

'Biodiversity' is a term used to describe the variety of life. It includes diversity within species, between species and of ecosystems. The state of Ireland's biodiversity can be viewed as a litmus test of the state of the environment, as whatever takes place in the land, air and water environments affects biodiversity. Unfortunately, many important aspects of Ireland's biodiversity are under threat from human activities leading to habitat degradation and loss. The global threat of climate change may bring particular challenges for the conservation of Ireland's natural heritage and emphasises the importance of conserving biodiversity in the wider countryside as well as in protected areas.

Some progress has been made in implementation of the National Biodiversity Plan 2002–2006, for example in the establishment of a National Biodiversity Data Centre and in increased biodiversity monitoring and assessment. However, a recent review of Ireland's biodiversity from a European perspective has revealed that the conservation status of many of the most important habitats and species gives cause for concern. In addition, significant declines in fish stocks threaten marine biodiversity and the livelihoods that depend on it.

The European Commission (EC) issued a Communication in 2006 setting out actions required to meet commitments made to halt biodiversity loss by 2010. Nationally, measures must be prioritised to address this challenge. The EC has identified the interlinked issues of biodiversity loss and climate change as the two most important challenges facing the planet. Much of the media focus is on climate change, but biodiversity loss can pose an even more serious threat. This is because the degradation of ecosystems is often irreversible, and extinction is for ever (Dimas, 2006). Therefore, we must value and protect the riches of our own unique biodiversity heritage while ensuring that we play our part towards stemming the rate of global biodiversity loss.

BIODIVERSITY

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## Introduction

Biodiversity protects and nurtures us, for example, through providing food, fuel, fibre and medicines, through the pleasure and inspiration it provides (a basis for much of our tourism and recreation industries) and through a wide variety of essential ecosystem services (such as carbon cycling and storage, nutrient cycling, maintenance of soil fertility, regulation of water, air and climate, and natural hazards mitigation). Concern for biodiversity is integral to sustainable development and underpins competitiveness, growth, employment and improved livelihoods. For many, prevention of biodiversity loss is also an ethical issue (European Commission (EC), 2006a).

However, biodiversity is declining globally at an alarming rate. This is principally due to habitat destruction, human population growth, development pressure, poverty, the introduction of non-native species, climate change and over-exploitation. Species extinction rates are now around 1000 times greater than those shown in fossil records, and are projected to increase (MEA, 2005). According to the UN Millennium Ecosystem Assessment (MEA), most ecosystem services worldwide are in decline (MEA, 2005). Damaged ecosystems are often very costly or impossible to restore, and ultimately humanity cannot survive without the earth's life support systems.

Ireland's biodiversity has been shaped by multiple factors including its glacial history and diverse geology, biogeographical factors (such as island status at the edge of Europe and mild climate) and, of course, human influence. Ireland is a land of varied habitats, including a patchwork of farmland, woodland, extensive wetlands, lakes and rivers.

It has approximately 7,500 km of coastline and a large expanse of territorial waters. All of these habitats contain a host of species – some common, some rare, and some subspecies that are unique to Ireland (Table 13.1). This chapter seeks to give an overview of the current state of Ireland's biodiversity, the pressures on it, the measures being taken to protect it and the challenges that lie ahead. Ireland's role in protecting biodiversity at European and global levels is also discussed.

## Habitats and Species in Ireland

Ireland has a wide diversity of habitats for its small size. Habitats of particular significance because of their scarcity in both Ireland and the rest of Europe include limestone pavement (such as in the Burren), turloughs, active peatlands, and intact sand and machair systems. The legacy of centuries of deforestation has meant that native woodlands survive only as tiny fragments but nevertheless include valuable oak, ash, yew and bog woods. Freshwater, coastal and marine habitats are relatively well represented. Of particular note are the west coast maerl beds (composed of deposits of calcareous algae), which support a diverse array of associated fauna.

In terms of flora, Ireland's flowering plants account for less than 5 per cent of the known species in the world and only 11 per cent of the total number of European species. However, the value of Ireland's floral diversity lies with its plant communities, which are ecologically highly significant (DAHGI, 1998). For example, Ireland has unique juxtapositions of Mediterranean flora (and fauna) with species of colder climates. Ireland is particularly rich in bryophytes (mosses and liverworts)

due to its mild wet climate and relatively unpolluted atmosphere, and has over 800 species (over 45% of the European flora) (DAHGI, 1998; Botanic Gardens, 2008). It is not known how many species of algae occur in Ireland but the number is thought to exceed 1,500. Many algae are aquatic; these include micro-algae (phytoplankton) such as diatoms and desmids and macro-algae such as seaweeds. Of the freshwater algae, the most familiar are the stoneworts, of which there are 25 species (10% of the global figure). Ireland has almost 1,000 native lichen species (over 30% of the European list), which makes it important in an international context. Lichens are plants that consist of a fungus in close association with an alga. They are sensitive to air pollution and have been used extensively as indicators of air quality. Since Ireland has comparatively low levels of air pollution, certain species are particularly abundant in Ireland relative to continental Europe. Approximately 3,500 species of fungi have been recorded in Ireland but the true figure is believed to be closer to 7,800 (or 0.5% of the global figure).



Some fungi are used commercially (e.g. yeasts, mushrooms, penicillin); others are essential to the survival of many plants and ecosystems (e.g. mycorrhizal fungi, which fix atmospheric nitrogen). The lichenicolous fungi parasitise lichens, and Ireland has an estimated 150 species (DAHGI, 1998; Botanic Gardens, 2008).

In terms of fauna, Ireland has some 35 terrestrial mammal species, including the greater white toothed shrew (*Crocidura russula*) discovered in 2008 and two seal species. Irish waters are among Europe's richest for cetaceans, 24 whale and dolphin species having been observed to date. There are some 200 regularly occurring bird species in Ireland, and the Irish red grouse (*Lagopus lagopus hibernicus*), jay (*Garrulus glandarius hibernicus*), dipper (*Cinclus cinclus hibernicus*) and coal tit (*Parus ater hibernicus*) are considered distinct endemic races unique to Ireland. Although Ireland has fewer breeding bird species than its neighbours, it does hold important numbers of species that are in decline or rare elsewhere. It is home to the largest breeding numbers of storm petrels (*Hydrobates pelagicus*) in the world, and holds very important breeding tern colonies; for example, Rockabill Island, Co. Dublin has Europe's largest colony of roseate tern (*Sterna dougallii*). Ireland also boasts one of the largest populations of choughs (*Pyrrhocorax pyrrhocorax*) in Europe, and is an important destination for many migratory birds of international significance, e.g. Greenland white-fronted goose (*Anser a. flavirostris*). There are three amphibian species in Ireland: the smooth newt (*Triturus vulgaris*), and common frog (*Rana temporaria*), both of which are relatively widespread, and natterjack toad (*Bufo calamita*), which is restricted to coastal sites

in Co. Kerry and an introduction site in Co. Wexford. The viviparous lizard (*Lacerta vivipara*) is Ireland's only native land reptile, joined recently by the slow worm (*Anguis fragilis*), which has been introduced in the Burren. Leatherback turtles (*Dermochelys coriacea*) are regularly found in Irish waters.

Ireland's great lakes and rivers and their wildlife are an integral part of the fabric of the country, not only from an economic point of view but also culturally and aesthetically. They are rightly regarded by many at home and abroad as jewels in our national heritage. They are home to 28 freshwater fish species, half of which are non-native (Fitzsimons and Igoe, 2004). Ireland still has some of the best Atlantic salmon (*Salmo salar*) and trout (*Salmo trutta*) rivers in western Europe, though these species are subject to multiple threats from human activities. Other notable native species include the pollan (*Coregonus autumnalis*), the arctic char (*Salvelinus alpinus*) and the twaite shad (*Alosa fallax*), all of which are under threat (Igoe, 2004; Maitland, 2004).

Ireland is home to an estimated 16,000 species of invertebrate, many of which are marine and most of which have received very little attention. Invertebrate species include sponges, echinoderms (starfish), worms, leeches, flatworms, roundworms, molluscs and arthropods (including insects, crustaceans and spiders). Examples of notable invertebrates include the Kerry slug (*Geomalacus maculosus*) and internationally important populations of the threatened freshwater pearl mussel (*Margaritifera margaritifera*), the freshwater crayfish (*Austropotomobius pallipes*), and the marsh fritillary butterfly (*Euphydryas aurinia*) (National Parks and Wildlife Service (NPWS), 2008a).

## Legislative and Policy Framework

### International and European Frameworks and Conventions

The EU and Ireland are party to a number of international conventions on nature conservation, including the

**Table 13.1** Ireland's Biodiversity – Estimated Number of Species (Botanic Gardens, 2008; Birdwatch Ireland, 2008; DAHGI, 1998)

Taxonomic Group	Approximate Number of Species
Vascular plants	812 native flowering plants; 3 native conifers; 1,108 alien seed plants; 78 native ferns
Bryophytes	584 mosses; 228 liverworts; 3 hornworts
Algae	700-1,000 desmids (freshwater microalgae); 579 marine
Lichens	957
Lichenicolous fungi	150
Fungi	>3,500
Mammals	~35 terrestrial; 24 whale and dolphin species observed
Birds	~450 observed; ~200 regularly occurring
Reptiles	3
Amphibians	3
Freshwater fish	28
Invertebrates	~16,000
Microbes	Unknown



Bonn Convention (on conservation of migratory species of wild animals), the CITES Convention (on international trade in endangered species of flora and fauna), the Berne Convention (on the conservation of European wildlife and habitats), the OSPAR Convention (on the protection of the marine environment of the North East Atlantic), the RAMSAR Convention (on wetlands) and, most significantly, the 1992 Rio Convention on Biological Diversity (CBD). The CBD aims to ensure the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources.

