

Chapter 4

Nature



Nature

Introduction

The terms “nature” and “biodiversity” are interchangeable. Human beings are an intrinsic part of biodiversity and interact with it on a daily basis. Our interactions with nature range from the mundane to the sublime but are generally taken for granted. Our activities change and shape the landscape in which we live. These human-mediated environmental and land use changes can have wide-ranging influences on biodiversity which need to be considered and managed.

Biodiversity

Its importance to individuals and to the country as a whole is often underestimated.

The Convention on Biological Diversity (CBD) defines ‘biological diversity’ or biodiversity as the variability among living organisms from all sources including, among other things, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.¹ Biodiversity underpins our economy, health and wellbeing and plays a key role in the functioning of ecosystems, their resilience and their continuing ability to provide ecosystem services. Biodiversity provides us with clean air, water, food, materials, medicines, health and recreation. It supports pollination and soil fertility, regulates climate and protects us from extreme weather (EC, 2015).

Habitats and Species

Ireland has legal obligations to protect habitats and species that are under threat and need protection across Europe.

A high proportion of Europe’s most endangered and vulnerable habitats and species are considered to have “unfavourable” conservation status (60% of protected species and 77% of protected habitats across Europe) (EEA, 2015). The European Agency’s report states that Europe will not meet its overall target of halting the loss of biodiversity by 2020; a similar conclusion has also been drawn in a global context (Secretariat of the Convention on Biological Diversity, 2014). It is also forecast that climate change impacts will intensify in the future and the underlying causes of biodiversity loss will persist.

Ireland has international and legal obligations to protect biodiversity. Protection of biodiversity within and outside protected areas is necessary, and this will require greater integration of biodiversity concerns in sectoral policy development and implementation, at local and national levels. Ireland’s second National Biodiversity Plan (2011-2016) includes a programme of measures aimed at meeting Ireland’s biodiversity obligations (DAHG, 2011). The linkages between biodiversity policies, from a national to a global scale, are outlined in Figure 4.1.

¹ Article 2: www.cbd.int/convention/text/



Figure 4.1 Linkages Between Biodiversity Policies from a National and Global Scale (Source: NPWS)



Current Status and Trends

Habitat Trends

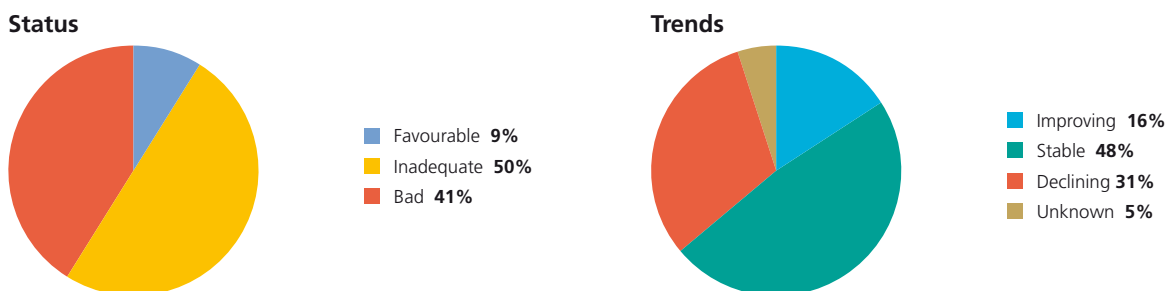
Raised bogs and species-rich grasslands are under threat in Ireland.

Owing to Ireland's geographical isolation and recent geological history, it has a lower diversity of non-marine flora and fauna than is found on continental Europe. Nevertheless, our aquatic systems and wetlands support internationally significant populations of birds, fish and invertebrates. Ireland is also relatively rich in bryophytes, algae, lichens and non-marine molluscs.

Member States are required to monitor habitats and species that are considered threatened across Europe and are listed in the Habitats Directive (92/43/EEC). The conservation status of habitats and species is assessed at a national level, not just in Special Areas of Conservation² (SACs). The most recent report of the National Parks and Wildlife Service (NPWS, 2013) provides an overview of the status of Ireland's 58 natural habitats and 61 native species.

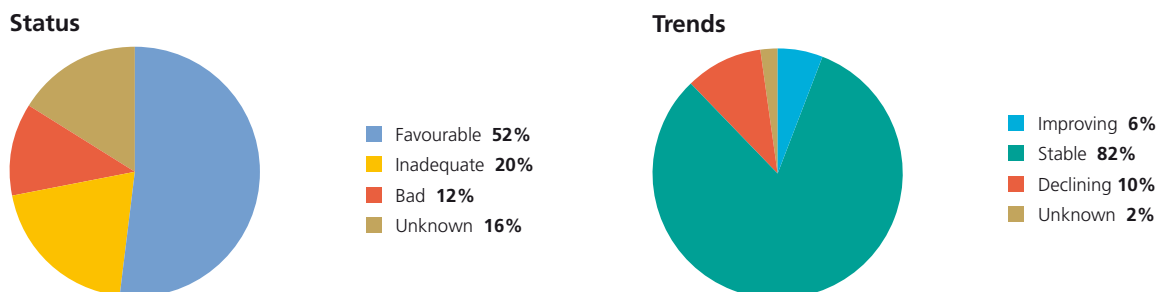
The current status and trends of Ireland's habitats are presented in Figure 4.2 (NPWS, 2013). Baseline surveys are still required to supplement our knowledge of habitats, particularly lakes and fens. The habitats of most pressing concern are those that have reduced range and/or area, notably raised bogs and species-rich grasslands.

Figure 4.2 Overall Assessment Results for the Status and Trends in Habitats Protected Under the EU Habitats Directive in Ireland 2007-2013 (Source: NPWS)



² SACs are prime wildlife conservation areas, considered to be important on a European as well as a national level.

Figure 4.3 Overall Assessment Results for the Status and Trends in Species Protected under the EU Habitats Directive in Ireland 2007-2013 (Source: NPWS)



Species Trends

Species most under threat include those linked to wetlands, uplands or sensitive to water pollution.

