current active production area falls within the pumped drainage category (such as the bogs along the River Shannon and River Suck) these areas will revert naturally to wetlands with fringe woodland habitats; while gravity drained sites (such as the Meath, East Offaly and Kildare Bogs) will progress towards heathland, grassland and woodland habitat. The area of pumped bogs alone, along with gravity drained sites that are difficult to drain (up to 40,000ha) has the potential to significantly increase biodiversity on a national scale and expand the extent of a number of habitats (particularly in terms of wetland habitats) and species that are either currently restricted or of fragmented in distribution in Ireland. Furthermore, development of more complex ecosystems will enhance benefits from ecosystem services as they continue to develop and evolve over time.

The current and potential biodiversity value of Bord na Móna bogs has already been recognised both locally by communities and County Councils and nationally by the statutory authorities, including National Parks and Wildlife Service as well as ENGOs such as the Irish Peatland Conservation Council, BirdWatch Ireland and Butterfly Conservation Ireland as significant natural heritage areas with potential to increase and connect existing established nature reserves and high value areas for habitats and species. Core areas with minimal human disturbance will be necessary for certain habitats and species, but there is scope where humans can interact with nature at less vulnerable biodiversity areas. By facilitating access for people to selected areas, awareness of the rich biodiversity of the Bord na Móna bogs and the value of nature in general in the Irish landscape can be nurtured.



Aerial view of Turraun Bog showing rehabilitated bog area with regenerating wetlands and woodland communities and ongoing peat production in the surrounding areas



It is possible to get a sense of the future of parts of the Bord na Móna bogs post peat production. The work carried out to date indicates that extensive mosaics of wetland and woodland habitats will emerge creating a space within the Irish landscape for biodiversity and a place for us to benefit from those ecosystem services that develop which can increase well-being on local and national levels into the future. Habitats and species will be able to expand beyond the restrictions of peat production boundaries into the open spaces provided by the blank canvasses of the cutaway bogs. Common species as well as increasingly rare species such as Corncrake (*Crex crex*) and even nationally extinct species such as Bittern (*Botaurus stellaris*) and habitats such as Scots Pine and Yew woodland may once again expand and flourish within the Irish landscape.



Above:
Redshank at
Finnamores Lake

4. Objectives & Actions of the Bord na Móna Biodiversity Action Plan 2010–2015

4.1 Objective 1: To continue to carry out all works in line with best practice guidelines and relevant legislation across all Bord na Móna bogs

Essentially this objective relates to ongoing compliance with legislation relevant to Bord na Móna activities. Compliance is necessary to ensure the continuation of the core businesses within Bord na Móna (peat production) while also facilitating development of potential commercial developments (such as wind farms) on Bord na Móna bog areas that will have to go through EIA and planning processes. Legislation, policies and best practice guidelines are generally updated on an ongoing basis and it will be necessary to develop Bord na Móna biodiversity policy and practice to reflect these trends. There is an ongoing project funded by the EPA aimed at contributing to a policy document on peatland management in Ireland (BOGLAND) and further guidelines for the peat industry are being developed by the European Peat and Growing Media Association (EPAGMA) and the International Peat Society (IPS). The outcome of projects such as these and other Biodiversity, Landscape and Green Infrastructure policy developments will be considered for incorporation into Bord na Móna policies.

Actions:

- Ensure responsible environmental management in terms of operational aspects of all Bord na Móna businesses through continuation of best practice in terms of IPPC Licensing and other similar instruments such as Waste Licenses and Waste Permits.
- Further encourage best practice within Bord na Móna in terms of all aspects of the environment, from ongoing operations to future developments. This will require continued cognisance of relevant environmental legislation: including EIA and SEA Directives, Habitats and Birds Directives, Water Framework Directive and other such instruments of Irish

legislation.

- Be aware of changes and developments in relevant policies and strategies, for example those arising from the outcome of the BOGLAND project, the EPAGMA Code of Best Practice and the IPS Strategy on Responsible Peatland Management.
- Develop a Bord na Móna policy on biodiversity.

These actions will require ongoing work including:

- Contribute updates on rehabilitation and biodiversity projects to Annual Environmental Reports on IPPC Licenses to the EPA.
- Provide input to any planning applications for developments within Bord na Móna bogs by contributing data and/or providing advice on best practice in terms of biodiversity management and conservation.
- Track developments in national and international policies relating to biodiversity and peatlands in general; interacting with relevant bodies and interest groups to share knowledge and contribute to policy development.
- Develop a biodiversity policy for Bord na Móna bogs to reflect these wider and relevant developments, and also to reflect the outcome of work completed to date and the biodiversity work programme 2010 to 2015.

The key indicators of success of these actions will be:

- Facilitation of ongoing core businesses and other proposed projects.
- Good design and planning of proposed developments for Bord na Móna bogs in terms of biodiversity.
- Awareness of relevant legislation and policy documents.
- Development of a Bord na Móna biodiversity policy.

Below:
Wetlands at Ballycon



4.2 Objective 2: To survey and identify potential biodiversity areas within Bord na Móna bogs

The Biodiversity Action Plan outlines the starting point from which Bord na Móna has operated in terms of its general approach to after-use and biodiversity management and conservation to date. The ecology survey is viewed as the core element from which future biodiversity management and conservation can be planned for the Bord na Móna bogs and will add to the knowledge base as to how the Bord na Móna bogs will develop in the short term and long term in terms of biodiversity. It will also inform how the Bord na Móna bogs can be connected by fringe areas and inter-connecting wildlife corridors.

Actions:

- Develop a Biodiversity Action Plan for Bord na Móna.
- Carry out a baseline ecology survey of all Bord na Móna bogs.
- Identify areas of biodiversity value within the Bord na Móna bogs based on species, habitats and other biodiversity features identified.
- Identify information gaps and support and develop surveys to update the knowledge base where required.
- Create a network of biodiversity areas that connect with other recognised areas of high biodiversity value outside of the Bord na Móna bogs.
- Identify core areas of high biodiversity value within Bord na Móna bogs and select representative areas to be managed primarily for biodiversity into the future.
- Monitor biodiversity areas identified.

These actions will require ongoing work including:

- Develop a Biodiversity Action Plan to outline past and current work in relation to biodiversity and outline the objectives and actions to further develop this aspect within Bord na Móna.
- Continue the baseline ecology survey initiated in 2009; all bog areas to be surveyed between 2010 and 2015.
- Develop habitat maps and survey reports detailing the baseline biodiversity starting point for each bog and potential for biodiversity enhancement.
- Use the information gathered in the ecology survey, carry out targeted ecology surveys in areas that require them; for example target bat, butterfly and other invertebrate surveys at potentially high-value sites.

- Continue to fund ongoing surveys such as the BirdWatch Ireland breeding wader 5-year monitoring survey at Boora and other annual surveys of Bord na Móna bog areas.
- Identify through survey and desktop studies areas where Bord na Móna bogs are adjacent to nature conservation designated areas and/or undesignated areas of high biodiversity value (such as Coillte Biodiversity Areas).
- Select and map core biodiversity value areas within Bord na Móna bogs (using GIS) and their relationship to established nature conservation designated areas such as SACs, SPAs and NHAs; highlight these areas and how they may be mutually enhanced.
- Target the monitoring of biodiversity areas to the specific value of each site as identified.

The key indicators of success of these actions will be:

- Publication of the Bord na Móna Biodiversity Action Plan (following consultation with relevant bodies and interest groups); to be launched and distributed in 2010.
- Completion of the baseline ecology survey for all bogs.
- Compilation of a comprehensive biodiversity knowledge base from which to plan for biodiversity management and conservation across the wider Bord na Móna bogs; this will include ecology reports and maps for each bog and a database of species recorded from Bord na Móna bogs. It will also include a predictive habitat map (long-term development) to be based on the biodiversity potential of each site.
- Establishment of a database and distribution maps of species of conservation interest on Bord na Móna bogs.
- Produce a map of potential biodiversity networks using GIS to link up Bord na Móna bogs with other high value biodiversity areas.
- Produce a zoning map of Bord na Móna bogs showing core areas of biodiversity interest with potential to be designated and managed for biodiversity in line with zoning for other potential after uses.
- Carry out long-term monitoring of habitats and species with biodiversity areas.

4.3 Objective 3: To promote and develop best practice in terms of rehabilitation plans for all Bord na Móna bogs to stabilise former peat production areas and enhance biodiversity

Actions:

- Develop rehabilitation plans for all bog areas.
- Implement rehabilitation plans (where peat production is phased out of an entire bog unit).
- Establish rehabilitation field trials to determine effective and efficient approaches to biodiversity enhancement on cutaway bogs.
- Establish breeding wader project at Drinagh with BirdWatch Ireland: target species Lapwing.
- Develop large-scale breeding wader action plan with BirdWatch Ireland for Boora bogs.
- Following from the outcome of the ecology survey, identify further potential research trials to enhance management of targeted species and habitats and pursue possible funding sources and project partners.
- Develop habitat and species management guidelines to be based on rehabilitation work carried out on Bord na Móna bogs.

These actions will require ongoing work including:

- Draw up rehabilitation plans for each Bord na Móna bog area; to be based on the outcome of the ecology baseline survey. Each plan will outline the starting point (baseline condition), set clear aims and objectives to stabilise and rehabilitate the area, necessary rehabilitation work based on best practice, timeframe for completion, and the outcome of consultations with statutory and other relevant bodies.
- Carry out rehabilitation work largely by Bord na Móna staff unless where contractors are required: for example, tree planting, clearing scrub etc.
- Establish rehabilitation trials on cutaway bog areas: work outlined in 2010 includes reed-bed establishment trial at Blackwater, West Offaly; Reed Canary Grass trial at Kilmacshane bog, East Galway; seed crops, and fertiliser trials on Drumman bog, East Offaly. This work will be carried out in 2010 and monitored to track changes in vegetation and impacts of management etc.
- Develop a management plan for breeding wader project at Drinagh Bog with BirdWatch Ireland; implement management and monitor effectiveness.
- Prepare and cost a project proposal for large-scale breeding wader action plan for Boora bogs; identify a project site; implement rehabilitation work and monitor effectiveness of work.
- Selection of other research trial sites and establishment of trials to determine effectiveness of other potential management options for rehabilitation; facilitation of potential funding sources such as EU LIFE and other research grants; communicate with potential project partners such as BirdWatch Ireland, Irish Peatland Conservation Council, Butterfly Conservation Ireland, National Parks and Wildlife Service, Fishery Boards, and second and third level education and research institutions.