To take forward the CBD, the EU adopted a Biodiversity Strategy in 1998. EU Heads of State and Government subsequently made commitments (EU Spring Council 2001, World Summit for Sustainable Development 2002) to halt the decline of biodiversity in the EU, and significantly reduce the current rate of loss globally, by 2010. The European Commission Communication in 2006 (EC, 2006a) sets out the measures required to halt biodiversity loss and the responsibilities of EU institutions and member states. The Communication identified ten priority objectives across four key policy areas – biodiversity in the EU, the EU and global biodiversity, biodiversity and climate change, and the knowledge base.

### Special Areas of Conservation and Special Protected Areas

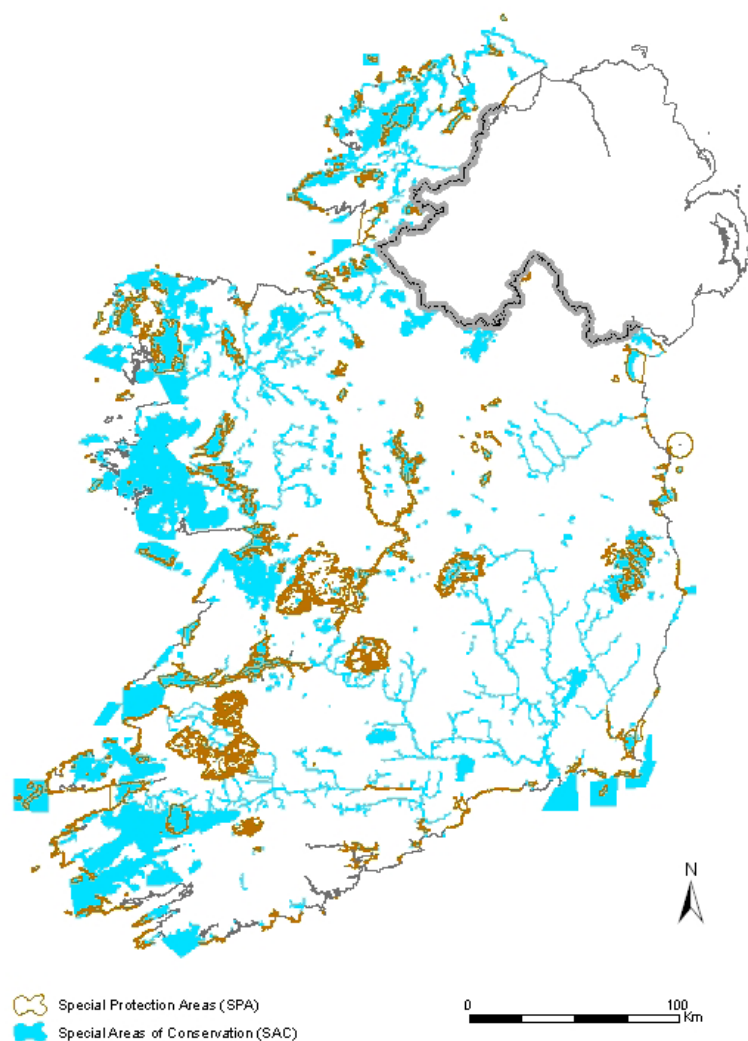
Much of our domestic biodiversity policy is influenced by European legislation, notably the Habitats Directive (Council of the European Communities (CEC), 1992) and the Birds Directive (CEC, 1979) (and the Water Framework Directive – see Chapter 5). The main objective of the Habitats Directive is to achieve

favourable conservation status of the habitats and species referred to in the annexes to the directive (Tables 13.2 and 13.3). This is achieved by designating key sites where there are habitats or species of European importance as Special Areas of Conservation (SACs), and also by introducing protective measures for species considered at risk. The Birds Directive requires Ireland to designate areas, known as Special Protection Areas (SPAs), for the habitats of birds of European importance. The sites designated by the two directives form the Natura 2000 network, the

cornerstone of EU nature protection policy. Conservation measures are required for the protection of both SACs and SPAs, which include strict conditions on any development in or near these sites.

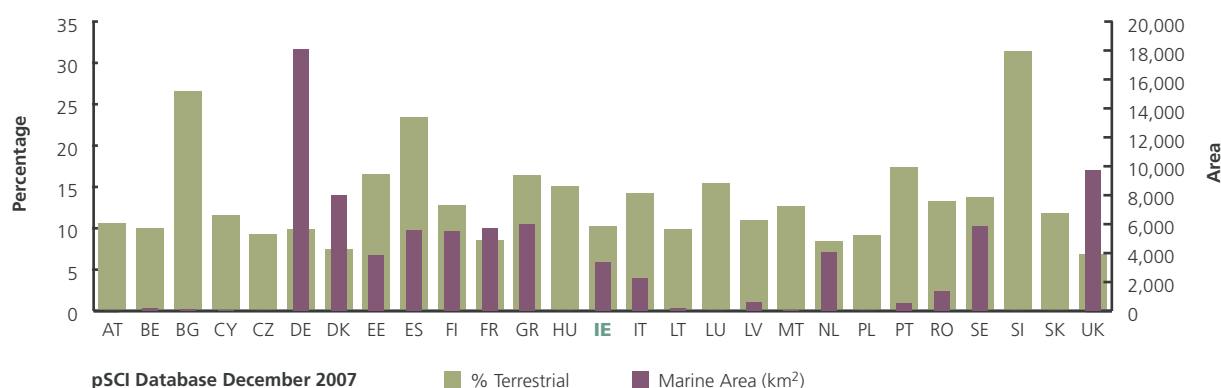
Natura 2000 covers around 20 per cent of the EU's terrestrial territory and significant marine areas. The European Commission reports 413 Sites of Community Importance (SCIs – an intermediate step before full SAC status) in Ireland, covering an area of over one million hectares; 92 of these are marine sites covering

**Map 13.1 Special Areas of Conservation and Special Protection Areas in the Republic of Ireland**



SAC and SPA data provided by kind permission of National Parks and Wildlife Service ([www.npws.ie](http://www.npws.ie))

**Figure 13.1** Proportion of Member State Land Area and Marine Surface Area Included in the Natura 2000 Network – Sites of Community Interest under the Habitats Directive – December 2007 (Source: European Commission)



over 330,000 ha. It also reports 131 SPAs covering an area of 280,000 ha; 66 of these are marine sites covering over 80,000 ha (see Map 13.1) (EC, 2007a). However, the NPWS state that they have now designated 423 SACs and 147 SPAs (C. O’Keeffe, *pers. comm.*). A recent assessment of the Irish conservation designation lists by the European Commission indicates that the state’s SPA list and its SCI list are incomplete (Figures 13.1 and 13.2). Indeed, in December 2007 the European Court of Justice ruled that Ireland had failed to fulfil its obligations under EU law in relation to the designation, classification and protection of wild

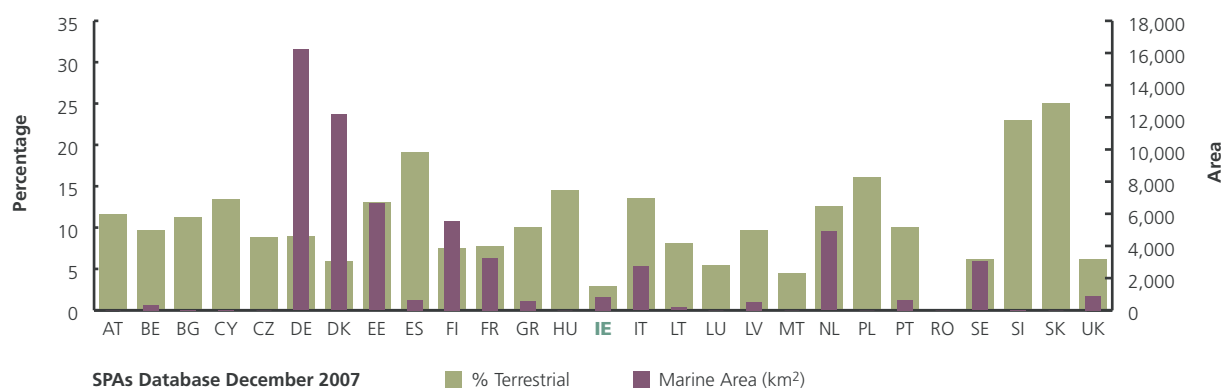
bird SPAs and in the protection of several significant bird species (C-418/04).

Ireland is required to report to the EC at six-yearly intervals on the implementation of the Habitats Directive; the most recent report was submitted in December 2007 (under Article 17). This report includes a first baseline assessment of the conservation status of habitats and species that are afforded protection by the directive. Each assessment includes an evaluation of the range, habitat area, habitat structure and functions, species population estimates, area of suitable habitat for each species and future prospects,

and concludes with an overall verdict of good, inadequate or bad, following EU guidance (see Tables 13.2 and 13.3). The assessments evaluate conservation status on a national level and not just within protected areas.