The current status and trends of Ireland’s species are presented in Figure 4.3 (NPWS, 2013). Levels of many species are reported to be stable, but a number of key or iconic species are declining. One of the species of greatest concern is the pollution-sensitive freshwater pearl mussel, as only a few rivers have populations with even near-adequate recruitment (NPWS, 2013).

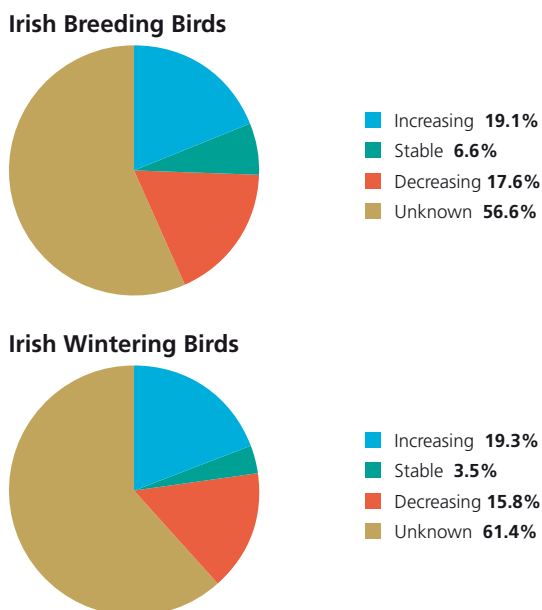
Birds

Changing long-term trends in breeding and wintering birds.

The protection of bird species at EU level is provided for under the Birds Directive (2009/147/EC). Under Article 12 of this directive Member States are obliged to report on the progress made with the implementation of the directive. This requires reporting on aspects of the status of all regularly occurring bird species in the Member States’ territories. Ireland reported to the EU on trends in bird populations in 2013 (EEA, 2015). The long-term trends of Ireland’s breeding and wintering bird populations are illustrated in Figure 4.4.



Figure 4.4 Long Term Trends in Ireland’s Breeding and Wintering Bird Populations (Source: EEA)



The Bird Atlas and Citizen Science

The Bird Atlas 2007-2011 mapped the occurrence of Ireland's and Great Britain's birds during winter and breeding seasons (Balmer *et al.*, 2013). The Atlas was a collaborative project involving BirdWatch Ireland, the Scottish Ornithologists' Club and the British Trust for Ornithology. In Ireland the project received funding from the National Parks and Wildlife Service (NPWS), the Northern Ireland Environment Agency (NIEA), the Heritage Council and the Environmental Protection Agency (EPA). The Atlas is an excellent example of citizen science in action, presenting analyses of records submitted by over 40,000 volunteer birdwatchers in Great Britain and Ireland. Nearly all of the 300 species covered by the Atlas have experienced changes, such as range contractions or expansions, location shifts or subtle changes in abundance. Key findings for the island of Ireland are that, over the last 40 years, the breeding ranges of 47% of species have contracted, whereas 18% of species have expanded to new areas.

Two main "new" groups of concern highlighted are breeding waders and upland birds. Large range contractions are noted for the curlew, which has declined dramatically in recent years, and also lapwing, common sandpiper, golden plover, merlin, ring ouzel, snipe and teal. Further research is necessary to determine whether there is an overriding driver for observed range changes, but climate change has been implicated in some cases (Balmer *et al.*, 2013). The ranges of several farmland birds declined before the end of the last century and the distribution of these birds remains restricted today, for example corncrake, grey partridge, twite, whinchat and yellowhammer. On the other hand, a large increase in the range of the blackcap has been noted (Figure 4.5), and 12 other species have increased in abundance, including the bullfinch and buzzard.

Figure 4.5 The Blackcap has Experienced a 249% Increase in Range Since the Breeding Atlas 1988-1991 Report (Source: BirdWatch Ireland)