Left:

David Fallon (Bord na Móna) on Kilmacshane bog, May 2010

Opposite:

Reed-bed at Garryduff bog

The key indicators of success of these actions will be:

- Acceptance of rehabilitation plans on submission to EPA and other consultees.
- Implementation and completion of rehabilitation plans where possible and monitoring programme established.
- Successful establishment and monitoring of all rehabilitation trial sites at Blackwater, Kilmacshane and Drumman.
- Successful establishment of breeding wader project at Drinagh and development of large-scale breeding wader action plan for the Boora bogs.
- Successful establishment of further research trials showcasing a range of rehabilitation and management options for species and habitat management/conservation within Bord na Móna bogs.
- Established projects and successful funding applications for a range of projects with relevant project partners.
- Habitat and species management guidelines for Bord na Móna bogs to be based on outcome of all rehabilitation trials and monitoring.



4.4 Objective 4: To raise awareness and create a greater appreciation of the biodiversity and natural heritage of Bord na Móna cutaway bogs and associated lands

Actions:

- Develop and promote a biodiversity awareness-raising campaign within Bord na Móna and to the wider public of the biodiversity value of the Bord na Móna bogs.
- Identify and promote accessible sites of nature conservation interest on Bord na Móna bogs.
- Promote increased participation in the conservation of our natural heritage by supporting community-led biodiversity projects such as the Abbeyleix Bog project and/or other walkways/amenity projects.
- Continue to consult with relevant bodies and interested parties on a regular basis to communicate updates in the biodiversity work programme and also to identify potential partnership projects within the Bord na Móna bog and adjacent lands.

These actions will require ongoing work including:

- Contribute biodiversity related articles to Bord na Móna media, such as the company magazine (Source) and the intranet; arrange biodiversity awareness days and training opportunities in the form of workshops for bog operatives and managers.
- Contribute articles to local and national media; participate and present in workshops and conferences relating to heritage, biodiversity and other areas of relevance.
- Circulate the Biodiversity Action Plan to all relevant bodies and interested parties; make an electronic copy available on-line.
- Develop a Bord na Móna biodiversity website with an overview of all projects carried out to date with information and details on access to sites.
- Develop fact sheets and best practice guidelines based on the biodiversity of the Bord na Móna bogs, but also with a view to the wider national biodiversity resource.
- Establish appropriate signage at selected biodiversity areas with information on biodiversity features, management and projects at each site.
- Interact with local communities and schools to identify potential local needs and projects in terms of amenity, education and/or biodiversity areas.

- Facilitate areas where people can access the Bord na Móna bogs and selected biodiversity areas, such as the Lough Boora Parklands and other walkways initiatives.
- Organise field trips and workshops for the public in conjunction with established Biodiversity and Heritage programmes.
- Interact with relevant bodies and interested parties: including Government Departments, National Parks and Wildlife Service, the National Biodiversity Data Centre, the Environmental Protection Agency, Fishery Boards, local County Councils, Coillte, the Irish Farmer's Association, the Heritage Council, BirdWatch Ireland, Irish Peatland Conservation Council, Butterfly Conservation Ireland, and other NGO's, local and national media, research and educational institutions (primary, secondary and third level) as well as the local landowners and communities that live in close proximity to the bogs.
- Continue to participate in Heritage fora organised by the Heritage Council and other biodiversity working groups for the counties within which Bord na Móna operates.
- Organise an annual seminar and/or workshop with a field trip to present updates on the Bord na Móna biodiversity work programme outlined in the Biodiversity Action plan to relevant bodies and interested parties.

The key indicators of success of these actions will be:

- Increased awareness of biodiversity within Bord na Móna and in the wider local and national community.
- Archive of biodiversity related articles submitted to all relevant media to be included on Bord na Móna biodiversity website.
- An established and mapped network of selected biodiversity areas and walking routes with signage and relevant printed information about Bord na Móna and biodiversity.
- Increased access and visits to selected Bord na Móna biodiversity areas.
- Biodiversity awareness projects established with local schools and communities and/or other interest groups.
- Ongoing consultation with relevant bodies and interested parties.

Opposite:

Members of the post-congress tour of the International Peat Congress 2008 at the Oweninny rehabilitated bog site, June 2008

4.5 Objective 5: To monitor the progress of the Bord na Móna Biodiversity Action Plan

The Biodiversity Action Plan is essentially a five year plan that will be updated in 2015. In terms of monitoring the outputs of the plan this will be carried out annually with a review and update of the Biodiversity Action Plan in the period 2014 to 2015.

Actions:

- Evaluate compliance by Bord na Móna with legislation and development of biodiversity policy.
- Evaluate outcome of actions relating to ecology baseline survey and other surveys.
- Evaluate outcome of actions relating to rehabilitation plans, trials and implementation of rehabilitation plans.
- Evaluate the outcome of actions relating to the awareness raising objective.

Measurement and monitoring of the progress of the Biodiversity Action Plan:

- Each action of the Bord na Móna Biodiversity Action Plan is underpinned by indicators of success and these will be used to measure the effectiveness of the work and indicate how new objectives and actions can be added to the next Biodiversity Action Plan(s).
- The key indicators of success outlined for each of the four objectives will be measured by answering a number of questions

- such as: Were each of the stated actions carried out? How were they carried out? What was the outcome? Has there been advancement in expertise in terms of knowledge base, management practice and effectiveness of work carried out? Is there an increased awareness of biodiversity in Bord na Móna? Is the biodiversity website being accessed by the public? Are people visiting the selected visitor access biodiversity areas?
- Refresh objectives and actions annually to reflect the increasing knowledge database and other trends in best practice and policy.
 - Provide annual updates to relevant bodies and interest groups by means of seminars and workshops.

The key indicators of success of these actions will be:

- A clear overview of the outcome of the Biodiversity Action Plan 2010-2015.
- An updated Biodiversity Action Plan for the period 2016-2020 with clear and measurable objectives building on the success of the Biodiversity Action Plan 2010-2015.
- A proven expertise in effectively carrying out rehabilitation work and managing Bord na Móna with best outputs for biodiversity.





Above:
Mute Swan and cygnets
at Lough Boora

Appendix I

List of Consulting Organisations

- An Taisce
- Bat Conservation Ireland
- BCI: Butterfly Conservation Ireland
- Bord na Móna
- BSBI: Botanical Society of the British Isles
- Burren Beo Trust
- BWI: BirdWatch Ireland
- Central Fishery Board
- Coillte
- EPA: Environmental Protection Agency
- Forest Service
- Golden Eagle Trust
- Heritage Council Biodiversity Officer and Local Heritage Officers
- IEEM: Institute of Ecology and Environmental Management
- IFA: Irish Farmers Association
- IMCG: International Mire Conservation Group
- IPCC: Irish Peatland Conservation Council
- IPS: International Peat Society
- Irish Grey Partridge Conservation Trust
- NBDC: National Biodiversity Data Centre
- NBG: National Botanic Gardens
- NPBR: Irish National Platform for Biodiversity Research
- NPWS: National Parks and Wildlife Service (Regional personnel and Scientific staff)
- UCD: University College Dublin
- WI: Waterways Ireland
- Woodlands of Ireland
- Individual Specialists

Appendix II – Glossary

Definitions relating to Bogs, Peat and Peatland Systems in Ireland

Bog is essentially a widely used term to describe peatlands, derived from the Irish word *bog* which literally means soft. All peatlands are generally referred to under the term bog in Ireland, with fens used for areas of mineral rich peatland. The term peatland is used more widely internationally and in this document the two terms are interwoven in use.

Peatland types in Ireland: There have been several different schemes proposed for the classification of peats and peatlands in Ireland. The accepted one is Hammond (1984), in which three types are described *fens*, *raised bogs* and *blanket bogs*. Blanket bogs can be further classified into two categories: Atlantic blanket bog, mountain blanket bogs. In general, bog is the most used term for any area of peatland

in Ireland.

Fens are formed in areas where there is constant flushing of base-rich ground water. They are described as *minerotrophic* (fed by ground water). Fen peats in Ireland have a relatively high pH ranging from 4.5 to 8.0. Fen peats are mineral-rich with a relatively high ash content (20%) and subject to a constant influx of nutrients in in-flowing water. In Ireland, most fens have been drained and cultivated for agricultural use, but there are some protected sites. The vegetation is generally species rich and largely dominated by tall herbs, rushes and grasses, with brown mosses a feature of the ground layer. There is a

notable absence of *Sphagnum* species. Fens are generally viewed as the precursor of bogs as vegetation succession and organic material may continue to build up in a fen, and the surface of the vegetation may become elevated above the influence of base-rich waters. The contrast between fen and bogs (*ombrotrophic* peatland: fed by precipitation only), is extreme and the distinction rests primarily on the water regime. Once the vegetation is elevated above the influence of base-rich waters, the vegetation is solely supplied by nutrient-poor water derived from the atmosphere. In the Irish Midlands, fen peat development was generally superseded by raised bog development. Ombrotrophic peat deposits also superseded fen peat development in wet depressions in Atlantic blanket bog.

Raised bogs are dome-shaped peat masses that once covered extensive areas in the Irish Midlands. Development of this bog type is dependent on the presence of *Sphagnum* species or peat mosses. The vegetation is dominated by these bryophytes, which keep the peat surface waterlogged as the peat moss grows above the water-table, while maintaining an acid environment that favours continued *Sphagnum* establishment. Ireland is home to some of the finest examples of raised bog in Europe: those remaining examples are recognised as being of national and international importance.

Blanket bogs have developed in Ireland in areas of high rainfall, covering entire landscapes. Peat develops due to a continuous supply of water from rainfall, maintaining waterlogged conditions on the ground. Blanket bogs are ombrotrophic or rain fed, and as a result their pH lies between 3.5 and 4.2. In Ireland the distribution of blanket bogs is confined to an area west of the 1,200mm isohyet, and all upland areas where precipitation is high and evaporation is low

Mountain blanket bogs have formed across mountain plateaux and gentle slopes (usually up to 15°, but on slopes of up to 25° in the extreme south-west in mountainous areas of counties Cork and Kerry).

Atlantic blanket bog has developed on lowland areas, occurring at altitudes below 200m. Rainfall in these areas exceeds evaporation and leads to the development of permanently waterlogged soils, and hence conditions that favoured the development of peat. The vegetation of blanket bogs is distinct from raised bogs, and mountain blanket bogs (White and Doyle 1982)

Peat: A sedentarily accumulated material comprising at least 30% (dry mass) of dead organic matter.

Peatland: An area with or without vegetation with a naturally accumulated peat layer at the surface.

Mire: A peatland where peat is currently being formed and accumulating.

Intact, natural or pristine peatland may be used to describe a spatially defined unit of peatland that has not been substantially altered by anthropic influences. In the context of a study or policy, more specific terms such as un-drained, undisturbed, unaltered vegetation, non-grazed, not influenced by atmospheric pollution etc. should be favored.