Many of Ireland’s most important habitats are reported to be of bad conservation status, including our dune systems, raised and blanket bogs, oligotrophic lakes, fens and mires, natural grasslands and woodlands. Certain protected species, particularly of wetland and aquatic environments, are also reported to be of bad conservation status, such as the Atlantic salmon

**Figure 13.2** Proportion of Member State Land Area and Marine Surface Area Included in the Natura 2000 Network – Special Protection Areas under the Birds Directive – December 2007 (Source: European Commission)



and freshwater pearl mussel. The key threats to these important habitats and species have been identified as direct habitat damage; overgrazing and undergrazing; water pollution; unsustainable exploitation; invasive alien species; and recreational pressure (NPWS, 2008b). In addition, in January 2007 the European Court of Justice ruled that Ireland did not have in place a system of strict protection for Annex IV species (see Table 13.2) due to inadequate monitoring arrangements and deficient procedures to protect species from development projects (C-183/05). Certain derogations under the Wildlife Act, 1976 were also found to be incompatible with EU law.

There are various controls in place to protect Natura 2000 sites, including the Planning Acts and Natural Habitats Regulations; sectoral initiatives such as forestry guidelines and the Rural Environment Protection Scheme (REPS); and the NPWS farm plan scheme. Designated areas attract payments to farmers through REPS and the NPWS farm plan scheme based on an agreed approach on how to manage farming in and around wildlife habitats. The NPWS has agreed farming prescriptions for some (but not all) habitats with the relevant farming organisations. Certain activities, known as notifiable actions, that might be damaging to protected areas can only be carried out with the consent of the Minister for Environment, Heritage and Local Government. In addition, under the Environmental Liabilities Directive (2004/35/EC) operators of certain activities may be financially liable for causing or threatening to cause environmental damage, including prevention or remediation of damage to protected habitats and species. However, the Environmental

Liabilities Directive has not yet been transposed into Irish law. It is clear that more proactive management and protection of protected sites will be required to address the issues raised by the conservation status assessment. Since 2001, over 200 draft management plans have been prepared for Natura 2000 areas, of which 45 have been finalised and published.

### **National Legislative and Policy Framework**

#### **National Legislation and Designations**

The Wildlife Act 1976 is the principal national legislation providing protection of wildlife (both flora and fauna) and the control of activities that may impact adversely on the conservation of wildlife. Under the Act all bird species and some 60 other animal species are afforded protected status, as are 89 species of flora under the Flora Protection Order 1999. As the habitat/site protection measures in the Act were relatively weak, nature conservation legislation was substantially enlarged and improved by the Wildlife Amendment Act 2000 and the European Union (Natural Habitats) Regulations 1997–2005, largely to implement EU legislation. Under the Whale Fisheries Act 1937, the hunting of all whale species, including dolphins and porpoises, is totally banned within the fisheries limits of the state, and Irish-registered ships are banned from hunting certain whales outside the fisheries limit of the state.

The basic national protected area designation is the Natural Heritage Area (NHA). To date 75 raised bogs have been given legal protection, covering some 23,000 ha. These raised bogs are located mainly in the midlands. A further 73 blanket bogs, covering 37,000 ha, mostly in

western areas are also designated NHAs. In addition, there are 630 proposed NHAs (pNHAs), covering approximately 65,000 ha, which were published on a non-statutory basis in 1995 but have since not been statutorily proposed or designated and thus are vulnerable to damaging activities. These pNHAs and potential new sites are being surveyed and reviewed; designation of a final list of NHAs will proceed on a phased basis over the coming years. The Geological Survey of Ireland is compiling a list of geological/geomorphological sites in need of protection through NHA designation. Other protected areas in the State include 6 National Parks, 78 Statutory Nature Reserves, 7 Refuges for Flora and Fauna and 68 Wildfowl Sanctuaries. There is considerable overlap in areas designated at national and European level and any area may have more than one designation.

#### **Development, Planning and Biodiversity**

Better planning at national, regional and local levels holds the key to preventing, minimising and offsetting potential negative impacts of development on biodiversity (EC, 2006a). The Planning Acts have been consolidated and revised by the Planning and Development Act 2000. Under the Act each local authority has responsibility to determine policy in its area through the making of a Development Plan. Development Plans must include mandatory objectives for the conservation of the natural heritage and for the conservation of European sites and any other sites that may be prescribed. There are also discretionary powers to set objectives for the conservation of a variety of other elements of the natural heritage. A planning authority must refer all planning applications

**Table 13.2** Assessment of Each Attribute and Overall Conservation Status of Species Listed in Annexes of the Habitats Directive (NPWS, 2008b)

Code	Species Name	Annex*	Range	Population	Suitable Habitat	Future Prospects	Overall
1421	Killarney Fern ( <i>Trichomanes speciosum</i> )	II, IV	Good	Good	Good	Good	Good
1528	Marsh Saxifrage ( <i>Saxifraga hirculus</i> )	II, IV	Good	Good	Good	Good	Good
1833	Slender Naiad ( <i>Najas flexilis</i> )	II, IV	Good	Poor	Poor	Good	Poor
1393	Slender Green Feather-Moss ( <i>Hamatocaulis vernicosus</i> )	II, IV	Good	Good	Good	Good	Good
1395	Petalwort ( <i>Petalophyllum ralfsii</i> )	II, IV	Good	Good	Good	Good	Good
1376	Maerl ( <i>Lithothamnion corralloides</i> )	V	Good	Unknown	Unknown	Poor	Poor
1377	Maerl ( <i>Phymatolithon calcareum</i> )	V	Good	Unknown	Unknown	Poor	Poor
1400	White Cushion Moss ( <i>Leucobryum glaucum</i> )	V	Good	Good	Poor	Good	Poor
1409	<i>Sphagnum</i> genus	V	Good	Good	Poor	Poor	Poor
1413	<i>Lycopodium</i> species group	V	Good	Poor	Poor	Poor	Poor
5113	<i>Cladonia</i> subgenus <i>Cladina</i>	V	Good	Good	Poor	Poor	Poor
1013	Geyer's Whorl Snail ( <i>Vertigo geyeri</i> )	II	Good	Poor	Poor	Poor	Poor
1014	Narrow-mouthed Whorl Snail ( <i>Vertigo angustior</i> )	II	Good	Poor	Poor	Poor	Poor
1016	Desmoulin's Whorl Snail ( <i>Vertigo moulinsiana</i> )	II	Bad	Bad	Poor	Bad	Bad
1024	Kerry Slug ( <i>Geomalacus maculosus</i> )	II, IV	Good	Good	Good	Good	Good
1029	Freshwater Pearl Mussel ( <i>Margaritifera margaritifera</i> )	II, V	Good	Bad	Bad	Bad	Bad
1990	Nore Freshwater Pearl Mussel ( <i>Margaritifera durrovensis</i> )	II, V	Bad	Bad	Bad	Bad	Bad
1092	White-Clawed Crayfish ( <i>Austropotamobius pallipes</i> )	II, V	Poor	Poor	Poor	Poor	Poor
1065	Marsh Fritillary ( <i>Euphydryas aurinia</i> )	II	Good	Poor	Poor	Poor	Poor
1095	Sea Lamprey ( <i>Petromyzon marinus</i> )	II	Poor	Poor	Poor	Poor	Poor
1099	River Lamprey ( <i>Lampetra fluviatilis</i> )	II, V	Good	Good	Good	Good	Good
1096	Brook Lamprey ( <i>Lampetra planeri</i> )	II	Good	Good	Good	Good	Good
1102	Allis Shad ( <i>Alosa alosa</i> )	II, V	Good	Unknown	Unknown	Unknown	Unknown
5046	Killarney Shad ( <i>Alosa fallax killarnensis</i> )	II, V	Good	Good	Good	Good	Good
1103	Twaite Shad ( <i>Alosa fallax fallax</i> )	II, V	Good	Bad	Unknown	Poor	Bad
5076	Pollan ( <i>Coregonus autumnalis</i> )	V	Good	Bad	Poor	Poor	Bad
1106	Atlantic Salmon ( <i>Salmo salar</i> )	II, V	Good	Bad	Poor	Poor	Bad
1202	Natterjack Toad ( <i>Bufo calamita</i> )	IV	Bad	Bad	Poor	Poor	Bad
1213	Common Frog ( <i>Rana temporaria</i> )	V	Good	Good	Poor	Good	Poor
1223	Leatherback Turtle ( <i>Dermochelys coriacea</i> )	IV	Unknown	Unknown	Unknown	Poor	Poor
1303	Lesser Horseshoe Bat ( <i>Rhinolophus hipposideros</i> )	II, IV	Good	Good	Good	Good	Good
1309	Common Pipistrelle ( <i>Pipistrellus pipistrellus</i> )	IV	Good	Good	Good	Good	Good
5009	Soprano Pipistrelle ( <i>Pipistrellus pygmaeus</i> )	IV	Good	Good	Good	Good	Good
1317	Nathusius' Pipistrelle ( <i>Pipistrellus nathusii</i> )	IV	Good	Good	Good	Good	Good
1322	Natterer's Bat ( <i>Myotis nattereri</i> )	IV	Good	Good	Good	Good	Good
1314	Daubenton's Bat ( <i>Myotis daubentonii</i> )	IV	Good	Good	Good	Good	Good
1330	Whiskered Bat ( <i>Myotis mystacinus</i> )	IV	Good	Good	Good	Good	Good
1320	Brandt's Bat ( <i>Myotis brandtii</i> )	IV	Good	Good	Good	Good	Good
1326	Brown Long-Eared Bat ( <i>Plecotus auritus</i> )	IV	Good	Good	Good	Good	Good
1331	Leisler's Bat ( <i>Nyctalus leisleri</i> )	IV	Good	Good	Good	Good	Good
1334	Irish Hare ( <i>Lepus timidus hibernicus</i> )	V	Good	Unknown	Poor	Good	Poor
1355	Otter ( <i>Lutra lutra</i> )	II, IV	Good	Poor	Good	Good	Poor
1357	Pine Marten ( <i>Martes martes</i> )	V	Good	Good	Good	Good	Good
1364	Grey Seal ( <i>Halichoerus grypus</i> )	II, V	Unknown	Good	Good	Good	Good