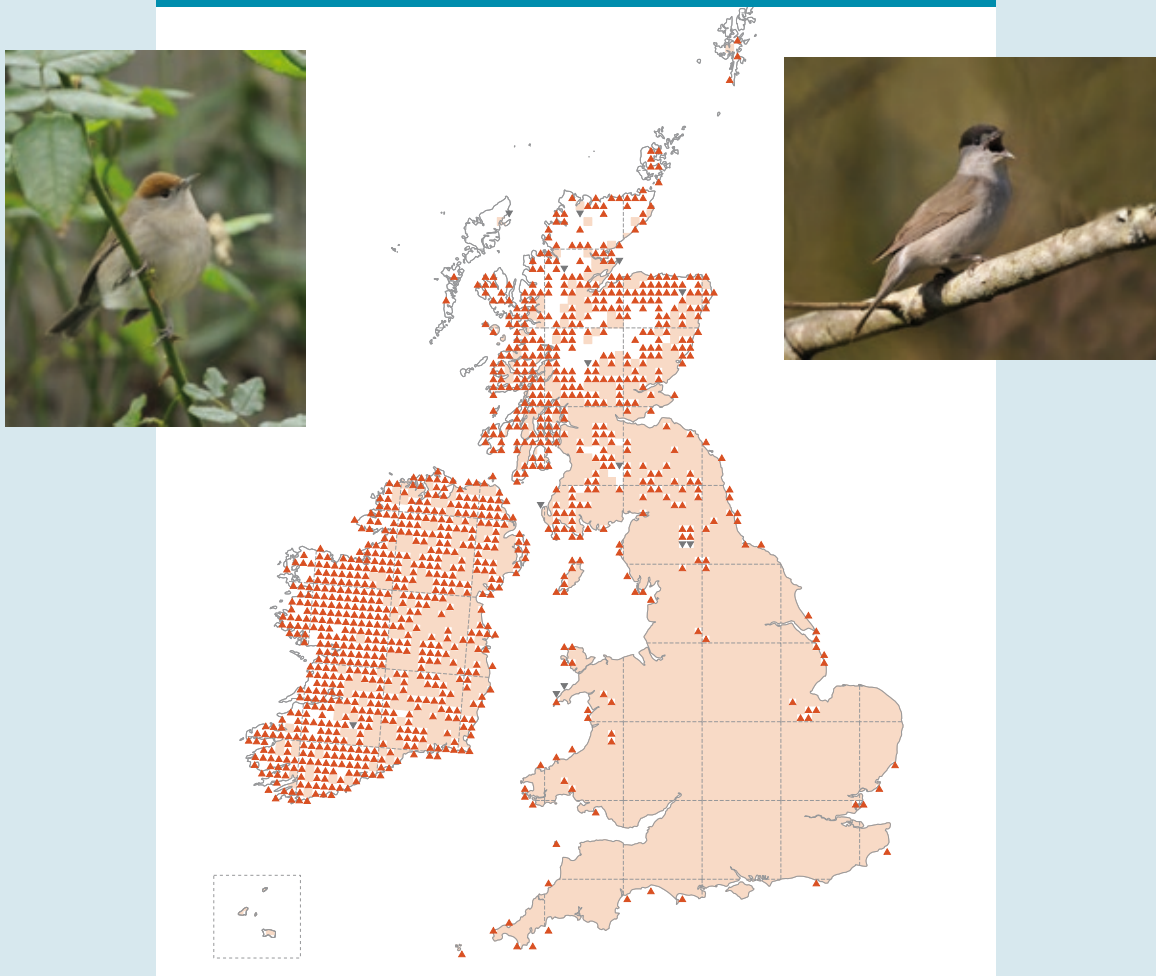
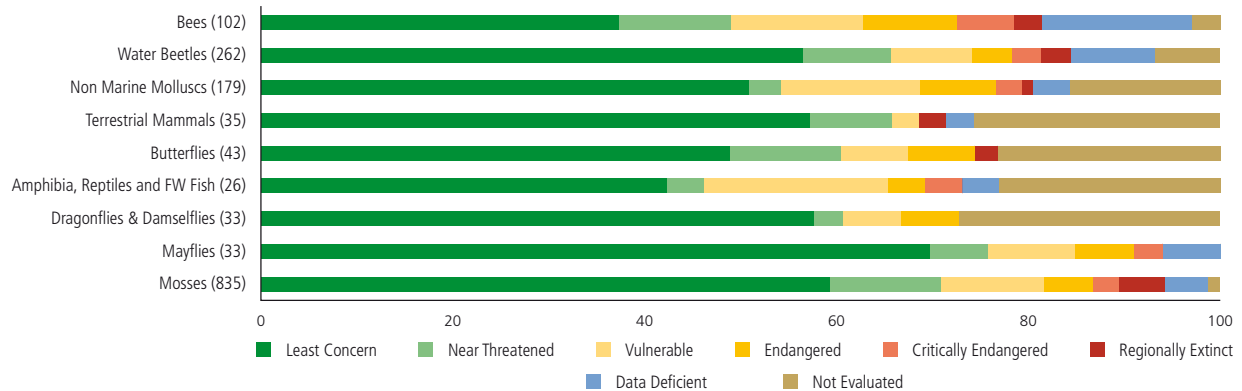


Figure 4.6 Conservation Status of Ireland's Red List Species; Number of Species Assessed in Brackets (Source: NPWS)

Red Lists Species

Identification and protection of species is aimed at protecting those most at risk.

Red Lists provide an objective assessment of species using the International Union for the Conservation of Nature (IUCN) categories and criteria. They identify species in most need of conservation interventions. The NPWS and NIEA co-ordinate Red Lists in Ireland, and these lists are available on the NPWS website.³ Current assessments of Irish Red List species are outlined in Figure 4.6. According to the latest Red List, Macro-moths (Lepidoptera), 43 species of Irish macro-moth are assessed as threatened to some degree (i.e. vulnerable, endangered or critically endangered), which represents 8% of the current Irish list. Fourteen species are considered to have become regionally extinct as they had not been recorded in the 50 years prior to 31 December 2012 (Allen *et al.*, 2016).

In 2014, BirdWatch Ireland and the Royal Society for the Protection of Birds (Northern Ireland) (RSPB NI) collaborated in producing a revised Birds of Conservation Concern in Ireland (BoCCI) list. Of 185 birds that breed and/or winter in Ireland, 37 were placed on the Red List and 90 on the Amber List, based on conservation status. Red-Listed breeding species include the barn owl, corncrake, grey partridge, grey wagtail and red grouse. Red-Listed breeding and wintering species include the curlew, dunlin, golden plover and Bewick's swan. Two birds of prey that have recently been reintroduced, the white-tailed eagle and the golden eagle (see topic box "Reintroducing Birds of Prey to Ireland"), are both Red Listed.

Drivers and Pressures

Key Pressures on Ireland's Habitats and Species

Changing land use, direct impact and unsustainable exploitation pressures evident across different habitats.

The key pressures on Ireland's habitats and species include direct habitat damage from peat cutting, wetland drainage/reclamation, over- and under-grazing, water pollution, unsustainable exploitation (e.g. over-fishing), invasive alien species (IAS) and recreational pressures (NPWS, 2013). An example of an indirect pressure is human population growth, the effects of which are exacerbated by limited public awareness of biodiversity and its benefits and economic value to society. Climate change is also likely to have some effect on Irish species and habitats (EPA, 2009). Pressures from urbanisation, fertiliser use and road building have reduced since the first assessment of Ireland's habitats and species (2001-2006) (NPWS, 2013). However, in a recovering economy, it is foreseeable that future land use changes will further threaten Ireland's habitats and species. The continuing deterioration of high quality rivers is of great concern, particularly as species such as salmon, trout and the declining freshwater pearl mussel require and depend on high quality water and river habitat (NPWS, 2013).

3 www.npws.ie/red-lists

Invasive Alien Species

Deliberate or accidental introduction of species can have a negative impact on the economy, wildlife or habitats and require a national response.

Invasive alien species are species that have been introduced to the island of Ireland, deliberately or accidentally, by humans and have a negative impact on the economy, wildlife or habitats. The Invasive Species Ireland project was a joint venture between the NIEA and NPWS that co-ordinated Ireland's activities in relation to IAS. The project is no longer operating but the website⁴ remains live. There is a need for a co-ordinated and centralised all-island approach for tackling IAS to be re-established.

Regulations on the prevention and management of the introduction and spread of IAS came into force in the EU in 2015 (Regulation (EU) No. 1143/2014; EU, 2014). These regulations seek to protect native biodiversity and ecosystem services from damage caused by IAS, as well as minimising and mitigating the effects they can have on human health and the economy.