Wise use management is defined as “use for which reasonable people, now and in the future, will not attribute blame”, and this has been developed into a more tractable approach/ framework for achieving responsible management and use of peat and peatlands (Joosten and Clark 2002).

Definitions relating to Peatland Use and Management Practices

Source and authorities: IMCG and IPS Terminology Working Group (Working Definitions)

Responsible peatland management concept: Responsible peatland management balances economic, social and environmental considerations in such a way that reasonable people now and in the future will not attribute blame. It may operate at any scale, from global and regional to local. It encompasses the process of managing peatlands to achieve one or more clearly specified objectives of management with regard to the protection and production of long-term services and or desired peatland products without undue reduction of their inherent values and future productivity and without undue undesirable effects on the physical and social environment.

Peat production: the overall management or the processes and methods used to produce peat for commercial operations.

Cutaway bog: bog where most of the peat has been removed by industrial means and will often show part of exposed mineral soil. In Ireland, this generally refers to industrial peat production areas where the commercially viable peat has been removed – this can result in variable peat depths remaining.

Cutover bog: bog where deep depths of organic matters remains after partial extraction of the peat deposit. In Ireland, this essentially refers to areas that have been harvested for domestic turf production.

Ecosystem Restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed (www.ser.org/content/ecological_restoration_primer.asp).

Peatland restoration: the process of assisting the recovery of a peatland (bog or fen) that has been degraded, damaged or destroyed.

Peatland rehabilitation: The reparation of ecosystem processes, productivity and services of the former peatland (bog or fen), but does not imply the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure.

Peatland reclamation: management actions aiming at the stabilization of the peat substrate, at public safety, aesthetic improvement, and usually the conversion of the land to what, within the regional context, is

considered to be a useful purpose. For example the Lough Boora Parklands comprises areas reclaimed for agriculture and commercial forestry.

Peatland regeneration: spontaneous revegetation of abandoned peatlands without any active (man-made) restoration measure.

Peatland rewetting: Actions to restore the hydrological regime of a peatland; usually involving actions to slow down the outputs of water from the ecosystem. It is often part of management actions for the ecological restoration of a peatland.

General Biodiversity and Ecological Terms

Biodiversity refers to the diversity of all living things at genetic, species and ecosystem level

Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. It is an intentional activity that initiates or accelerates ecosystem recovery with respect to its health (functional processes), integrity (species composition and community structure), and sustainability (resistance to disturbance and resilience). Restoration ensures abiotic support from the physical environment, suitable flows and exchanges of organisms and materials with the surrounding landscape, and the reestablishment of cultural interactions upon which the integrity of some ecosystems depends. Restoration attempts to return an ecosystem to its historic trajectory, i.e., to a state that resembles a known prior state or to another state that could be expected to develop naturally within the bounds of the historic trajectory. The restored ecosystem may not necessarily recover its former state, since contemporary constraints and conditions can cause it to develop along an altered trajectory.

www.ser.org/content/guidelines_ecological_restoration.asp

Ecosystem refers to the combined physical and biological components of an environment. An ecosystem is generally an area within the natural environment in which physical (abiotic) factors of the environment, such as rocks and soil, function together along with interdependent (biotic) organisms, such as plants and animals, within the same habitat.

Ecosystem services are “fundamental life-support services upon which human civilization depends” and can be direct or indirect. Examples of direct ecosystem services are: pollination, wood, and erosion prevention. Indirect services could be considered climate moderation, nutrient cycles, and detoxifying natural substances. The services and goods an ecosystem provides are often undervalued as many of them are without market value. Broad examples include:

- regulating (climate, floods, nutrient balance, water filtration)

- provisioning (food, medicine, fur)
- cultural (science, spiritual, ceremonial, recreation, aesthetic)
- supporting (nutrient cycling, photosynthesis, soil formation).[11]

Green infrastructure (GI) is a term that can mean different things to different people and there are a number of definitions available. There is a significant amount of common ground within the available definitions, (a) that GI involves natural and managed green areas in both urban and rural settings (b) is about the strategic connection of open green areas and (c) that GI should provide multiple benefits for people. Stakeholders were asked to formulate a GI definition for use; the result was a robust and inclusive definition:

Green infrastructure is the physical environment within and between our cities, towns and villages. It is a network of multi-functional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources, and thus a green infrastructure approach also contributes towards sustainable resource management.

Source: www.greeninfrastructure.eu

Invasive species: Alien species are plants or animals that have been introduced, usually by people, outside their natural range. Alien species can sometimes become ‘invasive’ when they spread rapidly and out-compete the native flora and fauna, pushing out native species and/or leading to environmental degradation. Invasive species present one of the greatest threats to biodiversity world-wide. Invasive species can be particularly problematic in aquatic systems. They can have a negative impact on recreational and amenity use of waterways, as well as threatening native ecosystems

Natural capital is the extension of the economic notion of capital (manufactured means of production) to goods and services relating to the natural environment. Natural capital is thus the stock of natural ecosystems that yields a flow of valuable ecosystem goods or services into the future. For example, a stock of trees or fish provides a flow of new trees or fish, a flow which can be indefinitely sustainable. Natural capital may also provide services like recycling wastes or water catchment and erosion control. Since the flow of services from ecosystems requires that they function as whole systems, the structure and diversity of the system are important components of natural capital.

Restoration of natural capital (RNC) is any activity that invests in the replenishment of natural capital and thereby improves the flows of ecosystem (natural) goods and services, while enhancing the wellbeing of people. Source: www.rncalliance.org

Sustainable development concept: development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland Commission 1987). The term incorporates environmental, economic and social sustainability.

Nature Conservation Terms

The Natura 2000 Network is a network of important ecological sites across the European Union. It is comprised of areas known as Special Protection Areas (SPAs) and Special Areas of Conservation (SACs). The total land and freshwater area within the Natura network in Ireland is some 11,644km²: this includes some 2,300km² of designated marine areas. The designation of an area as a site in the Natura 2000 Network does not mean the limitation of activities within the site and surrounding area if these are environmentally sustainable and do not affect the integrity of the area or its habitats, or the objectives of species conservation.

Special Areas of Conservation – SACs

Special Areas of Conservation are prime wildlife conservation areas in the country, considered to be important on a European as well as Irish level. Most SACs are in the countryside, although a few sites reach into town or city landscapes, such as Dublin Bay and Cork Harbour. Special Areas of Conservation are selected according to the EU Habitats Directive (92/43/EEC). The directive lists certain habitats and species that must be protected. Irish habitats include raised bogs, active blanket bogs, turloughs, sand dunes, machair (flat sandy plains on the north and west coasts), heaths, lakes, rivers, woodlands, estuaries and sea inlets. The 25 Irish species which must be afforded protection include: Salmon, Otter, Freshwater Pearl Mussel, Bottle-nosed Dolphin and Killarney Fern. Some habitats are deemed “priority” and have greater requirements for designation of sites and protection. Ireland has contributed some 420 SACs to the Natura network. These sites have been adopted as Sites of Community Importance.

Special Protection Areas – SPAs

Because birds migrate long distances, it is not sufficient to protect them over just part of their range. A network of sites is required to protect wild birds at their breeding, feeding, roosting and wintering areas. The EU Birds Directive (79/409/EEC) addresses the conservation of all wild birds throughout the European Union, including marine areas,

and covers their protection, management, control and exploitation. It places a broad requirement on countries to take necessary measures to maintain the populations of all wild birds at levels determined by ecological, scientific and cultural needs. The Birds Directive requires designation of Special Protection Areas (SPAs) for:

- Listed rare and vulnerable species such as: Whooper Swan, Greenland White-fronted Goose, Peregrine Falcon, Corncrake and Terns.
- Regular occurring migratory species such as: Ducks, Geese and Waders.
- Wetlands, especially those of international importance, which attract large numbers of migratory birds each year. (Internationally important means that 1% of the population of a species uses the site, or more than 20,000 birds regularly use the site.)

Some of the listed species conveniently occur in high numbers and densities. However others, such as breeding Waders and Birds of Prey, occur at very low density where designation of sites is a more difficult, although necessary, exercise. To date, 132 SPAs have been designated. Approximately 25 SPAs are also designated SAC. The Irish SPAs join a total of around 3,000 sites across the European Union.

The basic designation for wildlife conservation in Ireland is the **Natural Heritage Area (NHA)**. In 1995, proposals for over 1,100 NHAs were published, but it was not until December 2000 that powers were introduced for the statutory process of their designation and protection. Many of these NHAs have overlapping designations of SAC and/or SPA, but there are currently 800 (approx.) proposed NHAs which are not SAC/SPA. These pNHAs cover an area of over 100,000 hectares. These will be reviewed, and other sites surveyed, during the course of the designation process. Some of the proposed NHAs (pNHAs) are tiny, such as a roosting place for rare bats. Others are large - a blanket bog or a lake, for example. The process of formal designation of NHAs commenced in December 2002. To date 148 raised and blanket bog sites have been designated. The Geological Survey of Ireland (GSI) is compiling a list of geological sites in need of protection through NHA designation.

Other Relevant Terms

IPS: The **International Peat Society** is an international, non-governmental and non-profit organization with approx. 1,300 members from 35 countries. It is dedicated to fostering the advancement, exchange and communication of scientific, technical and social knowledge and understanding for the wise use of peatlands and peat. Scientific, industrial and regulatory stakeholders of all areas related to peat and peatlands are represented in its Commissions, National Committees and other bodies. To achieve its goals, the IPS regularly organizes conferences, symposia and workshops, publishes findings from science and industry and serves in general as a forum to bring together experts from different fields of business, science, culture and regulatory bodies dealing with peat and peatlands.

www.peat-society.org

IMCG: The **International Mire Conservation Group** is an international network of specialists who

- internationally promote, encourage and, where appropriate, co-ordinate the conservation of mires and related ecosystems; and
- internationally enhance the exchange of information and experience relating to mires and factors affecting them.