Code	Species Name	Annex*	Range	Population	Suitable Habitat	Future Prospects	Overall
1365	Common (Harbour) Seal ( <i>Phoca vitulina vitulina</i> )	II, V	Unknown	Good	Good	Good	Good
1345	Humpback Whale ( <i>Megaptera novaeangliae</i> )	IV	Unknown	Unknown	Unknown	Unknown	Unknown
1349	Bottle-Nosed Dolphin ( <i>Tursiops truncatus</i> )	II, IV	Good	Unknown	Good	Good	Good
1350	Common Dolphin ( <i>Delphinus delphis</i> )	IV	Good	Unknown	Good	Good	Good
1351	Harbour Porpoise ( <i>Phocoena phocoena</i> )	II, IV	Good	Good	Good	Good	Good
2027	Killer Whale ( <i>Orcinus orca</i> )	IV	Unknown	Unknown	Unknown	Unknown	Unknown
2029	Long-Finned Pilot Whale ( <i>Globicephala melas</i> )	IV	Unknown	Unknown	Unknown	Unknown	Unknown
1348	Risso's Dolphin ( <i>Grampus griseus</i> )	IV	Unknown	Unknown	Unknown	Unknown	Unknown
2031	White-Sided Dolphin ( <i>Lagenorhynchus acutus</i> )	IV	Good	Unknown	Good	Good	Good
2032	White-Beaked Dolphin ( <i>Lagenorhynchus albirostris</i> )	IV	Unknown	Unknown	Unknown	Unknown	Unknown
2034	Striped Dolphin ( <i>Stenella coeruleoalba</i> )	IV	Unknown	Unknown	Unknown	Unknown	Unknown
2035	Cuvier's Beaked Whale ( <i>Ziphius cavirostris</i> )	IV	Unknown	Unknown	Unknown	Unknown	Unknown
2038	Sowerby's Beaked Whale ( <i>Mesoplodon bidens</i> )	IV	Unknown	Unknown	Unknown	Unknown	Unknown
2618	Minke Whale ( <i>Balaenoptera acutorostrata</i> )	IV	Good	Unknown	Good	Good	Good
2621	Fin Whale ( <i>Balaenoptera physalus</i> )	IV	Good	Unknown	Good	Good	Good
5020	Blue Whale ( <i>Balaenoptera musculus</i> )	IV	Unknown	Unknown	Unknown	Unknown	Unknown
5031	Sperm Whale ( <i>Physeter catodon</i> )	IV	Unknown	Unknown	Unknown	Unknown	Unknown
5033	Northern Bottlenose Whale ( <i>Hyperoodon ampullatus</i> )	IV	Unknown	Unknown	Unknown	Unknown	Unknown
2619	Sei Whale ( <i>Balaenoptera borealis</i> )	IV	Unknown	Unknown	Good	Unknown	Unknown
1348	Northern Right Whale ( <i>Eubalaena glacialis</i> )	IV	Vagrant	Vagrant	Vagrant	Vagrant	Vagrant
5029	False Killer Whale ( <i>Delphinapterus lucas</i> )	IV	Vagrant	Vagrant	Vagrant	Vagrant	Vagrant
2037	True's Beaked Whale ( <i>Mesoplodon mirus</i> )	IV	Vagrant	Vagrant	Vagrant	Vagrant	Vagrant
2622	Pygmy Sperm Whale ( <i>Kogia breviceps</i> )	IV	Vagrant	Vagrant	Vagrant	Vagrant	Vagrant
5029	Beluga/White Whale ( <i>Delphinapterus leucas</i> )	IV	Vagrant	Vagrant	Vagrant	Vagrant	Vagrant
5034	Gervais' Beaked Whale ( <i>Mesoplodon europaeus</i> )	IV	Vagrant	Vagrant	Vagrant	Vagrant	Vagrant

\* Annex II species require the designation of SACs for their conservation; Annex IV species are in need of strict protection; Annex V species are those whose taking in the wild and exploitation may be subject to management measures.

**Table 13.3** Assessment of Each Attribute and Overall Conservation Status of Habitats Listed in Annex 1 of the Habitats Directive (NPWS, 2008b)

Code	Habitat Name (summarised)	Range	Area	Structure & Functions (Condition)	Future Prospects	Overall
1110	Sandbanks	Good	Good	Good	Poor	Poor
1130	Estuaries	Good	Good	Unknown	Poor	Poor
1140	Tidal Mudflats and Sandflats	Good	Good	Poor	Poor	Poor
1150	Coastal Lagoons*	Good	Poor	Bad	Poor	Bad
1160	Large Shallow Inlets and Bays	Good	Good	Unknown	Poor	Poor
1170	Reefs	Good	Unknown	Poor	Poor	Poor
1210	Annual Vegetation of Drift Lines	Good	Poor	Good	Poor	Poor
1220	Perennial Vegetation of Stony Banks	Good	Poor	Poor	Poor	Poor
1230	Vegetated Sea Cliffs	Good	Good	Poor	Poor	Poor
1310	Salicornia Mud	Good	Poor	Poor	Poor	Poor
1320	<i>Spartina</i> Swards	Good	Poor	Good	Poor	Poor
1330	Atlantic Salt Meadows	Good	Poor	Poor	Poor	Poor
1410	Mediterranean Salt Meadows	Good	Good	Poor	Poor	Poor

Code	Habitat Name (summarised)	Range	Area	Structure & Functions (Condition)	Future Prospects	Overall
1420	Halophilous Scrub	Good	Bad	Poor	Bad	Bad
2110	Embryonic Shifting Dunes	Good	Poor	Poor	Poor	Poor
2120	Marram Dunes (White Dunes)	Good	Bad	Bad	Bad	Bad
2130	Fixed Dunes (Grey Dunes)*	Good	Poor	Bad	Bad	Bad
2140	Decalcified Empetrum Dunes*	Good	Good	Bad	Poor	Bad
2150	Decalcified Dune Heath*	Good	Good	Bad	Poor	Bad
2170	Dunes with Creeping Willow	Good	Good	Poor	Poor	Poor
2190	Humid Dune Slacks	Good	Poor	Poor	Bad	Bad
2IA0	Machair*	Good	Poor	Bad	Bad	Bad
3110	Lowland Oligotrophic Lakes	Good	Good	Bad	Bad	Bad
3130	Upland Oligotrophic Lakes	Good	Good	Bad	Bad	Bad
3140	Hard Water Lakes	Good	Good	Bad	Bad	Bad
3150	Natural Eutrophic Lakes	Unknown	Unknown	Unknown	Bad	Bad
3160	Dystrophic Lakes	Good	Unknown	Bad	Bad	Bad
3180	Turloughs*	Good	Good	Poor	Poor	Poor
3260	Floating River Vegetation	Good	Good	Bad	Bad	Bad
3270	Chenopodium rubri	Good	Good	Good	Good	Good
4010	Wet Heath	Good	Unknown	Bad	Bad	Bad
4030	Dry Heath	Good	Good	Poor	Poor	Poor
4060	Alpine and Subalpine Heath	Good	Poor	Poor	Poor	Poor
5130	Juniper Scrub	Good	Poor	Poor	Poor	Poor
6130	Calaminarian Grassland	Good	Good	Good	Poor	Poor
6210	Orchid-Rich Grassland/Calcareous Grassland*	Good	Bad	Bad	Bad	Bad
6230	Species-Rich Nardus Upland Grassland*	Good	Bad	Bad	Bad	Bad
6410	Molinia Meadows	Good	Bad	Bad	Bad	Bad
6430	Hydrophilous Tall Herb	Good	Good	Poor	Poor	Poor
6510	Lowland Hay Meadows	Bad	Bad	Bad	Bad	Bad
7110	Raised Bog (Active)*	Bad	Bad	Bad	Bad	Bad
7120	Degraded Raised Bogs	Good	Good	Poor	Poor	Poor
7130	Blanket Bog (Active)*	Good	Bad	Poor	Bad	Bad
7140	Transition Mires	Good	Good	Bad	Bad	Bad
7150	Rhynchosporion Depressions	Good	Good	Good	Good	Good
7210	Cladium Fens*	Good	Good	Bad	Bad	Bad
7220	Petrifying Springs*	Good	Good	Bad	Bad	Bad
7230	Alkaline Fens	Good	Good	Bad	Bad	Bad
8110	Siliceous Scree	Good	Poor	Poor	Poor	Poor
8120	Calcareous Scree	Good	Poor	Poor	Poor	Poor
8210	Calcareous Rocky Slopes	Good	Poor	Poor	Poor	Poor
8220	Siliceous Rocky Slopes	Good	Poor	Poor	Poor	Poor
8240	Limestone Pavement*	Good	Poor	Poor	Poor	Poor
8310	Caves	Good	Unknown	Good	Good	Good
8330	Sea Caves	Good	Unknown	Good	Good	Good
91A0	Old Oak Woodlands	Good	Bad	Bad	Bad	Bad
91D0	Bog Woodland*	Good	Poor	Poor	Poor	Poor
91E0	Residual Alluvial Forests*	Good	Bad	Bad	Bad	Bad
91J0	Yew Woodlands*	Bad	Bad	Bad	Bad	Bad