The Regulations require Member States to implement early warning and eradication systems for listed species as well as establishing border controls and licensing systems to manage trade. Individual countries are also required to prepare management plans for the eradication or containment of listed species. Included on the initial list of 35 species, and of particular relevance to Ireland, are the grey squirrel, the muntjac deer, and the curly-leaved pond weed (*Lagarosiphon* sp.).

The National Biodiversity Data Centre (NBDC) has developed an online invasive species database and an early warning system. In 2014, a report entitled *Ireland's Invasive and Non-native Species – Trends in Introductions* was published by the centre (O'Flynn *et al.*, 2014). This report found that 13% of invasive alien species recorded in Ireland are high-impact IAS. The percentage of high impact species in Ireland is similar to that reported for other European countries.

Local groups are now tackling IAS in their communities across Ireland; for example, the Sraheens/Kildownet campaign to control/eradicate invasive species is a local community-led project in the Achill area concerned with investigating ways of removing giant rhubarb (*Gunnera* sp.) and Japanese knotweed infestations.

The safe disposal of IAS material, including soil infested with seed, is problematic and needs to be further addressed.

Raised Bogs and the Abbeyleix Bog Project

The Habitats Directive aims to protect active raised bog and restore degraded raised bog still capable of natural regeneration to active condition. The National Peatlands Strategy aims to give direction to Ireland's approach to peatland management and guidance on how to optimise the ecosystem services provided by our peatlands for the future (NPWS, 2015). The EC is currently co-financing a LIFE project entitled "LIFE Irish Raised Bogs" to improve the conservation status of active raised bogs through restoration measures in 12 Natura 2000 sites in the Irish midlands.

On a local level, Abbeyleix Bog Project is an example of a community initiative that stemmed from a local action group (Abbeyleix Residents for Environment Action). The project was established to provide stewardship for Abbeyleix Bog in County Laois. Abbeyleix Bog Project is also a member of Irish Rural Link's Community Wetlands Forum. In 2010, a 50-year lease agreement was signed with Bord na Móna giving management responsibility to the Abbeyleix Bog Project. A Board of Trustees and technical advisory group (made up of local business community representatives, Bord na Móna, NPWS, Irish Peatland Conservation Council and Laois County Council) is tasked with ensuring that the site is managed for conservation, education and local amenity purposes. The project is actively engaged in the restoration and management of the bog. Community engagement projects undertaken to date include the installation of a boardwalk and bog bridge, invasive rhododendron clearance and butterfly surveys.



⁴ www.invasivespeciesireland.com

Responses

Natura 2000 Network

Habitats and species are legally protected by a network set up under nature directives.

Implementation of the EU Habitats and Birds Directives has resulted in the creation of a comprehensive network of sites for habitat and species protection, the Natura 2000 network. Details of Ireland's protected sites can be found on the NPWS website.⁵ Steps required to legally protect Ireland's terrestrial network of SACs under the Habitats Directive and Special Protection Areas (SPAs) under the Birds Directive are largely complete. Of the 154 SPAs in Ireland, 140 are protected by a Statutory Instrument. Six new marine SACs were submitted by the Department of Arts, Heritage and the Gaeltacht (DAHG) to the European Commission in 2014, bringing the total to 430. A final formal designation of SACs is under way, although legal protection is already in place. In April 2016, the European Commission called on Ireland to step up its efforts to designate SACs and to establish conservation objectives and measures for all of them.⁶ Progress towards marine SPA designation has been slow, but will be based on data produced following baseline ecological surveys in offshore areas carried out by the Department of Communications, Energy and Natural Resources in collaboration with the DAHG in 2015-2016.

Prioritised Action Framework for Natura 2000

Appropriate management regimes should be the driver for protecting our Natura sites and protected species.

The Prioritised Action Framework for Natura 2000 (PAF)⁷ was approved by Government in 2014 and submitted to the EU. This framework identifies a range of actions needed to help improve the status of Ireland's habitats and wildlife, including conservation management strategies, more focused agri-environment schemes and habitat restoration.

Action 15.2 of the National Biodiversity Plan includes a commitment to "prepare and implement site-specific conservation objectives, management advice and/or plans on Natura 2000 sites, Nature Reserves and National Parks". Detailed site-specific conservation objectives, which define the most favourable conservation condition for the particular habitats and species on a site by site basis, have been published for 129 SACs and 37 SPAs (as of July 2016).

Brown Bog SAC (002346) – Site-specific Conservation Objectives

Brown Bog SAC is located 5 km north-west of Longford town. The site comprises a raised bog that includes areas of high bog and cutover bog. The site is designated as an SAC under the Habitats Directive for the following habitats that occur there: Active Raised Bog, Degraded Raised Bog and *Rhynchosporion* Vegetation (which occurs on wet peat on pool edges and in hollows).

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site. The maintenance of habitats and species within sites at favourable condition will contribute to the maintenance of favourable conservation status of those habitats and species at a national level. Conservation objectives for habitats and species are defined using attributes and targets that are based on parameters as set out in the Habitats Directive for defining favourable conservation status.

Targets have been set for attributes for each of the three habitats listed for Brown Bog according to the best information available. For example, for Active Raised Bog, a target to 'Restore the area of active raised bog to 13.2 ha, subject to natural processes' has been set (NPWS, 2016). The Active Raised Bog habitat in this SAC has 17 attributes that define favourable conservation condition. Separate conservation objectives have not been set for Degraded Raised Bog and *Rhynchosporion* Vegetation as they are inherently linked to Active Raised Bog.



5 www.npws.ie/protected-sites

6 www.europa.eu/rapid/press-release_MEMO-16-1452_en.htm

7 www.npws.ie/sites/default/files/general/PAF-IE-2014.pdf

Threat Response Plans

Threat Response Plans establish a system of strict protection for species and habitats listed in the Habitats Directive.

The NPWS has prepared Threat Response Plans⁸ to establish a system of strict protection for the species and habitats listed in Annex IV of the Habitats Directive, including otter, bats and cetaceans. These plans continue to be implemented with future appraisal and expansion to other species currently under consideration (National Biodiversity Working Group, 2014).