The network encompasses a wide spectrum of expertise and interests, from research scientists to consultants, government agency specialists to peatland site managers. The network currently has over 400 contacts in almost 60 countries

www.imcg.net

EPAGMA: The **European Peat and Growing Media Association** aims to contribute to the socio-economic development of regions and communities where peat is sourced and used. EPAGMA is committed to high environmental practices in peat extraction, to the sustainable use of peat as a local energy source and to promoting the unique properties of peat as a substrate in horticultural plant production. EPAGMA represents the peat and growing media industry at a European level and acts as the interface of peat and growing media companies with regards to the EU institutions (European Commission, European Parliament and Council), and where appropriate, national governments and other stakeholders. EPAGMA currently has 17 member companies active in 10 European countries.

www.epagma.org

Integrated Pollution Prevention Control Licenses: The EPA has been licensing large-scale industrial and agriculture activities since

1994. Originally the licensing system was known as Integrated Pollution Control (IPC) licensing, governed by the Environmental Protection Agency Act, 1992. The Act was amended in 2003 by the Protection of the Environment Act, 2003 which gave effect to the Integrated Pollution Prevention Control (IPPC) Directive. Detailed procedures concerning the IPPC licensing process are set out in the EPA Acts 1992 to 2007 and the associated licensing regulations. IPPC licences aim to prevent or reduce emissions to air, water and land, reduce waste and use energy/resources efficiently. An IPPC licence is a single integrated licence which covers all emissions from the facility and its environmental management. All related operations that the licence holder carries in connection with the activity are controlled by this licence. Under Bord na Móna IPPC Licensing there are a number of conditions relating to emissions and environmental management. **Condition 10** of the Bord na Móna IPPC Licences relates to rehabilitation of the licensed peat production areas once peat production has ceased. Under Condition 10 a **rehabilitation plan** must be developed by Bord na Móna for all bog areas to ensure that the area is left in an environmentally stable condition following cessation of peat production.

The **BOGLAND** project is an EPA funded project whose aims are to review and synthesise current information on social, economic, environmental and institutional aspects of peatland utilisation and management. The project was initiated in 2005 and will develop a protocol for the development of a sustainable management of peatlands policy in Ireland. The results of the report are due to be published in 2010.

The **Native Woodland Scheme** provides financial support in the form of grant aid for landowners for either conservation and/or establishment of native woodland habitat. It also supports a wide range of other benefits and functions arising from native woodlands, relating to landscape, cultural heritage, wood and non-wood products and services, the practice of traditional woodland management techniques, environmental education, and carbon sequestration.

Sculpture in the Parklands is represented at Lough Boora Parklands. It comprises significant artworks, both permanent and temporary by Irish and international artists. The aims are to build an awareness of the arts within the community, educational institutions and business community through public participation and interaction

Appendix III – Policies and Legislation

Legislative Framework

European and National Legislation now protects many valuable remaining wild habitats through the designation of sites as proposed Natural Heritage Areas (NHAs), candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs).

One of the most important pieces of legislation governing nature conservation is the Wildlife Act, 1976, the Wildlife (Amendment) Act, 2000 and the European Union (Natural Habitats) Regulations, S.I. 94/1997 (which have been amended twice with S.I. 233/1998 & S.I. 378/2005). The Council's role as competent authority in the context of European sites is to ensure that development, when permitted, does not adversely affect the integrity of the site.

National Legislative

The Wildlife Act, 1976, as amended by the Wildlife (Amendment) Act, 2000.

This Act gives the Minister power to designate Natural Heritage Areas (NHAs). At present, most sites identified are yet to be formally designated so are proposed (pNHAs). These sites have special national significance for wildlife and habitats. Many of Ireland's wild mammals are protected and so are all bird species. The Wildlife Act also protects flora, by means of the Flora Protection Order 1999 (FPO) (SI No 94 of 1999). Sixty-nine species of vascular plants (flowering plants and ferns) and twenty-one species of lower plants (mosses, liverworts and algae) are protected currently. The Act forbids anyone from uprooting, cutting or damaging these plants or interfering with their habitats, except under licence from NPWS. The Act provides for the establishment of Nature Reserves, refuges for Fauna and Wildfowl Sanctuaries. The Act forbids the destruction of Hedgerows during the bird-nesting season from 1st March to 31st August each year. Nature Reserve (NR) status delivers the protection of flora and fauna. They are protected from damaging activities under the Wildlife Amendment Act 2000. There are 77 Nature Reserves in the country. Wildfowl Sanctuaries (VWS) were initially designated under the Game Preservation Act 1930, and now under the 1976 Wildlife Act to protect certain geese, ducks and waders from hunting. A total of 68 Wildfowl Sanctuaries have been designated.

European Communities (Natural habitats) Regulations, 1997 (S.I. No.94 of 1997)

This transposes the EU Habitats Directive (92/43/EEC) into Irish law and provides protection to designated sites from the time of notification to the landowner. It amends the 1963 Planning Act by requiring

Planning Authorities to request an 'appropriate assessment' of a development on a cSAC or SPA; disallows any justification for damaging a protected site other than for H&S reasons and these must be argued and documented; and includes lists of activities requiring Ministerial consent (Notifiable Actions) have been created for each protected habitat.

Other Relevant Irish Legislation

- The Local Government (Planning and Development Acts, 1963–2000).
- Planning and Development Act, 2000.
- The Heritage Act, 1995.
- Continental Shelf Act, 1968.
- Sustainable Development: A Strategy for Ireland, 1997.
- The National Development Plan 2000–2006.
- Local Authorities and Sustainable Development: Guidelines on Local Agenda 21.
- National Spatial Strategy, 2002.
- National Climate Change Strategy, 2000.

The full text of Irish legislation is available at:
www.irishstatutebook.ie and www.irlgov.ie.

European Directives

Habitats Directive

The European Union Directive 92/43/EEC of May 1992 on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive) aims to protect important habitats and rare or endangered species throughout the European Union. The Directive provides for the establishment of a coherent ecological network of protected areas across all EU member states, known together with sites designated under the Birds Directive as 'Natura 2000'. This is the EU's contribution to the Convention on Biodiversity that was ratified by Ireland in 1996. Special Areas of Conservation (SAC) are designated under the Habitats Directive. The designation process is ongoing and as such these sites are 'candidate' (cSACs) although their level of protection is the same as complete designation.

Habitats listed under Annex I the Directive are considered vulnerable in a European context or contribute significantly to the suite of habitats across Europe. These habitats are strictly protected. Annex II lists species that must be afforded protection. The Directive also lists species that Require Strict Protection under Annex IV. In this case the resting and breeding locations are also to be protected – bat roosts

and otter holts, for example. Annex V lists species whose taking in the wild must be subject to management measures.

Birds Directive

Under the European Union Directive 79/409/EEC of April 1979 on the conservation of wild birds, Ireland must protect particularly vulnerable species included in Annex I as well as all regularly occurring migratory species especially wetland species. Ireland is obliged to protect habitats of birds that are vulnerable due to climate change or that are vulnerable due to their small population size. Ireland must also include wetland considerations within land-use planning programmes. Special Protection Areas (SPAs) are designated to help achieve this. The cSACs and SPAs together constitute the 'Natura 2000' network of sites, contribution to a network across all of Europe.

Other Relevant European Legislation

- EU Water Framework Directive (Council Directive 2000/60/EC establishing a framework for Community Action in the field of water policy) 2000.
- EU Directive on Environmental Impacts (Council Directive 97/11/EC amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment) 1997.
- EU Directive on Public Access to Environmental Information (Council Directive 90/313/EEC on the freedom of access to information on the environment) 1990.
- Freshwater Fish Directive (Council Directive 78/659/EC)
- The Strategic Environmental Assessment Directive (SEA)
- Environmental Liabilities Directive (2004/35/EC)

European Plans and Strategies

- COM (2010) 4/4. Communication from the commission to the European parliament, the council, the European Economic and Social committee and the committee of the regions. Options for an EU vision and target for biodiversity beyond 2010. Source: (ec.europa.eu/environment/nature/biodiversity/policy/pdf/communication_2010_0004.pdf)
- European Biodiversity Strategy, 1998 (COM (98) 42 final).
- Biodiversity Action Plans in the areas of Conservation of Natural resources, Agriculture, Fisheries, and Development and Economic Co-operation, 2001 (COM(2001)162 final).
- The European Union Strategy for Sustainable Development, 2001 (COM(2001)264 final).
- The Sixth EU Environmental Action Programme, Our Future, Our choice, 2001 (COM(2001)31).

EU legislation is available at www.Europa.eu.int/eur-lex/en.

International Conventions and Agreements

- Convention on Biological Diversity 1992, Rio Earth Summit www.biodiv.org
- European Landscape Convention 2000 www.conventions.coe.int

- Convention on the Conservation of European Wildlife and Natural Habitats (Berne Convention) 1979 www.conventions.coe.int
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979 www.cms.int
- Convention on Wetlands of International Importance (Ramsar Convention) 1971 www.ramsar.org
The Ramsar list is a list of wetlands of international importance designated to promote the conservation and wise use of these wetlands for their water-birds. The Irish government signed up to this convention in 1971, it is a voluntary inter-governmental treaty.
- Convention on International Trade in Endangered Species (CITES) 1973 www.cites.org
- Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) 1992 www.ospar.org
- Agreement on the Conservation of Bats in Europe (Bonn Convention) 1993 www.eurobats.org/documents/agreement_text.htm
- International Convention for the Regulation of Whaling 1946 www.iwcoffice.org/commission/convention.htm
- Agreement in the Conservation of African-Eurasian Migratory Waterbirds (AEWA)(Bonn Convention) 1996 www.ramsar.org/speech/speech_quebec_medwet.htm
- International Timber Trade Agreement 1994, signed in 1996.
- Pan-European Biological and Landscape Diversity Strategy, endorsed 1995 www.strategyguide.org/fulltext.html
- The European Network of Biogenetic Reserves (1976) (contains representative examples of the natural habitats that are especially valuable for nature conservation in Europe)
- The Man and Biosphere Reserve Programme (MAB) of UNESCO (United Nations Educational, Scientific and Cultural Organisation) aims to develop a basis for the rational use and conservation of resources and the biosphere. Killarney National Park and North Bull Island in Dublin are the only two in Ireland. Their purpose is to combine conservation, education, scientific research, monitoring and to involve the local community.
- IBA: The Important Bird Area programme of Bird-Life International is a worldwide initiative aimed at identifying and protecting a network of crucial sites important for birds. There are 156 IBAs in Ireland, 122 of which regularly support wintering water-birds.
- Pan-European Biological and Landscape Diversity Strategy, 1995.
- United Nations Framework Convention on Climate Change, 1992.

Local Plans and Policies

Local authorities in Ireland have a central role in protecting the environment and biodiversity through forward planning and development control to ensure sustainable development. In order for Local Authorities to fulfill their obligations and responsibilities in relation to the environment and biodiversity, it is important that there are policies in the Development plan to ensure appropriate levels of protection of the natural heritage. The County Development Plans include several policies that relate to the conservation of natural heritage, generally detailed in County Heritage Plans and County Biodiversity Plans.

Appendix IV – Habitats Recorded from Bord na Móna Sites

Bord na Móna habitat classification scheme with reference to Heritage Council codes.