\* Priority habitats – those that the EU considers require particular protection because their global distribution largely falls within the EU and they are in danger of disappearance.

that might have significant effects in relation to nature conservation to the Minister for the Environment, Heritage and Local Government. The Birds and Habitats Directives, Environmental Impact Assessment (EIA) Directive (85/337/EEC as amended by 97/11/EC), and Strategic Environmental Assessment (SEA) Directive (Directive 2001/42/EC) all require the consideration of potential development impacts on biodiversity. There needs to be improved coherence at national level between various plans and programmes affecting biodiversity and it must be ensured that decision-making at regional and local levels is consistent with high-level commitments for biodiversity (EC, 2006a).

#### The National Biodiversity Plan

The National Biodiversity Plan 2002–2006 (DEHLG, 2002) is the main tool by which Ireland seeks to meet its commitments under the Convention on Biological Diversity and the EC Biodiversity Strategy. An Inter-Departmental Steering Group oversees its implementation. The plan contains 91 actions aimed at securing the conservation and sustainable use of biodiversity in Ireland and, where possible, its enhancement. It also aims to contribute to the conservation and sustainable use of biodiversity globally. A key concept of the plan is that every sector of society shares responsibility for the conservation and sustainable use of biodiversity. The focus of the plan is, therefore, to integrate biodiversity concerns into all sectoral activities over time. Following recommendations on implementation of the plan (Comhar, 2004), an interim review was published in 2005 (Department of the Environment, Heritage and Local Government (DEHLG), 2005). The DEHLG stated that at that stage 23

actions had been completed, with progress reported on most (60) of the remaining actions. A Second National Biodiversity Plan (2008–2012) is under development.

Under the National Biodiversity Plan 2002–2006, each local authority is required to prepare a Local Biodiversity Action Plan (LBAP) to ensure the conservation and sustainable use of biodiversity at the local level and to undertake awareness-raising initiatives. This should include the protective zoning of locally important biodiversity-rich areas in development plans. While most local authorities (27 out of 34) have appointed Heritage Officers, very few have appointed Biodiversity Officers to deal specifically with nature conservation matters. A network of locally protected areas is needed to complement and enhance the coherence of sites designated at the national or European level and to ensure that locally important areas for biodiversity are protected.

Under the National Biodiversity Plan the NPWS is committed to preparing Species Action Plans (SAPs) for species of highest conservation concern. SAPs for the otter, Kerry slug, red squirrel, Killarney fern and the nine Vesper bat species were published in 2008 and SAPs covering the Irish hare, corncrake, pollan, and Irish lady's tresses orchid were published in 2005. A conservation plan for the natterjack toad was published in 2002. Plans in preparation will focus on cetaceans and the freshwater pearl mussel. The SAPs have been prepared on an all-Ireland basis where appropriate, given that the island comprises a single biogeographical unit, and the benefits of joint work and pooling of resources north and south to protect our natural heritage are clear (NPWS, 2008c).

Figure 13.3 Irish Hare



The NPWS and the Northern Ireland Environment Agency (NIEA) are currently assessing and prioritising species for conservation, which may be published as red data books and lists. A Regional Red List of Irish Bees was recently published (Fitzpatrick *et al.*, 2006), which identified that of the 102 Irish bee species, 16 are considered to be either critically endangered or endangered. More than half of the bumblebee species and 45 per cent of the solitary bee species in Ireland are showing evidence of decline. A species conservation priority list and actions are proposed.

A recent assessment of the population status of Ireland's birds indicates that of the 199 species assessed, 25 were placed on the red list (i.e. of most conservation concern), 85 on the amber list (generally of unfavourable conservation status) and 89 on the green list (of least concern). The number of red-listed species has increased by seven and amber-listed species by eight since the first review in 1999. The roseate tern and the

hen harrier (*Circus cyaneus*) are the only red-listed species identified in 1999 to have since improved in conservation status. The corn bunting (*Miliaria calandra*) has become extinct as a breeding bird in Ireland and several of the remaining red-listed species are in danger of extinction in Ireland, including the common scoter (*Melanitta nigra*), black-necked grebe (*Podiceps nigricollis*), quail (*Coturnix coturnix*), red-necked phalarope (*Phalaropus lobatus*) and nightjar (*Caprimulgus europaeus*) (Lynas *et al.*, 2007). As noted earlier, the European Court of Justice recently found that Ireland has failed to put in place a coherent set of measures to promote conservation of bird populations (C-418/04).

Although not proposed as an action in the first National Biodiversity Plan, native bird species reintroductions in Ireland have engendered much public interest and support. A golden eagle (*Aquila chrysaetos*) reintroduction programme co-funded between 2001 and 2006 by the EU's Life-Nature Programme resulted in much positive publicity with the hatching of a chick for the first time in 100 years in this country. Other recent native species reintroductions include the release in July 2007 of 30 young red kites in Co. Wicklow and several young white-tailed eagles in Killarney National Park.

A National Strategy for Plant Conservation in Ireland has been developed as a response to the Global Strategy for Plant Conservation (GSPC), adopted by the CBD in 2002 ([www.botanicgardens.ie/gspc/gspc.htm](http://www.botanicgardens.ie/gspc/gspc.htm)). The strategy is making progress in relation to understanding, documenting and conserving wild plant diversity in Ireland, for example through providing recent online census

**Figure 13.4** The first Golden Eagle Chick hatched in Ireland in approximately 100 years (Photo courtesy of Lorcan O'Toole, Golden Eagle Trust)



catalogues of bryophytes, vascular plants and marine and freshwater algae and preliminary checklists of all plant and fungi species. The conservation of the genetic diversity of wild species forms an important part of the strategy, which may require more attention in the future.

### Biodiversity in the Wider Countryside and the Impact of Selected Sectors

EU and national approaches recognise that biodiversity is not evenly spread, and that certain species are more at risk than others. Consequently they afford special attention to the protection of sites of highest nature value and species most at risk. However, they also recognise that much of our biodiversity lies outside protected areas, and effective conservation and sustainable use of biodiversity and the maintenance of essential ecosystem services require action in the wider countryside. Protected areas and the conservation of threatened species will not be viable in the long term without a wider freshwater, terrestrial and

marine environment favourable to biodiversity. In this regard it is important to advance implementation of framework Directives, that reduce pressure on biodiversity by protecting the quality of our water, air and soils and reduce diffuse pollution (e.g. from pesticides, nitrates).

The primary threat to biodiversity both within and outside protected areas is from habitat degradation, fragmentation and loss. This has largely been caused by changes in agricultural practices (such as intensification), poorly managed commercial forestry, fisheries overexploitation, peat extraction, air and water pollution, invasive alien species, land clearance and development, tourism and recreational activities and climate change. Pressures on biodiversity are increasing with growth in population, use of resources and change in land use, urbanisation, road-building and infrastructure development. Therefore integration of biodiversity protection into regional and sectoral development also has a major role to play. The interactions between several important human activities and biodiversity are discussed below.

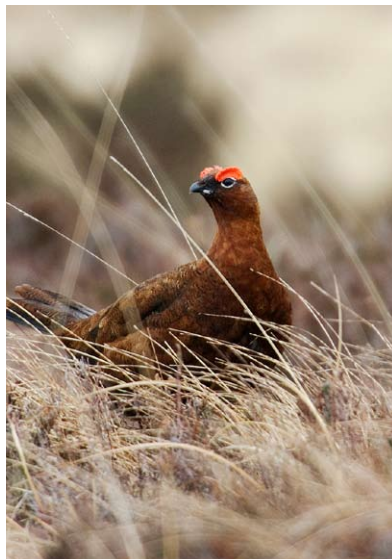


## Agriculture

Agriculture, in managing a large part of Ireland's terrestrial environment, has the potential to contribute significantly to the conservation of species and habitats. For example, the traditional low-intensity grazing system in the Burren, Co. Clare has contributed to maintaining one of Ireland's most important floristic habitats (see e.g. [www.burrenlife.com](http://www.burrenlife.com)). However, in recent decades intensification and specialisation, and to some extent under-utilisation of land, have had detrimental effects on biodiversity (for example through land drainage, nutrient enrichment, overgrazing and undergrazing) (DAHGI, 1998; NPWS, 2008b). The Common Agricultural Policy (CAP) was one of the main drivers of these

processes, but has been adapted to better integrate biodiversity needs in recent years (see box on overgrazing).