A Red Grouse Species Action Plan was published in 2013, as a collaborative project between the Irish Grey Partridge Conservation Trust, National Association of Regional Game Councils, Golden Eagle Trust, Irish Kennel Club, BirdWatch Ireland and NPWS. The plan provides guidance for the conservation and management of red grouse and its habitats and suggests a framework for actions and recommendations to achieve this.

Updating the Water Framework Directive (WFD, 2000/60/EC) freshwater pearl mussel sub-basin management plans and the effective implementation of measures within these plans will be essential in improving the status of this endangered species.

8 www.npws.ie/publications/species-action-plans

Group Species Action Plans for the Protection of Birds

Plans for priority, migratory and dispersed birds based on their habitat requirements.

BirdWatch Ireland developed a series of 10 Group Species Action Plans for Ireland's "priority, migratory and dispersed" birds based on their habitat requirements. These plans encompass those species that are found on the BoCCI Red and Amber Lists, including some regularly occurring birds in Ireland that are on Annex I of the Birds Directive, along with some additional bird species requiring protection. The Action Plan for Upland Birds in Ireland 2011-2020 is an example of such a plan (BirdWatch Ireland, 2010). Uplands are considered to contain important areas of semi-natural habitats in Ireland. The plan covers 22 bird species, of which seven are Red Listed and 13 are Amber Listed. Seventeen targets and associated actions are categorised by themes with some specific actions for species that require them; e.g. a target has been set to establish the size of the breeding curlew population, a Red-Listed species that has undergone a dramatic decline in Ireland.

Reintroducing Birds of Prey (Raptors) to Ireland with Mixed Success

A programme to reintroduce three large raptor species into the wild in Ireland has had mixed success. Current monitoring indicates that a number of birds have been subjected to illegal poisoning.

Of the 61 golden eagles released in Donegal up to 2012, seven were found dead, three of these confirmed as having been poisoned. There are three known breeding pairs surviving, one pair having produced the first Donegal-bred golden eagle in 2014. However, there are concerns regarding the appropriate management of upland habitats and availability of prey to sustain a viable population of golden eagles (IWT, 2015).

One hundred white-tailed sea eagles were released in Kerry from 2007 to 2011. Of these, 30 died (including 12 confirmed poisonings). In 2015, eight pairs nested, and four of these nests produced young. The nest site of a breeding pair in Mountshannon, Co. Clare, which can be viewed by the public attracted over 17,000 visitors in the 2013-2014 period. In 2016, white-tailed sea eagles successfully bred on an island on Lough Leane in Kerry for the first time in over 100 years.

Thirty-one of the 158 red kites released in Dublin and Wicklow from 2007 to 2011 were found dead (including 23 confirmed poisonings and one shooting). Overall, however, the red kite reintroduction project has been largely positive; breeding has been successful and translocation of Wicklow donor stock into Munster is being considered for the future (National Biodiversity Working Group, 2014).



National Biodiversity Plan – Actions for Biodiversity 2011–2016

Good reasons for the further integration of biodiversity initiatives into land use planning and agriculture.

Various initiatives have been put in place to mainstream biodiversity protection in areas such as planning and development, agriculture, and peatland and woodland management. The NBDC's online data portal 'Biodiversity Maps'⁹, provides a mechanism for validated biodiversity data to be available for decision making in areas such as conservation management and land-use planning.

The legal strength of the EU Birds and Habitats Directives is instrumental in promoting sustainable development in planning decisions. The increasing attention on biodiversity issues in development control and forward planning because of requirements under the Habitats Directive is helping to integrate species and habitat protection into land use and marine policies and is increasing awareness amongst key stakeholders at the national level.¹⁰

The National Biodiversity Plan 2011-2016 (DAHG, 2011) outlines the following vision for Ireland's biodiversity: "That biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally." The draft interim review of the plan (National Biodiversity Working Group, 2014) found that, of the 102 actions, 24 were completed, 67 are ongoing and 11 still need to be progressed.

Action 1.1 of the National Biodiversity Plan states that relevant Government departments and state agencies should prepare sectoral Biodiversity Action Plans in line with the National Biodiversity Plan to ensure and promote the conservation and sustainable use of biodiversity. Bord na Móna recently launched its Biodiversity Action Plan (BAP) 2016-2021 (BNM, 2016) to build on the objectives and actions of its first BAP, 2010-2015 (BNM, 2010), for managing and rehabilitating peatlands under its ownership (biodiversityactionplan.bordnamona.ie/index.html). The new plan incorporates a natural capital accounting system whereby losses and gains to ecosystem services (e.g. pollination) by the company's activities will appear on its balance sheet. There is ongoing work on rehabilitation of high-quality bog sites, mainly through drain blocking.

Action 1.7 of the National Biodiversity Plan states that each local authority should publish a Local Biodiversity Action Plan or review existing plans. Implementation of Local Biodiversity Action Plans and/or heritage plans will ensure that biodiversity and green infrastructure issues are taken into account in land use planning. This will also promote habitat connectivity through the maintenance of regionally and locally important wildlife sites linked by ecological corridors.

National Agri-environment Scheme – GLAS

European and national funding for the Rural Development Programme up to 2020 demonstrates a strong commitment to rural development and the national agri-environment scheme, GLAS (Green, Low-Carbon, Agri-Environment Scheme). A number of biodiversity actions have been included within GLAS, including specific priority actions targeted at vulnerable habitats and threatened species, as well as general actions which will have wider biodiversity benefits. "GLAS Plus" gives additional rewards to farmers for exceptional environmental commitment on farms that have been identified as habitats of endangered birds. For example, if farmers have breeding curlews on their land, they will become a priority for access to GLAS.

The National Biodiversity Plan states that high-nature-value (HNV) farming is a new and evolving approach to farming based on the growing awareness that biodiversity is usually higher on farmland that is managed at a lower intensity (DAHG, 2011). HNV farming has been gaining recognition across EU Member States and, in recent years, there have been efforts to ensure that the importance of HNV farmland is appreciated and supported by appropriate policy instruments. The Heritage Council, in particular, has championed the identification and description of what constitutes HNV farmland and how it might be supported under Common Agricultural Policy (CAP) reform (McGurn and Moran, 2013).