HABITATS OF INDUSTRIAL CUTAWAY	General	Habitat ¹	BnM Habitat Code	Equivalent Heritage Council Codes ²
	Peatland	Bare peat (0-50% cover)	BP	ED2
		Embryonic bog community (containing Sphagnum and Bog Cotton)	PBa	PB
		Embryonic bog community (Calluno-Sphagnion)	PBb	PB
	Flush and Fen	Pioneer Campylopus-dominated community	pCamp	PF2
		Pioneer Juncus effusus-dominated community (Soft Rush)	pJeff	PF2
		Pioneer Eriophorum angustifolium-dominated community (Bog Cotton)	pEang	PF2
		Pioneer Juncus bulbosus-dominated community (Bulbous Rush)	pJbulb	PF2
		Pioneer Triglochin palustris-dominated community (Marsh Arrowgrass)	pTrig	PF2
		Pioneer Caricion davallianae-Community with Cladium (rich fen)	pCladium	PF1
	Emergent communities	Pioneer Carex rostrata-dominated community (Bottle Sedge)	pRos	FS1
		Pioneer Phragmites australis-dominated community (Common Reed)	pPhrag	FS1
		Pioneer Typha latifolia-dominated community (Reedmace)	pTyp	FS1
		Pioneer Schoenoplectus lacustris-dominated community (Bulrush)	pSch	FS1
	Open water	Charaphyte-dominated community	pChar	FL2
		Permanent pools and lakes	OW	FL2
		Temporary open water	tOW	
	Woodland and scrub	Emergent Betula/Salix-dominated community (A) (Birch/Willow)	eBir	WS1
		Open Betula/Salix-dominated community (B) (Birch/Willow)	oBir	WS1
		Closed Betula/Salix scrub community (C) (Birch/Willow)	cBir	WS1
		Ulex europaeus-dominated community (Gorse)	eGor	WS1
		Betula/Salix-dominated woodland (Birch/Willow)	BirWD	WN7
	Heathland	Pioneer dry Calluna vulgaris-dominated community (Heather)	dHeath	HH1
		Dense Pteridium aquilinum (Bracken)	dPter	HD1
	Grassland	Pioneer dry calcareous and neutral grassland (Centaureo-Cynosuretum) Dactylis-Anthoxanthum-dominated community (Cocksfoot-Sweet Vernalgrass)	gCal	GS1
		Anthoxanthum-Holcus-Equisetum community (Sweet Vernalgrass-Yorkshire Fog-Horsetail)	gCo-An	GS2
		Molinia caerulea-dominated community (dry) (Purple Moorgrass)	gAn-H-Eq	GS
		Marsh (Meadowsweet and other tall herbs) (Filipendulion ulmariae)	gMol	GS4
			Mar	GM1
	Disturbed	Tussilago farfara-dominated community (vegetation > 50%) (Colt's Foot)	DisCF	ED3
		Epilobium-dominated community (vegetation > 50%) (Willowherb spp.)	DisWil	ED3
	General	Riparian areas (streams or drain with associated edge habitats (e.g. FW2/4 + WS1, GS2 etc)	Rip	FW2 +
		Silt Ponds (artificial ponds with associated bank habitats (e.g. FL8 + WS1, GS2, ED2, ED3)	Silt	FL8 +
		Access (tracks or railways with associated edge habitats (e.g. BL3 + gCal, gMol, eGor etc)	Acc	BL3 +
		Works areas (predominately built land but can include landscaped and brownfield habitats (e.g. GA2, WS3, WD4, ED2, ED3)	Works	BL3 +

¹ These are generally pioneer habitats, some habitats are more developed than others, frequently occurring in mosaic with each other.

² Not all these communities are equivalent to habitat classes used by The Heritage Council habitat classification scheme (Fossitt 2000) as some are rudimentary.

Heritage Council Habitat Classification Scheme (Fossitt 2000)

		General	Habitat	Heritage Council Code
SEMI-NATURAL AND MODIFIED HABITATS	Peatlands		Raised Bog	PB1
			Lowland Blanket bog	PB3
			Cutover Bog	PB4
			Rich fen and flush	PF1
			Poor fen and flush	PF2
			Transition mire and quaking bog	PF3
	Woodland and scrub		Oak-Birch-Holly woodland	WN1
			Oak-Ash-Hazel woodland	WN2
			Wet Pendunculate Oak-Ash woodland	WN4
			Riparian Woodland	WN5
			Wet Willow-Alder-Ash woodland	WN6
			Bog woodland	WN7
			Mixed broad-leaved woodland	WD1
			Mixed broad-leaved/conifer woodland	WD2
			Conifer plantation	WD4
			Scrub (Gorse)	WS1
			Emergent Betula-dominated community	WS1
			Closed Betula scrub community	WS1
			Recently-planted woodland	WS2
			Ornamental scrub	WS3
			Short-rotation coppice	WS4
			Recently-felled woodland	WS5
	Linear woodland		Hedgerow	WL1
			Treeline	WL2
	Grasslands and Marsh		Improved grassland	GA1
			Amenity grassland	GA2
			Dry calcareous and neutral grsld	GS1
			Dry meadows and grassy verges	GS2
			Dry-humid acid grassland	GS3
			Wet grassland	GS4
	Heath and Bracken		Freshwater Marsh	GM1
			Dry Heath	HH1
			Dry calcareous Heath	HH2
			Wet Heath	HH3
	Disturbed ground		Dense Bracken	HD1
			Exposed sand, gravel or till	ED1
			Spoil and bare ground	ED2
			Recolonising bare ground	ED3
	Freshwater		Active quarry	ED4
			Acid Oligotrophic lakes	FL2
			Mesotrophic lakes	FW4
			Artificial ponds (slit ponds)	FL8
			Depositing rivers	FW2
			Canals	FW3
	Cultivated and Built land		Drain	FW4
			Stonewalls and other stonework	BL1
			Earth Banks	BL2
			Buildings and artificial surfaces	BL3
			Arable crops	BC1
			Horticulture	BC2
			Tilled land	BC3

Appendix V – Habitats and Species of Nature Conservation Value Recorded from Bord na Móna Sites

Table 1. List of EU Habitats Directive Annex I habitats that have been recorded on Bord na Móna bogs. Most habitats are found in cSACs/pNHAs already recognised for their conservation value and have already been listed as qualifying interests for these conservation sites (part owned by Bord na Móna)

Habitat	Fossitt Code	National	International	Examples
* Active Raised bogs (7110)	PB1	ECHR	EU HD Annex I	Clera Island Bog in Co. Roscommon (Clonboley Group); Townparks Bog (Daingean Bog NHA).
Degraded raised bogs still capable of regeneration (7120)	PB1	ECHR	EU HD Annex I	Clera Island bog in Co. Roscommon (Clonboley Group); Killamuck Bog (Abbeyleix Bog), Co. Laois.
Blanket Bog (*if active bog) (7130)	PB3	ECHR	EU HD Annex I	O'Boyle's Bog (Co. Mayo)
Depressions of the peat substrates of the Rhynchosporion (7150)	PB1	ECHR	EU HD Annex I	Several sites within bog remnants to margins of production areas.
* Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae (7210)	PF1	ECHR	EU HD Annex I	Overlap with Fin Lough cSAC (Co. Offaly)
* Alkaline fens (7230)	PF1	ECHR	EU HD Annex I	Overlap with Fin Lough cSAC (Co. Offaly); some regeneration at Lullymore Bog, Co. Kildare
Transition mires and quaking bogs (7140)	PF3	ECHR	EU HD Annex I	Cranberry Lough bog (Cranberry Lough pNHA, Co. Roscommon)
* Bog woodland (91D0)	WN7	ECHR	EU HD Annex I	Clera Island Bog in Co. Roscommon (Clonboley Group)
* Petrifying springs with tufa formation (Cratoneurion) (7220)	FP1	ECHR	EU HD Annex I	Derryarogue Island in Co. Roscommon (Mountdillon Works)
Atlantic salt meadows (Glauco-Puccinellietalia) (1330)	CM1/CM2	ECHR	EU HD Annex I	Margins of Bangor-Ballycroy (Tullaghan Bay NHA, Co. Mayo)
Mediterranean salt meadows (Juncetalia maritimi) (1410)	CM2/CM2	ECHR	EU HD Annex I	Margins of Bangor-Ballycroy (Tullaghan Bay NHA, Co. Mayo)
Semi-natural dry grasslands and scrublandfacies on calcareous substrates (Festuco-Brometea) (*important orchid sites) (6210)	GS1	ECHR	EU HD Annex I	Likely to be present at Derryarogue Island in Co. Roscommon (Mountdillon Works)
* Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-padion, Alnion incanae, Salicion albae) (91E0)	WN4	ECHR	EU HD Annex I	Potential to be present on some riparian zones (not recorded yet)
European dry heaths (4030)	HH1	ECHR	EU HD Annex I	Present on some bog remnants

* Priority habitat - habitat types in danger of disappearance and whose natural range mainly falls within the territory of the European Union (Commission of the European Communities 2003)

Table 2. List of EU Habitats Directive Annex II species that have been found on Bord na Móna bogs to date.

Species	National	International	Details
Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>) ¹	ECHR, RDB (LC) & WA	EU HD Annex IV & Bern (II)	Large bat roost at Bord na Móna works, Boora, (Co. Offaly). Activity noted at other locations
Common Pipistrelle (<i>Pipistrellus pipistrellus</i>)	ECHR, RDB (LC) & WA	EU HD Annex IV & Bern (II)	Activity noted around Bord na Móna property (Co. Offaly)
Leislars Bat (<i>Nyctalus noctula</i>)	ECHR, RDB (NT) & WA	EU HD Annex IV & Bern (II)	Activity noted around Bord na Móna property (Co. Offaly)
Otter (<i>Lutra lutra</i>)	ECHR, RDB (NT) & WA	EU HD, Annexes II, IV & Bern (II)	Frequently seen within Lough Boora Parklands. Signs recorded at several other sites, including Lullymore, Lullybeg and Mayo bogs.
Pine Marten (<i>Martes martes</i>)	ECHR, RDB (LC) & WA	EU HD, Annexes II, IV & Bern (II)	Signs recorded at most sites
Irish Hare (<i>Lepus timidus hibernicus</i>)	ECHR, SAP, RDB (LC) & WA.	EU HB, Annex V & Bern (II)	Frequent user of cutaway and production bog. Regularly seen.
Red Squirrel (<i>Sciurus vulgaris</i>)	RDB (NT) & WA	Bern (III)	Recorded at one site in east Co. Galway. (Signs of squirrel recorded in other woodlands around the fringes of other bogs in east Co. Galway – potentially Red Squirrel)
Hedgehog (<i>Erinaceus europaeus</i>)	RDB (LC) & WA	Bern (II)	Unconfirmed. (Likely to be regular user of the cutaway and production bog)
Badger (<i>Meles meles</i>)	RDB (LC) & WA	Bern (III)	Frequent user of cutaway and production bog. Signs regularly recorded.
Amphibians and Reptiles			
Common Frog (<i>Rana temporaria</i>)	RDB (II) and WA	EU HD, Annex V & Bern (II)	Frequent user of cutaway bog. Regularly recorded.
Common Newt (<i>Triturus vulgaris</i>)	RDB, WA		Recorded at Lough Boora Parklands (Turraun), Lullymore/Lullybeg
Viviparous Lizard (<i>Lacerta vivipara</i>)	RDB, WA		Recorded at Lough Boora Parklands and Mayo bogs
Invertebrates			
Marsh Fritillary (<i>Euphydryas aurinia</i>)	EU HD, Annex I		Butterfly species is using part of Lullybeg (Co. Kildare). Site managed by Butterfly Conservation Ireland. Doire Bhile Wetland, Co. Tipperary.
Plants			
Basil thyme (<i>Acinos arvensis</i>)	FPO RDB (VU)		Plant of eskers in midlands. Found at the Long Derries cSAC, Co. Offaly
Blue Fleabane (<i>Erigeron acer</i>)	RDB (VU)		Plant of eskers in midlands. Recently recorded on disturbed glacial till and along railway embankments at cutaway bog sites in Co. Offaly
Marsh Saxifrage (<i>Saxifraga hirculus</i>)	FPO RDB (EN)		Plant of wet bogs in west of Ireland. Recorded at Bellacorick Iron Flush (site owned by An Taisce)
Bryophytes			
			To be updated as ecology survey proceeds