**Figure 13.5 Red Grouse**



Under the National Development Plan (NDP) 2007–2013, the government plans to spend over €6 billion on agricultural schemes with potentially positive environmental impacts. Implementation of agri-environment measures (such as REPS), organic farming and the support of Less Favoured Areas are likely to favour farmland biodiversity. The 2003 CAP reform promotes these and other pro-biodiversity measures. The stated objectives of REPS 4, which was launched in 2007, include increased emphasis on biodiversity, and enhancing high nature value farming, on traditional landscape, on water quality and on measures to combat climate change. The implementation of REPS involves very substantial sums of money, with almost €2.5 billion spent on the scheme from 1994 to 2007 (Department of Agriculture, Fisheries and Food (DAFF), 2007). REPS currently covers some 30 per cent of the land area of the state, and involves 55,000 farmers. The European Commission is to put in place a Common Monitoring and Evaluation Framework that, *inter alia*, will be used to evaluate the success of REPS, especially in the realm of biodiversity.

Measures under market and income policy, including the single farm payment (SFP) scheme (decoupling) and mandatory cross-compliance, should also benefit biodiversity. The SFP scheme, which commenced in 2005, applies to all farmers. Implementation of cross-compliance requires all applicants under the SFP scheme to maintain all their land in 'good agricultural and environmental condition' and comply with 19 Statutory Management Requirements. These include requirements relating to birds, habitats, groundwater, sewage sludge and nitrates.

## Overgrazing

The sharp increase in sheep numbers from 3.2 million to 8.9 million between 1980 and 1992, which was driven largely by the EC Ewe Premium, resulted in widespread sheep overgrazing which damaged upland habitats, particularly in the west of Ireland, leading to extensive erosion of peatlands and siltation of rivers. In June 2002 Ireland was condemned by the European Court of Justice (ECJ) on two counts: firstly for not protecting the 25,000 ha Owenduff-Nephin Beg Complex SPA in County Mayo from erosion damage caused by overstocking of land by sheep, and secondly for not protecting the wider habitats of the red grouse from similar damage (Case C-117/00). To address the issue of sheep overgrazing, 4,372 Commonage Framework Plans have been prepared, covering 439,840 ha. Despite destocking of hillsides under programmes such as the

Commonage Framework Plans, sheep numbers are still almost twice the 1980 population (CSO, 2007). Studies carried out in the Owenduff-Nephin Beg Complex in 2004/2005 showed poor levels of vegetation recovery, indicating that further steps are necessary there. The European Commission expressed concern that Ireland still had not carried out the necessary scientific studies to check the success or otherwise of sheep reduction measures across several hundred thousand hectares of uplands elsewhere in Ireland or put in place any necessary additional restrictive measures (EC, 2006b). More recently management measures have been put in place in the Owenduff-Nephin Beg Complex, which include off-wintering of sheep, and these measures are being considered for other overgrazed areas.

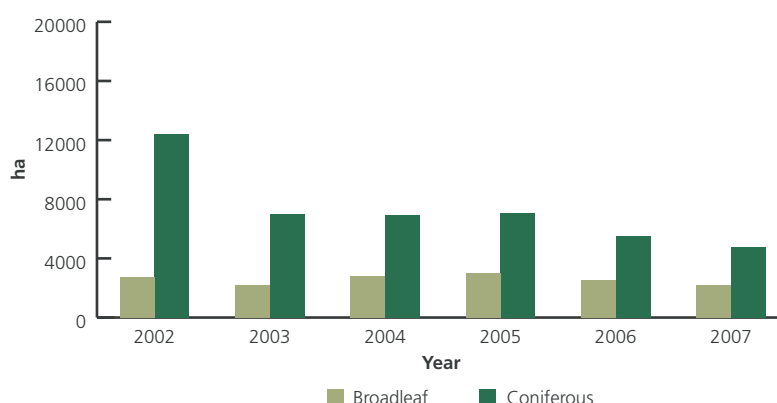


## Forestry

Forestry plantations can make a significant positive contribution to biodiversity in the landscape if properly planned and managed, but can have a significant negative effect if not. Many peatlands and other habitats of conservation value have been damaged over the years as a result of inappropriate planting (see e.g. Hickie, 1997; Foss, 1998) and concern has been expressed that areas of relatively high biodiversity, landscape and heritage value outside of protected areas may be adversely affected by forestry development (Heritage Council, 1999; Hickie, 2002). On the other hand, forestry in more intensively managed agricultural areas can potentially provide a valuable habitat for a wide array of flora and fauna.

Commercial forestry policies have favoured the planting of fast-growing, non-native coniferous species such as Sitka spruce (*Picea sitchensis*), monoculture plantations of which have very limited biodiversity value. Sitka spruce occupies 52 per cent of the total national forest area and monocultures make up approximately 45 per cent of all stands. Since 1997 policies have been in place to increase broadleaf planting, and the Rural Development Programme 2007–2013 sets a target of 30 per cent annual broadleaf afforestation. This target has been reached in recent years, but primarily through a reduction in afforestation using coniferous trees rather than an increase in planting of broadleaves (Figure 13.6). Currently, public (i.e. Coillte) and private (grant-aided) forests comprise similar proportions of conifers (80–85%) and broadleaves (~15%). However, other private forests are 80 per cent broadleaf to 20 per cent conifer. Native broadleaves now occupy 22

**Figure 13.6 Afforestation – Coniferous/Broadleaf Breakdown**  
(Source: Forest Service)



per cent of the total stocked forest area (Forest Service, 2007).

The Forest Service is implementing the principles of Sustainable Forest Management with a view to ensuring that all timber produced in Ireland is derived from sustainable forests. It has issued Forest Biodiversity Guidelines, which focus on the conservation and enhancement of biodiversity within forests through appropriate planning, conservation and management (Forest Service,

2000). The Code of Best Forest Practice and other guidelines on issues such as forest harvesting and water quality also contain biodiversity elements. Compliance with these guidelines is a condition of grant-aided projects, felling licences and all afforestation schemes. Guidance has also been recently issued on forestry and freshwater pearl mussel requirements (Forest Service, 2008). A GIS-based indicative forest strategy is being developed by the Forest

## BIOFOREST Research Project

The BIOFOREST project was a five-year project that looked at plants, birds, spiders and other invertebrates in over 100 forest sites throughout the country before planting and at different stages of the forest cycle and also investigated the effects of forest practice to improve biodiversity. The project was funded from the NDP funds through the EPA and the Council for Forest Research and Development (COFORD) and undertaken by University College Cork, Trinity College Dublin and Coillte. Fifty-seven recommendations were made as a result of the project, addressing aspects of forestry from

strategic planning to localised planning and practice and the consideration of biodiversity in forest establishment and management. These recommendations are currently under consideration by the Forest Service. For example, the project emphasised the importance of adequate biodiversity assessments of sites before decisions on planting are taken; the creation of mixed forestry stands in terms of age, structure and species; and the importance of retaining habitats of biodiversity significance that exist within plantations (Iremonger *et al.*, 2007).

Service to ensure the planting of the right trees in the right places in terms of socioeconomic and environmental criteria. The consideration of biodiversity issues in the Forest Management Plans of Coillte, which were prepared in 2004 and 2005, is also significant.

Other initiatives that have been undertaken in recent years to improve forest biodiversity include the People's Millennium Forest Project, which resulted in the restoration or creation of 16 native woodlands covering approximately 600 ha, and the Native Woodland Scheme, which offers grants to landowners to conserve native woods or create new woods from native seed (DEHLG, 2005). In 2007, a Forest Environment Protection Scheme was introduced on a pilot basis to encourage establishment of high nature value forestry on farms that participate in REPS (Department of Agriculture and Food, 2007).

### Fisheries, Aquaculture and Marine Biodiversity

Fisheries at European and national level have had damaging impacts both on commercially harvested fish stocks and on non-target species and habitats (see Chapter 9). While recent years have seen progress in

integrating biodiversity concerns into fisheries policy, it is too soon to judge its effectiveness. Considerable efforts are required under the Common Fisheries Policy to restore fish stocks, reduce impacts on non-target species and reduce damage to marine habitats. It is important that fishing capacity be adjusted to improve the balance with available fish stocks (EC, 2006a). Progress has been made in this respect with the introduction of a Decommissioning Scheme, which aims to withdraw capacity from the whitefish sector of the Irish fishing fleet.

In 2006 Ireland became the first EU country to formally propose four important coral reef sites as SACs, covering an area the size of Co. Wexford. These reefs occur between 400 and 1200 m deep along the edge of the Continental Shelf, and scientists have estimated some to be over 4,500 years old. Planning is currently under way to conduct a long-term mapping and monitoring programme at each of these sites to ensure their protection. Surveys are also being undertaken of marine sandbanks, large shallow inlets and bays, and estuaries in order to facilitate the conservation of these habitats and dependent species.