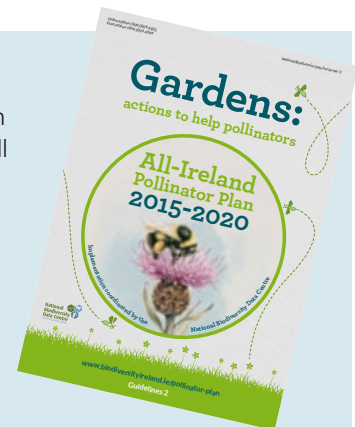
Action 5.7 of the National Biodiversity Plan (DAHG, 2011) recommends continued promotion of the Native Woodland Scheme (NWS). The NWS was launched by Woodlands of Ireland in conjunction with the Forest Service under the Forestry Programme 2014-2020. The scheme targets the management of ancient, old and emerging (scrub) native woodland and the establishment of new native woodlands on greenfield sites.

9 maps.biodiversityireland.ie/#/Home

10 www.npws.ie/sites/default/files/publications/pdf/Fitness%20Check%2015%204%2015.pdf

All-Ireland Pollinator Plan 2015-2020

The All-Ireland Pollinator Plan 2015-2020 (NBDC, 2015) is a voluntary plan of action supported by 68 organisations from the public, private and NGO sectors. The overall aim of the plan is to tackle pollinator decline, caused mainly by the loss of natural and semi-natural habitats, and to make Ireland's landscape one where pollinators can survive and thrive, providing invaluable pollination services to both crops and wild plants. The plan has five objectives: (1) to make Ireland pollinator-friendly, (2) to raise awareness of pollinators and how they can be protected, (3) to manage pollinators by supporting beekeepers and growers, (4) to expand our knowledge on pollinators and their services and (5) to collect evidence to track change and measure success.



The plan can be downloaded at www.biodiversityireland.ie/pollinator-plan, with a junior version at ark.ie/downloads/Junior_Pollinator_Plan_for_Web2.pdf. Guidelines (NBDC, 2016) on how to make gardens more pollinator friendly are available at: www.biodiversityireland.ie/wordpress/wp-content/uploads/Gardens_actions-to-help-pollinators-July-2016.pdf.

The declining bee population is also an early warning of the wider systemic risk posed by habitat loss and pesticide use.

Knowledge Base

National Biodiversity Data Centre

The collection of data on our natural world is critical to allow informed decisions on nature protection.

The effective management of biodiversity in Ireland is dependent on having accurate information on the condition of ecosystems of interest and importance, as well as information on trends over time. The National Biodiversity Data Centre (NBDC) is a national organisation that collates, manages, analyses and disseminates data on Ireland's biodiversity.¹¹ The NBDC currently maintains in excess of 3.8 million records relating to over 15,000 species in Ireland, a large proportion of which are records from NPWS and verified records submitted by the public. The NBDC also hosts a suite of biodiversity indicators (indicators.biodiversityireland.ie) which inform the public and policymakers on biodiversity status, trends and pressures and the effectiveness of policy measures outlined in the National Biodiversity Plan.

Research

A driver for nature protection through knowledge generation and pilot programmes.

Ireland recently submitted an evidence-gathering questionnaire through the NPWS to the European Commission as part of its fitness check of the Birds and Habitats Directives. Appendix I of that document¹² outlined relevant biodiversity research undertaken on species and habitats listed in the Habitats Directive in Ireland.

Much information and knowledge about ecosystems is generated from research projects and demonstration projects. These projects help to pilot management measures to show how effective management can be in improving conditions for biodiversity. The EU provides funding for nature/biodiversity, environment and climate action under the LIFE programme. A number of Irish projects incorporate a significant element of nature/biodiversity research in their remit.

- Burren LIFE and its successor, Burren Programme, aim to protect and support the heritage, environment and communities of the Burren (burrenlife.com and www.burrenprogramme.com)

11 www.biodiversityireland.ie

12 www.npws.ie/sites/default/files/publications/pdf/Fitness%20Check%2015%204%2015.pdf



- Aran LIFE (2014-2017) seeks to develop best conservation management practices of local farmers on designated Natura 2000 sites on the Aran Islands¹³
 - Kerry LIFE aims to support local communities in the Caragh and Kerry Blackwater areas to help restore populations of freshwater pearl mussel¹⁴
 - The Raised Bog Restoration LIFE project 2011-2015 focused on demonstrating best practice in bog restoration in Ireland.¹⁵ The LIFE Irish Raised Bogs project 2016-2020 will focus on restoring 12 active raised bogs within Ireland's SAC network¹⁶
 - The EPA Research Programme has funded over 30 research projects between 2007 and 2015, with a total commitment from the EPA of approximately €6 million. The range of projects funded includes desk studies, scholarships, fellowships and large-scale multi-annual and multi-partner awards.
- The Natural Capital and Ecosystem Services sub-pillar of the EPA Research Programme has a strong focus on policies for biodiversity conservation and protection. It has been driven by national plans, strategies, European directives and regulations, and international obligations.
- Key achievements of the EPA Research Programme**
- The Ag-Biota project outputs represented a significant contribution to Ireland's obligations under the United Nations Convention on Biological Diversity and will assist in the national aspiration to halt and reverse the decline in biodiversity in the wider countryside
 - The BOGLAND report provided large-scale analysis and findings demonstrating that the Irish State needs to change the way in which the peatland resource is currently viewed and managed if it wishes to secure the multiple benefits offered by these natural ecosystems and avoid the costly consequences of further unsustainable management of peatland
- Outputs from the BIOFOREST project have been used in the development of the Forest Environment Protection Scheme
 - The SIMBIOSYS project quantified impacts on biodiversity of key activities (bioenergy crops, road landscaping and aquaculture) and identified some win-win situations where both biodiversity and sectoral outputs can be maximised
 - The HYDROFOR project investigated the impacts of forestry operations on Ireland's aquatic ecology and will inform forest policy review and WFD implementation, environmental considerations in the development of forestry programmes, the refinement of forest and water quality guidelines and guidance on best practice in relation to forest operations and appropriate mitigation measures (e.g. aquatic buffer zones and sediment traps) aimed at reducing pollutant inputs. The latter is especially relevant in the development of measures to protect endangered species such as the freshwater pearl mussel.
- Priority areas for nature research**
- Furthering our knowledge base on the role of the natural environment, its resources and ecological limits and our understanding and protection of ecosystems, along with their role in sustaining the economy and human wellbeing. In particular, this will enable us to increase our understanding of peatlands (ecosystem services and mapping) and support the management of invasive species
 - Engaging the public in the protection and improvement of the environment via a rolling programme of citizen science projects.