¹ Likely to be other bat species using Bord na Móna bogs (such as Daubenton's Bat – *Myotis daubentonii*) and potentially using other Bord na Móna buildings but these have not been confirmed yet

Table 3. List of Bird species that have been recorded on Bord na Móna bogs to date.

Common Name	Latin Name	Breeding ¹	Wintering	EU BR Annex I	BoCCI	Notes ²
Mute Swan	<i>Cygnus olor</i>	Y	Y		Amber	Recorded
Bewick's Swan	<i>Cygnus columbianus</i>		Y	Y	Red	Recorded
Whooper Swan	<i>Cygnus cygnus</i>		Y	Y	Amber	Internationally and nationally important numbers occasionally counted on Blackwater bogs (Galway/Offaly) and in Boora Parklands and associated bogs such as Lullymore and Ballycon (Offaly)
Pink-footed Goose	<i>Anser brachyrhynchus</i>		Y			Recorded
Greenland White-fronted Goose	<i>Anser albifrons flavirostris</i>		Y	Y	Amber	Recorded
Greylag Goose	<i>Anser anser</i>	Y	Y		Amber	Recorded
Canada Goose	<i>Branta canadensis</i>		Y			Recorded
Barnacle Goose	<i>Branta leucopsis</i>		Y	Y	Amber	Recorded
Wigeon	<i>Anas penelope</i>		Y		Amber	Recorded
Gadwall	<i>Anas strepera</i>		Y		Amber	Recorded
Teal	<i>Anas crecca</i>	Y	Y		Amber	Nationally important wintering numbers have been counted at Blackwater, Co. Offaly ³
Green-winged Teal	<i>Anas crecca carolinensis</i>					Vagrant – one Blackwater record
Mallard	<i>Anas platyrhynchos</i>	Y	Y			Nationally important wintering numbers occasionally recorded at Boora Parklands, Co. Offaly ³ . Breeding confirmed (2009) ⁴
Pintail	<i>Anas acuta</i>		Y		Red	Nationally important wintering numbers have been counted at Blackwater, Co. Offaly ³
Garganey	<i>Anas querquedula</i>				Amber	Rare passage migrant
Shoveler	<i>Anas clypeata</i>	S	Y		Red	Recorded
Pochard	<i>Aythya ferina</i>		Y		Amber	Recorded
Tufted Duck	<i>Aythya fuligula</i>	Y	Y		Amber	Breeding suspected (2009) ⁴
Scaup	<i>Aythya marila</i>		Y		Amber	Recorded
Goldeneye	<i>Bucephala clangula</i>		Y		Amber	Recorded
Smew	<i>Mergus albellus</i>			Y		Vagrant – one Leabeg record
Red-breasted Merganser	<i>Mergus serrator</i>					Recorded
Red Grouse	<i>Lagopus lagopus hibernicus</i>	Y			Red	Recorded
Grey Partridge	<i>Perdix perdix</i>	Y			Red	Recorded
Quail	<i>Coturnix coturnix</i>	S			Red	Recorded
Pheasant	<i>Phasianus colchicus</i>	Y				Recorded

Common Name	Latin Name	Breeding ¹	Wintering	EU BR Annex I	BoCCI	Notes ²
Great Northern Diver	<i>Gavia immer</i>					Recorded
Red-throated Diver	<i>Gavia stellata</i>				Red	Recorded
Cormorant	<i>Phalacrocorax carbo</i>	Y	Y		Amber	Recorded
Little Egret	<i>Egretta garzetta</i>		Y			Recorded
Grey Heron	<i>Ardea cinerea</i>	Y	Y			Resident breeder ⁴
Little Grebe	<i>Tachybaptus ruficollis</i>	Y	Y		Amber	Nationally important numbers occasionally recorded at Boora Parklands, Co. Offaly. Breeding confirmed (2009) ^{4 5}
Great Crested Grebe	<i>Podiceps cristatus</i>	Y	Y		Amber	Resident breeder ⁴
Marsh Harrier	<i>Circus aeruginosus</i>		Y	Y		Scarce passage migrant. Several birds have over-wintered at Boora Parklands in the past 10 years ⁶
Hen Harrier	<i>Circus cyaneus</i>	Y	Y	Y	Amber	Occasionally recorded on cutaway. Some birds probably winter on cutaway sites such as Lullymore (Co. Offaly). Breeding confirmed in Co. Mayo.
Sparrowhawk	<i>Accipiter nisus</i>	Y				Recorded
Buzzard	<i>Buteo buteo</i>	S				Recorded
Osprey	<i>Pandion haliaetus</i>			Y		Rare passage migrant
Kestrel	<i>Falco tinnunculus</i>	Y			Amber	Frequently recorded hunting over cutaway
Merlin	<i>Falco columbarius</i>	S		Y	Amber	Recorded from Lullymore; breeding in some sites suspected ⁴
Peregrine Falcon	<i>Falco peregrinus</i>	S		Y		Breeding suspected ⁴
Water Rail	<i>Rallus aquaticus</i>	Y	Y		Amber	Breeding confirmed (2009) ⁴
Moorhen	<i>Gallinula chloropus</i>	Y	Y			Breeding confirmed (2009) ⁴
Coot	<i>Fulica atra</i>	Y	Y		Amber	Recorded
Common Crane	<i>Grus grus</i>			Y		Vagrant – recorded at Leabeg and Ballycon
Oystercatcher	<i>Haematopus ostralegus</i>		Y		Amber	Recorded
Ringed Plover	<i>Charadrius hiaticula</i>	Y	Y		Amber	Breeding confirmed (2009) ^{4 5}
Golden Plover	<i>Pluvialis apricaria</i>	S	Y	Y (breeding)	Red	Nationally important wintering numbers occasionally recorded at Boora Parklands, Co. Offaly ³
American Golden Plover	<i>Pluvialis dominica</i>					Vagrant – one Blackwater record
Grey Plover	<i>Pluvialis squatarola</i>		Y		Amber	Recorded
Lapwing	<i>Vanellus vanellus</i>	Y	Y		Red	Nationally important wintering numbers occasionally recorded at Boora Parklands, Co. Offaly ³ . Also recorded at Lullymore

Common Name	Latin Name	Breeding ¹	Wintering	EU BR Annex I	BoCCI	Notes ²
						(breeding). Breeding confirmed in Offaly (2009) ⁴ .
Knot	<i>Calidris canutus</i>				Red	Scarce passage
Sanderling	<i>Calidris alba</i>					Scarce passage migrant
Little Stint	<i>Calidris minuta</i>					Scarce passage migrant
Temminck's Stint	<i>Calidris ferruginea</i>					Vagrant – one Turraun record
Dunlin	<i>Calidris alpina</i>	S	Y	Y	Amber	Recorded (Breeding)
Ruff	<i>Philomachus pugnax</i>		Y	Y	Amber	Recorded
Jack Snipe	<i>Lymnocyrtus minimus</i>		Y			Recorded
Snipe	<i>Gallinago gallinago</i>	Y	Y		Amber	Breeding confirmed (2009) ⁴
Woodcock	<i>Scolopax rusticola</i>	S	Y		Amber	Recorded
Black-tailed Godwit	<i>Limosa limosa</i>		Y	Y	Amber	Recorded
Whimbrel	<i>Numenius phaeopus</i>					Passage migrant
Curlew	<i>Numenius arquata</i>	S	Y		Red	Recorded
Common Sandpiper	<i>Actitis hypoleucos</i>	S	Y		Amber	Breeding suspected (2009) ⁴
Green Sandpiper	<i>Tringa ochropus</i>		Y			Recorded ⁶
Spotted Redshank	<i>Tringa erythropus</i>		Y			Recorded
Greenshank	<i>Tringa nebularia</i>		Y		Amber	Recorded
Redshank	<i>Tringa totanus</i>	Y	Y		Red	Breeding confirmed (2009) ⁴
Red-necked Phalarope	<i>Phalaropus lobatus</i>			Y	Red	Vagrant – recent annual records ^{4 6}
Grey Phalarope	<i>Phalaropus fulicarius</i>					Vagrant – one Derries record
Black-headed Gull	<i>Larus ridibundus</i>	Y	Y		Red	Breeding confirmed (2009) ⁴
Common Gull	<i>Larus canus</i>	Y	Y		Amber	Breeding confirmed (2009) ⁵
Lesser Black-backed Gull	<i>Larus fuscus</i>		Y		Amber	Recorded
Herring Gull	<i>Larus argentatus</i>		Y		Red	Recorded
Great Black-backed Gull	<i>Larus marinus</i>		Y		Amber	Recorded
Kittiwake	<i>Rissa tridactyla</i>				Amber	Recorded
Common Tern	<i>Sterna hirundo</i>				Amber	Recorded
Stock Dove	<i>Columba oenas</i>		Y		Amber	Recorded
Wood Pigeon	<i>Columba palumbus</i>	Y				Recorded
Collared Dove	<i>Streptopelia decaocto</i>					Recorded
Cuckoo	<i>Cuculus canorus</i>	S				Breeding suspected (2009) ⁴
Barn Owl	<i>Tyto alba</i>	Y			Red	Recorded
Snowy Owl	<i>Bubo scandiacus</i>					Vagrant – one Clonbonny record
Long-eared Owl	<i>Asio otus</i>	S				Recorded
Short-eared Owl	<i>Asio flammeus</i>		Y	Y	Red	Recorded ⁶
Swift	<i>Apus apus</i>					Recorded