The EU Marine Strategy Framework Directive (2008/56/EC) seeks to achieve environmentally healthy waters by 2020. This will be achieved by establishing marine strategies for marine regions and sub-regions, which will be managed by member states in an integrated manner based on environmental criteria. This directive will complement the Water Framework Directive and help to ensure that human activities that impact on the aquatic environment are kept within sustainable levels. Significantly, the Directive obliges member states to establish a network of marine protected areas. It is also expected that the EC will adopt Community plans of action for the conservation of sharks and seabirds in the near future (EC, 2006a).

The NDP seeks to continue development of the aquaculture industry. It is vital that biodiversity considerations be incorporated into any proposed development, particularly given the fact that much aquaculture activity takes place in areas of high conservation importance including Natura 2000 sites. Significant concerns have been raised about the aquaculture licensing system in Ireland and the potential impact of aquaculture on nature conservation (Comhar, 2004; Galvin, 2000) and the European Court ruled against Ireland on this issue in December 2007 (C-418/04). In addition, marine salmon farming has been identified as a major contributory factor in the collapse of Irish wild sea trout stocks, primarily through sea lice infestation (Gargan *et al.*, 2002) and recent research also indicates potential impacts on wild salmon smolts (CFB, 2008). Aquaculture is only one of many possible threats to the coastal environment; others include tourism developments, recreation,



housing and climate change. The NBP commits Ireland to preparing a National Integrated Coastal Zone Management Strategy (DEHLG, 2002) and there have been calls for the development of a governmental support framework for sustainable local integrated coastal management initiatives (Heritage Council, 2006).

### Peatland Utilisation

The island of Ireland has a considerable variety of peatlands, many of which are of international importance. They include fens, raised bogs, blanket bogs and several transitional types, and once covered approximately 16 per cent of the country. However, the destruction of Ireland's peatlands by afforestation, turbary, mechanical extraction, overgrazing and agricultural land reclamation has resulted in at least a 92 per cent loss in raised bogs, a 79 per cent loss of blanket bogs and a 79 per cent loss of fens of conservation importance, and this loss is continuing (Foss *et al.*, 2001).

Raised bogs are probably the most threatened peatland habitat, as the conservation status of this habitat is deemed bad in relation to all assessment indicators (see above) and less than 1 per cent of intact active raised bog remains (NPWS, 2008d). While restoration initiatives have been undertaken in recent years by the NPWS and Coillte, ongoing deterioration of the hydrological conditions of raised bogs at current rates, caused by peat cutting, drainage, forestry and burning, severely threatens the viability of the habitat. Major positive management actions including land and turbary purchase and restoration works are required (NPWS, 2007). The Cessation of Turf Cutting Scheme provides compensation for purchase of bogs that have been statutorily proposed for designation as an SAC



or NHA. The NDP states that the purchase and restoration of raised bogs will be a particular focus of the programme. Other peatland types face similar threats, especially intact peatlands outside conservation designated areas. Given the importance of Ireland for peatland conservation on a European scale, there is a need for development and proactive implementation of a national peatland conservation strategy (Foss *et al.*, 2001). In addition, the development of a national wetland inventory, as required under the RAMSAR Convention, would be a significant positive contribution (Comhar, 2004).

### Invasive Alien Species and Alien Genotypes

Ireland, north and south, has international obligations to address invasive species issues, principally the CBD, the International Plant Protection Convention, the Berne Convention and the Habitats Directive. The National Biodiversity Plan requires strategies, in consultation with Northern Ireland, to control introduced species and to prevent, or minimise, future (accidental or deliberate) introduction of alien species or genotypes, which might threaten biodiversity.

A review of invasive alien species in Ireland has been published (Stokes *et al.*, 2004). In Ireland the most prominent of the negative impacts appears to be direct competition with native biota; for example, *Rhododendron ponticum* reducing native plant cover through shading effects. Alteration to habitats (for example, the giant hogweed causing alteration of river habitats) and the influence of parasites and pathogens (for example, introduced by the aquaculture industry) are also important. Specific habitat types currently under threat in Ireland from invasive species include freshwater river systems, ponds, mesotrophic lakes, native woodland, lowland heath, coastal floodplain, coastal saltmarsh and coastal sand dunes. A variety of native species are also threatened by invasives, including red squirrels (*Sciurus vulgaris*; see box on grey squirrel), red deer (*Cervus elaphus*; through hybridisation with sika deer, *Cervus nipal*) and earthworms (from predation by the New Zealand flatworm, *Arthurdendyus triangulatus*). The introduction and spread of invasive alien species can result in significant economic costs.

Various measures for the prevention and control of invasive alien species in Ireland are in place, but the



## Grey Squirrel (*Sciurus carolinensis*)

There are two species of squirrel in Ireland – the native red squirrel and the alien grey squirrel. The grey squirrel was introduced at Castleforbes, Co. Longford in 1911 from where it has rapidly spread, resulting in a decline in numbers and a contraction of the range of the red squirrel. Grey squirrels are particularly well adapted to life in deciduous woodlands and outcompete red squirrels for available food. In fact, grey squirrels can cause severe damage to broadleaf forest and pose a significant threat both to commercial hardwood production and to the conservation and expansion of native woodland cover in Ireland. In Britain grey squirrels are also responsible for the asymptomatic spreading of squirrel pox virus which can devastate red squirrel populations, and this could become a factor in the loss of red squirrels in Ireland. A recent Irish squirrel survey indicates dramatic expansion of the grey squirrel population in the past decade and provides a renewed warning that planned and effective action is needed to conserve the remaining red squirrel numbers in the country, and protect a very significant state and private investment in broadleaf woodland (Carey *et al.*, 2007).

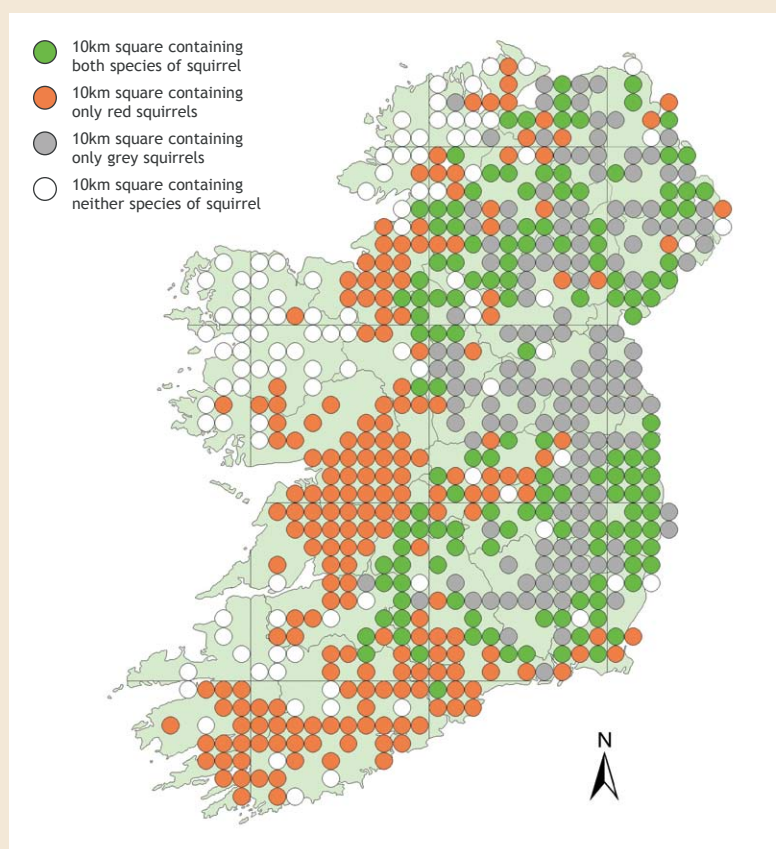
**Figure 13.7** Grey Squirrel



**Figure 13.8** Red Squirrel



**Map 13.2** Summary Map of Survey Results Showing Distribution of Both Squirrel Species and Their Overlap Zones (Carey *et al.*, 2007)



review identifies ten key actions that are required to reduce the risks of invasions, help control and manage new and established invasive species, monitor impacts, raise public awareness, improve legislation and address international obligations. In March 2004 the report was presented to both Environment Ministers and it was agreed that the NIEA and NPWS would work together and with others to examine the implications of the report. An inaugural meeting of the all-Ireland Invasive Species Steering Group took place in November 2005. The Invasive Species in Ireland project started in May 2006 and this joint NPWS/NIEA contract will take forward the recommendations of the report in the north and south of the island (see [www.invasivespeciesireland.com](http://www.invasivespeciesireland.com)).