13 www.aranlife.ie

14 www.kerrylife.ie

15 www.npws.ie/sites/default/files/general/Project%20Brochure%20for%20LIFE09%20222.pdf

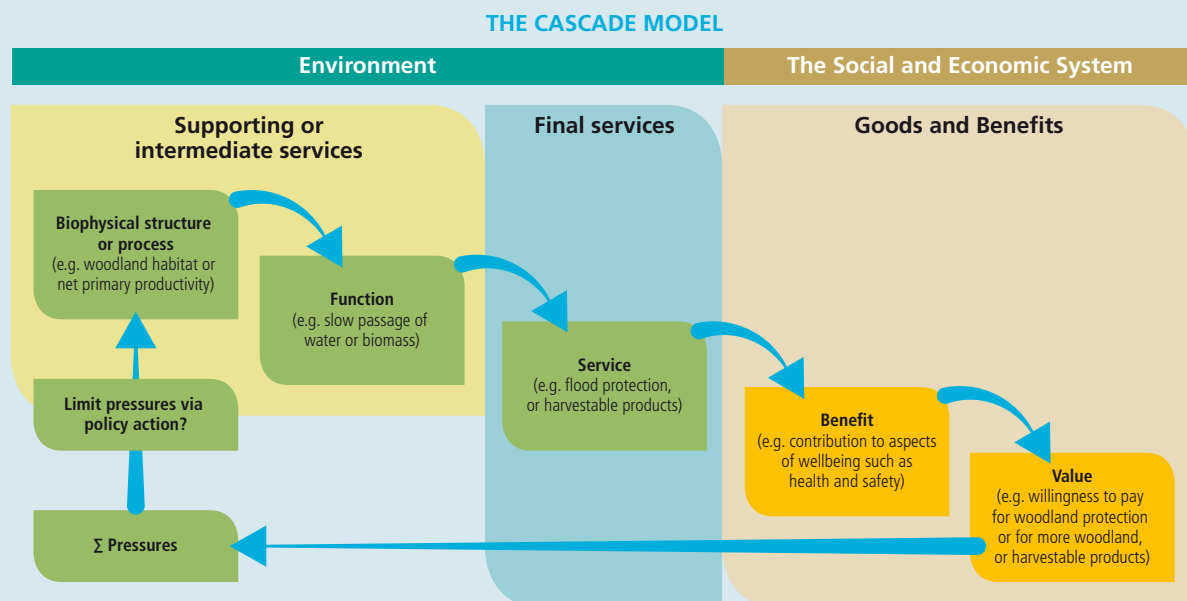
16 www.ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=5321

Natural Capital and Ecosystem Services – A New Approach to How We Value Biodiversity

Biodiversity management initiatives undertaken to date have had limited success in addressing the ongoing loss and fragmentation of habitats, as indicated by the current conservation status of Ireland's habitats and species. The main challenge in protecting and restoring biodiversity has been raising sufficient awareness of the benefits and value of diverse ecosystems to society. The ecosystem approach, incorporating natural capital accounting, seeks to redress this by ensuring that biodiversity is recognised as part of a wider socio-economic ecological system (Figure 4.7) and is considered in decision making. The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (www.cbd.int/ecosystem/).

Natural capital consists of the world's stocks of physical and biological resources, including air, water, minerals, soils, fossil fuels and all living things. Natural capital accounting (NCA) involves attributing a measurable economic and/or ecological value to the ecosystem goods and services that provide benefits to society. NCA is required in all EU Member States by 2020 under Action 5 of *The EU Biodiversity Strategy to 2020* (EU, 2011). This process is under way in Ireland through the Mapping and Assessment of Ecosystem Services (MAES) project, commissioned by NPWS, which aims to map a suite of prioritised ecosystem services based on available data. This project will contribute towards the production of a National Ecosystem and Ecosystem Services map (www.npws.ie/research-projects/ecosystems-services-mapping-and-assessment/project-details).

Figure 4.7 The Link Between Biophysical Structures, Ecosystem Services and the Socio Economic System as Shown by the Cascade Model (Source: DAHG, 2015; after Potschin and Haines-Young, 2011)



The Irish Forum on Natural Capital (IFNC) administered by a part-time secretariat jointly funded by NPWS and EPA, brings together a diverse range of organisations and individuals from academic, public, private and NGO sectors who are interested in the development and application of the natural capital agenda in Ireland.

NCA has the potential to better inform policies that effectively promote, enhance and restore ecosystems and the human wellbeing that depends upon them (National Biodiversity Working Group, 2014). It is envisaged that standardised NCA methodologies will increasingly be used by businesses to identify risks and opportunities and ensure their sustainability in a world of ever-diminishing resources (CIMA *et al.*, 2014).

Outlook for Habitats and Species

Most pressures on habitats and species are set to continue unless we rethink how we manage our natural resources and tackle climate change.

In Ireland there is no evidence that there will be any major reduction in pressures impacting negatively on habitats and species listed in the Habitats Directive over the next decade, although some potential improvements have been noted (NPWS, 2013). These include a decline in invasive infestation of woodlands as a result of improved forestry management; and a reduction in pollution from household waste and sewage. However, it must be noted that initiatives such as Food Harvest 2020 and Food Wise 2025 may threaten to reverse any gains made in pollution reductions from the agriculture and aquaculture sectors if the plans are not implemented in a sustainable way. This is covered in more detail in Chapters 5 and 12.

There is evidence that climate change is negatively impacting on coastal habitats. Predictions indicate that degraded upland habitats, in particular, will become less resilient to the impacts of climate change in the immediate future. Predicted drier summers and higher levels of more intense rainfall are likely to result in bog bursts and landslides which may indirectly impact other habitats such as lakes.