Common Name	Latin Name	Breeding ¹	Wintering	EU BR Annex I	BoCCI	Notes ²
Kingfisher	<i>Alcedo atthis</i>	S	Y	Y	Amber	Occasionally recorded on cutaway sites (Turraun, Ballycon, Lullymore in Co. Offaly, Drumman & Milkernagh, Co. Westmeath)
Magpie	<i>Pica pica</i>	Y				Recorded
Jay	<i>Garrulus glandarius</i>	Y				Recorded
Jackdaw	<i>Corvus monedula</i>	Y				Recorded
Rook	<i>Corvus frugilegus</i>	Y				Recorded
Hooded Crow	<i>Corvus corone cornix</i>	Y				Recorded
Raven	<i>Corvus corax</i>	Y				Recorded
Goldcrest	<i>Regulus regulus</i>	Y				Recorded
Blue Tit	<i>Parus caeruleus</i>	Y				Recorded
Great Tit	<i>Parus major</i>	Y				Recorded
Coal Tit	<i>Parus ater</i>	Y				Recorded
Skylark	<i>Alauda arvensis</i>	Y	Y		Amber	Breeding confirmed (2009) ⁴
Sand Martin	<i>Riparia riparia</i>	S			Amber	Recorded
Swallow	<i>Hirundo rustica</i>	Y			Amber	Breeding confirmed (2009) ⁵
House Martin	<i>Delichon urbica</i>	Y			Amber	Recorded
Long-tailed Tit	<i>Aegithalos caudatus</i>	Y				Recorded
Chiffchaff	<i>Phylloscopus collybita</i>	Y	Y			Recorded
Willow Warbler	<i>Phylloscopus trochilus</i>	Y				Recorded
Blackcap	<i>Sylvia atricapilla</i>	Y	Y			Recorded
Whitethroat	<i>Sylvia communis</i>	Y				Recorded
Grasshopper Warbler	<i>Locustella naevia</i>	Y			Amber	Breeding confirmed (2009) ⁴
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	Y				Recorded
Treecreeper	<i>Certhia familiaris</i>	Y				Recorded ⁶
Wren	<i>Troglodytes troglodytes</i>	Y				Breeding confirmed (2009) ⁵
Starling	<i>Sturnus vulgaris</i>	Y	Y		Amber	Recorded
Blackbird	<i>Turdus merula</i>	Y				Recorded
Fieldfare	<i>Turdus pilaris</i>		Y			Recorded
Song Thrush	<i>Turdus philomelos</i>	Y				Recorded
Redwing	<i>Turdus iliacus</i>		Y			Recorded
Mistle Thrush	<i>Turdus viscivorus</i>	Y				Recorded
Spotted Flycatcher	<i>Muscicapa striata</i>	Y				Recorded
Robin	<i>Erithacus rubecula</i>	Y				Breeding confirmed (2009) ⁵
Stonechat	<i>Saxicola torquata</i>	Y	Y			Breeding confirmed (2009) ⁵
Wheatear	<i>Oenanthe oenanthe</i>	S			Amber	Breeding suspected (2009) ⁴

Common Name	Latin Name	Breeding ¹	Wintering	EU BR		Notes ²
				Annex I	BoCCI	
Duncock	<i>Prunella modularis</i>	Y				Recorded
House Sparrow	<i>Passer domesticus</i>	Y			Amber	Recorded
Grey Wagtail	<i>Motacilla cinerea</i>	Y				Recorded
Pied Wagtail	<i>Motacilla alba</i>	Y				Recorded
Meadow Pipit	<i>Anthus pratensis</i>	Y				Breeding confirmed (2009) 5
Chaffinch	<i>Fringilla coelebs</i>	Y	Y			Recorded
Brambling	<i>Fringilla montifringilla</i>		Y			Recorded
Greenfinch	<i>Carduelis chloris</i>	Y				Recorded
Goldfinch	<i>Carduelis chloris</i>	Y				Recorded
Linnet	<i>Carduelis cannabina</i>	Y			Amber	Recorded
Redpoll	<i>Carduelis flammea</i>	Y				Recorded
Crossbill	<i>Loxia curvirostra</i>	Y	Y			Recorded
Bullfinch	<i>Pyrrhula pyrrhula</i>	Y				Recorded
Yellowhammer	<i>Emberiza citrinella</i>	Y			Red	Recorded 6
Reed Bunting	<i>Emberiza schoeniclus</i>	Y				Breeding confirmed (2009) 5

¹ Y indicates breeding confirmed, S indicates breeding probable.

² List compiled using records from Crowe (2005), Copland (2010a,b), Heery (2009) and internal Bord na Móna records. List likely to expand in future as more records are accumulated.

³ Data from Crowe (2005).

⁴ Data from Copland (2010a).

⁵ Data from Copland (2010b) (Mayo).

⁶ Data from Heery (2009).

Abbreviations and definitions to Appendix V

Bern: Convention on the conservation of European wildlife and natural habitats 1979

Biog: European network of Biogenetic reserves (1973)

BoCCI: Birds of Conservation Concern Ireland (Red, Amber and Green lists)

Bonn: Convention on the conservation of migratory species and wild animals 1979

CA: Conservation Area as defined in the Dublin City Development Plan

cSAC: Candidate Special Area of Conservation. Habitat listed on Annex I of the EU Habitats Directive and afforded European legal protection. Same protection as non-candidate.

dSAP: Draft Species Action Plan. Written by DoEHLG for only a few species nationally. Not yet published.

ECHR: European Communities (Natural Habitats) Regulations, 1997. Transpose the EU Habitats Directive into Irish law.

EU BD: European Union Directive 79/409/EEC on the conservation of wild birds. Commonly called the Birds Directive. Areas with species listed on Annex 1 that occur in internationally important numbers are legally protected. These areas designated for birds under the EU BD are called Special Protection Areas (SPAs).

EU HD: European Union Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna. Commonly called the Habitats Directive. Areas with habitats listed on Annex I (that exist to required specifications) or fauna listed on Annex II (at internationally important numbers) are legally protected and called candidate Special Areas of Conservation (cSAC). Flora listed on Annex I are individually protected. Species listed under Annex IV of the EU HD are afforded strict protection. Species listed under Annex III are to be managed whereby their disturbance is only under licence with specified conditions.

FFD: Freshwater Fish Directive (78/659/EC)

FPO – Flora Protection Order. The Act forbids anyone from uprooting, cutting or damaging these plants or interfering with their habitats, except under licence from NPWS.

IBA: Important Bird Area. This is a site listed by BirdLife International (of which BirdWatch Ireland is affiliated).

I: Indeterminate category in Red Data Book

II: Internationally Important category in Red Data Book

NBP: National Biodiversity Plan (2002). Written by DoEHLG under Convention on Biodiversity requirements. Sets out national objectives and specifies targets for IAs.

NR: Nature Reserve. Special protection given to species that occur in this area.

pNHA: Proposed Natural Heritage Area. Given legal status under The Wildlife Act, 1976 due to national importance of habitat/species in that area.

R: Ramsar site designated under the Ramsar Convention on wetlands (1971 as amended). Ramsar sites are wetlands of international importance.

RDB: Red Data Book. Compiled using strict criteria of International Union for Conservation of Nature. Lists species of conservation concern and gives defined status to each depending on status in the country e.g. Rare, Vulnerable, Endangered, Nearly Extinct, etc. In Ireland there are RDBs for vertebrates, vascular plants and bees.

RDB (LC): Least Concern. (Marnell et al. 2009)

RDB (NT): Near Threatened. (Marnell et al. 2009)

RDB (EN): Endangered (Curtis and McGough 1988).

RDB (VU): Vulnerable (Curtis & McGough 1988).

SAP: Species Action Plan. Written by DoEHLG for only a few species nationally. Not yet published.

SPA: Special Protection Area. Legally protected area for birds. See definition under EU HD above.

SWR: EC (Quality of Salmonid Waters) Regulations 1988. Transposes FFD into Irish law.

WA: The Wildlife Act, 1976 as amended in 2000. Founding Irish legislation listing protected species in Ireland and laying out strict legislation for the protection and enforcement of wildlife in the country.

WS: Wildlife Sanctuary. Certain activities not allowed in this area for protection of wildlife.

Appendix VI – Biodiversity Areas identified within Bord na Móna Bogs

Areas of Biodiversity on Bord na Móna lands with an outline of main habitats and rehabilitation/management carried out at each site (list compiled 2009; areas will continue to be added as the ecology survey continues).

Site Name	County	Area (ha)	Irish National Grid. Ref.	Habitats	Rehabilitation/Management	Brief Site Description
Amenity lakes and biodiversity areas						
Lough Boora Lakes	OY	30	218128 218676	Open water Acidic grassland	Lake creation Amenity	Area developed for local amenity
Leabeg Wetlands	OY	45	218686 218618	Open water Acidic grassland	Lake creation Amenity	Area developed for local amenity
Finnamores	OY	20	221158 220626	Open water Acidic grassland	Lake creation Amenity	Area developed for local amenity
Loch Clochan and Wetlands	OY	40	210813 219543	Open water	Lake creation Amenity	Area developed for local amenity Lease agreement with local fishing club
Derryounce	OY	50	254093 214965	Freshwater lake Cutaway bog	Lake creation (outfalls blocked) Amenity	Angling lake and walkway Lease agreement with local community
Doire Bhile	TP	50	221828 151879	Freshwater lake <i>Molinia</i> grassland Cutaway bog	Lake creation Amenity	Area developed for local amenity Angling lake and walkway Lease agreement with local community Marsh Fritillary site
Wetland and woodland habitat mosaics						
Clongawney	OY	30	207554 213317	Oligotrophic lake Cutaway bog	Lake creation (outfalls blocked)	Area colonising naturally
Turraun	OY	200	217420 223494	Open water Birch and Scots Pine woodland Acidic grassland Heathland	Blocking main outfalls Path maintenance	Area of cutaway bog regenerating since early 1990s Diverse mosaic of habitats Wide range of flora and fauna
Tumduff	OY	100	219787 217962	Open water Poor fen	Blocking main outfalls Managing outflows	Area of cutaway bog regenerating since early 1990s Diverse mosaic of habitats Site is utilised by Whooper Swans

Site Name	County	Area (ha)	Irish National Grid. Ref.	Habitats	Rehabilitation/ Management	Brief Site Description
Drinagh	OY	170	211050 217046	Open water Poor fen	Blocking main outfalls Managing outflows	Diverse mosaic of dry and wetland habitats Site is utilised by Whooper Swans in winter
Ballycon	OY	230	254733 226134	Wetland Birch woodland	Intensive drain blocking Pool creation	Former cutaway bog Good regeneration of wetland and birch habitats Site is utilised by Whooper flocks in winter
Lullymore	KE	100	269330 224882	Rich and poor fen Open water Birch woodland	Blocking main outfalls	Cutaway bog with good regeneration Lapwing breeding recorded Adjacent BCI Marsh Fritillary site
Blackwater	OY	30	201339 226874	Open water Acidic grassland	Lake creation Amenity	Area developed for local amenity
Clonfinlough	OY	20	202931 229437	Reed bed	Drain blocking	Adjacent Clonfinlough SAC area
Rehabilitated cutaway bog, high biodiversity value						
Lullymore BCI	KE	10	268522 225102	Wet grassland	Scrub control	Area of cutover bog Managed by BCI
Corlea	LD	5	209947 262512	Degraded Raised bog Cutover	Bunding of bog remnant Lagoon creation	Managed as part of preservation of wooden track-way at Corlea Centre
Lough Bannow	LD	30	208183 265426	Poor fen Birch woodland	Natural colonisation	Re-colonising cutaway bog Diverse area adjacent active peat production site
Derraghan	LD	80	206381 262819	Birch woodland	Natural colonisation	Diverse area adjacent active peat production site Re-colonising cutaway bog area Barn Owls recorded breeding
Mineral Islands						
Derrylesk Island (Mountlucas Bog)	OY	20	250798 224599	Woodland	Access restricted	Mineral island surrounded by bog area Diverse woodland

Site Name	County	Area (ha)	Irish National Grid. Ref.	Habitats	Rehabilitation/ Management	Brief Site Description
Derryarogue Island	LD	10	203121 271523	Woodland Orchid rich grassland	Access restricted	Mineral island surrounded by bog area Diverse habitats; possible Tufa spring
Overlap with nature conservation designated areas						
Lough Boora NHA	OY	45	216002 217898	Rich fen Acidic grassland	NHA	Archaeology interest site Mesolithic site
Overlap with SAC, NHA, SPA site margins		810	Scattered sites	Wet grassland Open water, reedbed Birch woodland		Overlap along rivers, bogs, canal, etc.
Degraded Raised Bog areas						
Abbeyleix Bog	LS	190	243638 182498	Degraded Raised bog Cutover Birch woodland	Drain blocking on high bog Funded BNM-NPWS	Raised bog drained in 1990s Good prospects for recovery of active raised bog and lagg zone Work completed 2009, leased to local community
Clera Island Bog	RN	150	198115 237167	Degraded raised bog Schoenus flush	Access restricted	Former drains in-filling and rewetting Degraded and active raised bog
Rehabilitated blanket bog						
Oweninny Bogs	MO	6000				
Bellacorick and Bangor			99410 322018 83682 321519	Open water Poor fen Acidic grassland Heathland Willow scrub Bog remnants	Blocking field drains Blocking outfalls Managing outflows Bunding and ridging	Extensive industrial cutaway Atlantic blanket bog Good regeneration of peat-forming vegetation Surrounded by SAC and SPA bog complexes Rehabilitation work completed between 2001 and 2005
O'Boyle's Bog	MO	350	97037 325332	Degraded Atlantic Blanket Bog	Blocking field drains	Large area adjacent Bellacorick Bog SAC complex Drain blocking is assisting rewetting

Site Name	County	Area (ha)	Irish National Grid. Ref.	Habitats	Rehabilitation/ Management	Brief Site Description
Native Woodland Scheme project areas						
Madden's Derry (Clongawney Bog)	OY	5	205456 214521	Oak Woodland	Oak seedlings planted Fencing of wooded area Removal non-native species	Mineral island with mature oak woodland surrounded by cutaway bog Funded under NWS, work completed 2008 Oak planting; rabbit and deer fencing; clearing Poplar seedlings
Turraun	OY	14	218780 223766	Oak/Scots Pine woodland	Oak and Scots Pine seedlings planted Fencing of oak transplants Removal non-native species	Cutaway bog re-colonising naturally Funded under NWS, work completed 2008 Oak and Scots Pine planting; rabbit and deer fencing
Total Biodiversity area		8,834ha				

Appendix VII – References and Useful Websites

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Relevant papers that are included in *After wise use – the future of peatlands* (Proceedings of the 13th International Peat Congress, Farrell and Feehan 2008) are outlined below. These can be sourced on line at the IPS website: www.peatsociety.org

Buckley, K. 2008. *Cutaway bog vs. Rural Environmental Protection Scheme – on cost benefit, could cutaway deliver more for biodiversity?*

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Copland, A., Bayliss, J., Power, E and Finney, K. 2008. *Breeding waders on cutaway peatlands in County Offaly.*

Egan, T. 2008. *The Lough Boora Parklands project on cutaway bogland in West Offaly Ireland: regional ecological, economic and social benefits*

Farrell, C.A. 2008. The Oweninny Bogland: post rehabilitation management challenges.

Farrell, C.A. 2008. The biodiversity value and future management of degraded peatland habitats in Ireland.

Lally, H., Higgins, T., Collieran, E. and Gormally, M. 2008. *Lakes: a new concept for wildlife conservation on Irish cutaway peatlands.*

McNally, G. 2008. *50 years of research endeavour on the future use of Irish industrial cutaways.*

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Useful Websites

Biodiversity Sites

National Biodiversity Data Centre www.biodiversityireland.ie
Public interface to learn about biodiversity www.noticenature.ie
Irish Biodiversity homepage www.npws.ie/en/Biodiversity
EU Biodiversity Homepage www.ec.europa.eu/environment/nature/index_en.htm
Convention on Biodiversity; 2010 www.cbd.int/2010/welcome

General

Bord na Móna www.bnm.ie
International Peat Society www.peatsociety.fi
EPAGMA website www.epagma.org
Lough Boora Parklands www.loughbooraparklands.ie
Sculpture in the Parklands www.sculptureintheparklands.com
National Parks and Wildlife www.npws.ie
Coillte www.coillte.ie
Heritage Council www.heritagecouncil.ie
Teagasc, Agricultural Research Institute www.teagasc.ie
EPA, Ireland www.epa.ie
Irish related scientific articles www.ria.ie/publications/journals
Irish Landscape Institute www.irishlandscapeinstitute.com

Directory of peatlands project in UK	www.peatlands.org.uk
International Mires Conservation Group	www.imcg.net
Chicago Wilderness Project	www.chicagowilderness.org
Green Infrastructure in European context	www.greeninfrastructure.eu
BOGLAND project	www.ucd.ie/bogland
Carbon Restore project	www.ucd.ie/carbonrestore

Biodiversity Irish

Irish Wildflowers Index	www.irishwildflowers.ie
National Botanic Gardens	www.botanicgardens.ie
Nature Calendar - (Mapping Species through out Ireland)	www.biology.ie
ENFO	www.enfo.ie
NI Biodiversity Group	www.ehsni.gov.uk/natural/biodiversity

Restoration

Society of Ecological Restoration	www.ser.org
Global Restoration Network	www.globalrestorationnetwork.org
Restoring Natural Capital Alliance	www.rncalliance.org
IMCG Restoration of Peatlands Manual Draft	www.imcg.net/docum/prm/gprm_01.pdf

Restoration projects Ireland

Blanket Bog Restoration (Coillte Life project)	www.irishbogrestorationproject.ie
Raised Bog Restoration (Coillte Life project)	www.raisedbogrestoration.ie
Woodlands Restoration (Coillte Life project)	www.woodlandrestoration.ie
Burren management (Life project)	www.burrenlife.com
Bird Watch Ireland (Termoncarragh and East Coast Nature Reserve Life projects)	www.birdwatchireland.ie

EU and Life funding

ec.europa.eu/environment/nature/index_en.htm
ec.europa.eu/environment/nature_biodiversity/index_en.htm
ec.europa.eu/environment/life/index.htm
www.environ.ie/en/Environment/SustainableDevelopment

Nature conservation and management

Burren Region Resource Centre	www.burrenbeo.com
Irish Peatland Conservation Council	www.ipcc.ie
An Taisce	www.antisce.org
Earthwatch (Friends of the Earth Ireland)	www.foe.ie
Eco UNESCO	www.ecounesco.ie
Environmental Conservation Organisation	www.youth.ie/member/eco.html
Network of Irish Environmental and Development Organisation	www.dochas.ie
Groundwork - habitat preservation organisation	www.groundwork.ie
Biodiversity and Environmental Change research	www.biochange.ie
Leave No Trace Ireland - promoting	www.leavenotraceireland.org
Heritage Know How - Heritage Council	www.heritageknowhow.ie/responsible_recreational_use_of_the_countryside
Abbeyleix Bog Restoration Group	www.abbeyleixbog.com

Birds, insects and mammals

BirdWatch Ireland	www.birdwatchireland.ie
Bat Conservation Ireland	www.batconservationireland.org
Dragonfly Ireland	www.habitats.org.uk/dragonflyireland
Dublin ZOO	www.dublinzoo.ie
Golden Eagle Re-Introduction Project	www.goldeneagle.ie
The Grey Partridge Trust	www.greypartridge.ie
Irish Whale & Dolphin Group	www.iwdg.ie

Irish Wildlife Trust	www.iwt.ie
Shannon Dolphin & Wildlife Foundation	www.shannondolphins.ie
Spring Alive - Bird Survey	www.springalive.ie
Photographic Guide to Moths in Ireland	www.moths.ie
Irish Seal Sanctuary	www.irishsealsanctuary.ie

Trees and Plants

COFORD	www.coford.ie
CRANN	www.crann.ie
Irish Seed Savers	www.irishseedsavers.ie
Irish Timber Growers	www.itga.ie
National Council for Forest Research and Development	www.treecouncil.ie
Native Woodlands Scheme	www.woodlandsofireland.com
Lichens of Ireland	www.lichens.ie

Environmental Education

An Tairseach "Dominican Farm and Ecology Centre"	www.ecocentrewicklow.com
Ecology Centre, Louth	sonairte.org
Galway-Mayo Institute of Technology	www.gmit.ie
DIT	www.dit.ie
National University of Ireland, Galway	www.nuigalway.ie
Natural History Museum	www.museum.ie/naturalhistory
Sligo Institute of Technology	www.itsligo.ie
Trinity College	www.tcd.ie
UCC	www.ucc.ie
UCD	www.ucd.ie
University of Limerick	www.ul.ie

Notes

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Notes

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Above:
Marsh Helleborine
at Lough Boora