Pressures and threats to the environment arising from the energy, transport and agriculture sectors have potential to adversely impact biodiversity. Agricultural practices have a high impact on protected species that occur within agricultural systems, e.g. the *Vertigo* species of snail and the marsh fritillary butterfly. Pollution is considered a significant pressure and threat to the conservation status of some species, for example those species that need good or excellent quality water to survive such as the remaining limited populations of the freshwater pearl mussel.

Overall, it is likely that the cumulative impacts of a growing economy will be more evident in the wider countryside rather than the protected Natura network (SACs and SPAs), as this is afforded considerable legal protection under EU and national environmental legislation.

Public Awareness and Education on Biodiversity

The 2016 Barometer survey, commissioned by the Heritage Council, on consumer awareness, understanding and interest in biodiversity found that there is a real shift in awareness which is particularly evident in Dublin and urban areas generally. Nationally, awareness and understanding of biodiversity has grown from 18% to 31% between 2010 and 2016. However, Ireland is still

well behind the EU average (2013) of 44%. Overall 33% of Irish people feel that they are well informed about the loss of biodiversity, compared to 20% in 2010. Again, however, we lag behind the European average (45%), recorded in 2013 (EC, 2013).

The National Biodiversity Plan recommends the inclusion of biodiversity to a greater extent in secondary and third-level education and the implementation of a communications campaign. While a wide range of activities are undertaken at a local level by local authorities, the Heritage Council and NGOs, there is a need for an overall strategy to take account of landowner dissatisfaction with biodiversity regulation and to enhance the appreciation of biodiversity and ecosystem services amongst the wider public as per Action 4.3 of the National Biodiversity Plan (DAHG, 2011).

The Department of Arts, Heritage, Regional, Rural and Gaeltacht affairs and other organisations such as the Irish Environmental Network celebrate National Biodiversity Week annually through a number of awareness-raising events. The EPA sponsors media promoting biodiversity conservation and sustainability such as the TV series *Eco Eye* and *Ireland's Ocean* and provides educational materials for primary – and secondary-level students such as identification keys for some common species and educational modules on wetlands biodiversity. Organisations, such as ECO-UNESCO, Ireland's Environmental Education and Youth Organisation, provide educational materials, training and organise events that promote awareness of wildlife and habitats.

Citizen science is the involvement of volunteers in scientific research conducted, in whole or in part, by members of



the public. Citizen science is included in the EPA Strategic Plan 2016-2020 (EPA, 2016). The EPA's objective is to engage the public in the protection and improvement of the environment. The National Biodiversity Data Centre greatly enhances public awareness through its online biodiversity recording service and via an extensive programme of workshops specifically targeting capacity building within the citizen science sector. Other popular citizen science projects include the garden bird survey and the Bird Atlas (see topic box "The Bird Atlas and Citizen Science") run by BirdWatch Ireland, bat monitoring projects run by Bat Conservation Ireland (Aughney *et al.*, 2012) and coastal projects run by Coastwatch and An Taisce. Much of the data received by the NBDC is also generated through citizen science, such as the Mammal Atlas project which has accumulated over 120,000 records of Irish mammals since 2010, mostly from the general public, towards the production of a new Atlas of Irish Mammals.¹⁷ Funding opportunities exist for community initiatives via LEADER (e.g. catchment initiatives), Local Agenda 21 and Heritage Council grants, but there are still challenges in stimulating community involvement and sustaining public engagement in such initiatives.

Conclusions and Future Challenges

Land use changes and the planned intensification of agriculture may lead to further habitat loss.

Some future challenges are emerging alongside the list of current pressures. Increased land use change as the economy improves may lead to further habitat loss and/or fragmentation, through the draining of wetlands, for example. The implementation of initiatives such as Food Harvest 2020 and Food Wise 2025 will have to be scrutinised to ensure that they are implemented in a sustainable way.

Climate Change

Climate change is intensifying and the current underlying issues will persist. Species and habitat ranges may expand and contract in reaction to pressures from climate change. Such changes will facilitate a range expansion in some invasive alien species, for example. The impacts of climate change and the continuing threat of invasive alien species are areas that need to be constantly monitored and guarded against, where possible.

The mainstreaming of biodiversity into economic and development decisions would be of benefit to nature protection.

There is a real need to increase efforts at all levels to bring biodiversity into the mainstream using measures such as Biodiversity Action Plans, thorough environmental assessments and the ecosystem approach/natural capital accounting (NCA), where appropriate, in the development of our policies, plans and strategies. This will ensure that evidence-based decisions are made and unforeseen negative consequences for biodiversity are mitigated and avoided, where possible.

There is room for improved co-ordination on nature issues across linked directives and regulatory bodies.

There is a need for increased clarity in the roles and responsibilities of our government agencies with regard to biodiversity protection. Continued co-ordinated implementation of existing measures to protect biodiversity within protected areas and in the wider countryside is required. One step towards this would be better co-ordination of the relevant EU directives that protect biodiversity, namely the WFD, Habitats and Birds Directives and the Marine Strategy Framework Directive (MSFD, 2008/56/EC), as outlined by the EU Biodiversity/Nature Directors and Water/Marine Directors (Annex III in circabc.europa.eu or <https://circabc.europa.eu/>). In addition, improved integration of sectoral policies by applying the ecosystem approach and NCA principles to the economy will be necessary to protect and restore Ireland's biodiversity.

Robust baseline biodiversity monitoring systems and comprehensive ecosystem services mapping systems are needed to highlight and protect nature in Ireland.

There is a pressing need to follow the approach of the Mapping and Assessment of Ecosystem Services (MAES) project and put in place robust baseline biodiversity monitoring systems and comprehensive ecosystem services mapping. Ideally, these initiatives should be co-ordinated and regularly updated by a single lead organisation with ring-fenced funding.

Increased public awareness is vital.

Ongoing collaborative efforts to increase public awareness of biodiversity must be continued and augmented. Public awareness and appreciation of biodiversity and its intrinsic link to everyday life is vital if measures to protect our environment are to succeed.

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