## Climate Change and Biodiversity

The effects of climate change on biodiversity in Europe are already observable through changing distribution, migration and reproductive patterns of species (EC, 2006a). Climate change is likely to have both positive and negative effects on ecosystems and biodiversity. Future climate scenarios indicate that Ireland will experience warmer and drier summer months with a longer growing season, and evidence of a longer growing season in Ireland has already been detected (Sweeney *et al.*, 2002). Species most likely to be threatened by climate change in Ireland are the Arctic relicts (e.g. Arctic char, pollan, smelt (*Osmerus eperlanus*)); boreal species at the southern end of their range (e.g. oysterplant, *Mertensia maritima*); and mountain species (e.g. cowberry, *Vaccinium vitis-idaea*) (Sweeney *et al.*, 2003). Species that prefer warmer temperatures may expand;

for example, the expansion in range of the little egret (*Egretta garzetta*) into southern Ireland is possibly symptomatic of a warming climate (Crowe, 2005). Predicted reduction in summer rainfall is likely to place wetland and other water-dependent habitats and species under increased threat. Peatlands are considered to be particularly vulnerable to climate change (Jones *et al.*, 2006). There may be an increase in migrant species of birds and insects, earlier breeding and arrival of birds, changes in the distribution of plants and animals (e.g. butterflies), and changes in bud burst, germination and leaf emergence of plants (McElwain and Sweeney, 2006). Disruption of food chains and other aspects of ecosystem diversity (loss of pollinators, seed-dispersal agents) may lead to further species loss. Climate change is also likely to favour the arrival and expansion of more alien species and pathogens. It is estimated that 170 native plant species (approximately 20% of the total native vascular plant flora) are particularly vulnerable to climate change during the period 2007–2050 (Wyse Jackson, 2008).

Figure 13.9 Little Egret



Habitats and species in the marine and coastal environment are likely to be affected by increased temperatures, rising sea levels, changes in local and global ocean circulation patterns, the supply of nutrients and sediment from the land, and changes in waves and storminess (MONARCH, 2001). For example, it is predicted there may be a reduction in range of coldwater species (e.g. cod, *Gadus morhua*; herring, *Clupea harengus*; and haddock, *Melanogrammus aeglefinus*) and an increase in range of warmwater species (e.g. bass, *Dicentrarchus labrax*). Impacts on phytoplankton, which is sensitive to temperature, nutrient supply and ocean circulation patterns, will need to be monitored closely as they form the base of the marine food chain. Low-lying coastal areas such as estuaries and coastal lagoons are likely to be most vulnerable and significantly affected by sea-level rise.

Climate change has the potential, over the period of a few decades, to undermine efforts for the conservation and sustainable use of biodiversity. It also places some Irish habitats and species that are already under pressure due to anthropogenic activities (such as peatlands) under increased threat. This reinforces the imperative for effective action on greenhouse gas (GHG) emissions. Protection of biodiversity can help limit atmospheric GHG concentrations because woodlands, peatlands and other habitats store carbon.

Action must be taken to support biodiversity adaptation to climate change, particularly for those habitats and species most at risk. This includes conserving and restoring the existing biodiversity resource, reducing other threats to biodiversity and developing ecologically resilient



landscapes through reducing habitat fragmentation (MONARCH, 2007). Securing coherence of our protected area network (including Natura 2000) and protection of biodiversity in the wider countryside are particularly important. Diverse, healthy ecosystems provide greater resilience to climate change and may offer more options for adaptation. It is, however, vital to ensure that climate change adaptation and mitigation measures are not themselves harmful to biodiversity. For example, biodiversity assessments should be undertaken to ensure that development of alternative energy sources (such as biofuels) does not impact negatively on nature conservation. It is also important that the need for action to tackle the wider issue of biodiversity loss is not overlooked as a result of the current global political emphasis on climate change.

### Public Education, Awareness and Participation

A Biodiversity Forum was established in 2006 under the auspices of Comhar – the National Sustainable Development Council. The forum is made up of representatives from social, economic, academic, state and environmental non-governmental sectors as well as representatives from the equivalent body in Northern Ireland (NI Biodiversity Group). It provides assessment of progress on implementing the National Biodiversity Plan and contributes to the development of future national strategies. One of the forum's roles is to promote increased public awareness of biodiversity.

In January 2007, 'Notice Nature' – the first public awareness campaign for biodiversity in the state – was launched by the DEHLG. This

complements the NIEA 'It's in Our Nature' public awareness campaign launched in Northern Ireland in June 2006. The Notice Nature campaign involves targeted sectoral campaigns, including collaboration with the farming, business, tourism and construction sectors, as well as information aimed at the wider public. The campaign is accompanied by a website ([www.noticenature.ie](http://www.noticenature.ie)), which includes information on various aspects of Ireland's biodiversity and information on practical action that can be taken to secure its conservation. There are also education, participation and awareness programmes under other initiatives such as the Water Framework Directive, through farmer participation in REPS and more generally by the DEHLG Environmental Information Office (ENFO), which should facilitate protection of biodiversity.

The Minister for the Environment, Heritage and Local Government established a Biodiversity Fund in 2006, which is administered by the Heritage Council and provides grants for capital works to support the conservation and enhancement of Ireland's biodiversity (€1.8 million provided in the 2006–2008 period). These grants are available to individuals, community groups, non-governmental organisations (NGOs) and other statutory and non-statutory interested parties. Projects supported include a Corncrake Habitat Restoration Project on the Donegal Islands, the creation of native hedgerow in Ballymun, Dublin, and bog restoration in Carlow. The Heritage Council also administers a Wildlife Grant Scheme to provide assistance for the collection of data on biodiversity.

Despite these awareness-raising campaigns there is evidence that

significant work is still required in this area. The November 2007 Eurobarometer report on attitudes of Europeans to biodiversity found that 52 per cent of those surveyed in Ireland had never heard of the term 'biodiversity', while 26 per cent had heard of it but did not know what it meant and only 22 per cent had heard of it and knew what it meant. The results showed that knowledge of biodiversity in Ireland is well below the EU average (EC, 2007b).

### Our Response

Ireland is a single geographic entity and biodiversity does not recognise political boundaries. Therefore an all-Ireland approach is necessary to safeguard biodiversity on this island. All sectors must be engaged to ensure protection and restoration of biodiversity. This is a considerable challenge, especially in the context of climate change. There has been progress in relation to raising awareness about biodiversity among the public, within certain sectors and in some government departments and agencies. However, much remains to be done to increase this level of awareness to, for example, that which currently exists for climate change. It is essential that Irish society values biodiversity in order to engender support for, and participation in, necessary conservation measures.

Serious consideration should be given to the roll-out of national media campaigns, on a scale similar to those undertaken for waste and climate change, which highlight national (and global) biodiversity issues and the steps people can take to address them. Incentives for people to safeguard biodiversity should be expanded, for example in the provision of local nature reserves and community participation. Another

point of concern is that too often, local inhabitants view designation of areas as protected for biodiversity negatively, whereas the positive benefits of such designations in ensuring a wildlife-rich environment should be highlighted and promoted.

One aspect of biodiversity conservation that is frequently overlooked is recognition of the economic value of biodiversity and ecosystem services and the costs of biodiversity loss and ecosystem damage from poor decision-making. Inspired by the significant impact made on climate change policy by the recent Stern Review on the Economics of Climate Change (Stern, 2006), the European Commission is collaborating with Germany on a Review on the Economics of Biodiversity Loss. This Review seeks to investigate the economic costs of biodiversity loss and decline in ecosystems worldwide and an interim report has been published (EC, 2008). Nationally, research findings on the social and economic benefits of biodiversity indicate a marginal value of biodiversity to Ireland of at least €2.6 billion per annum. This is a conservative estimate and would be likely to rise considerably if other significant services such as waste assimilation by aquatic biodiversity and benefits to human health were considered (DEHLG, 2008).

In relation to the Habitats Directive, Ireland is moving from a site designation phase into a situation where the focus will be on site monitoring, management, protection and restoration, and adequate resources must be provided to achieve this. Greater enforcement of legislation will also be required. Ireland must complete the designation of an adequate number of SACs and SPAs and prepare, adopt and implement site management



plans. It is important that the management plans for all Natura 2000 sites be prepared as soon as possible, with stakeholder input, to ensure that the consequences of designation are understood and clear conservation actions and targets are identified for each site.

The bad conservation rating for so many of its important habitats and species poses a very significant challenge for Ireland in striving to meet the obligations of the Habitats Directive and the EC policy objective of halting biodiversity loss. Clear targets and timescales for species and habitat restoration and conservation are required. The development of SAPs for some of Ireland's most threatened species is welcome, and it is important that resources be available to implement these plans. There is also a case for the development of habitat action plans, particularly in the case of peatlands, for which Ireland is of such international importance and which are under serious threat.

Ultimately the Natura 2000 network of protected sites cannot be effective in isolation and does not in itself guarantee protection for Ireland's biodiversity, particularly in the context of climate change. There needs to be increased emphasis

on the designation and protection of a coherent network of national and locally important biodiversity areas, an aspect that has not received sufficient attention in recent years. The development and implementation of Local Biodiversity Action Plans should contribute to this process. Adequate support and resources at both national and local authority level will be required. In addition, protection of biodiversity in the wider countryside and integration of biodiversity concerns into sectoral policies is essential. Indeed, there is tremendous potential for biodiversity to benefit from imaginative sectoral initiatives. For example, a large area of cutaway bog is available in the midlands from which peat extraction is no longer economically viable (this is expected to constitute some 80,000 ha by 2050) (Renou *et al.*, 2006). There have been calls for a significant part of this area to form the basis of a national wetlands wilderness park (e.g., Feehan, 2004). Given the precarious state of our peatlands and wetlands generally, such a development would be most welcome.

Similarly, a significant area of commercial forestry on peatlands, particularly in the west of Ireland, is considered uneconomic (Tiernan, 2008a). Yet while this forestry

remains *in situ* it is potentially causing damage to surrounding habitats, typically to the peatlands on which it is planted and to rivers draining these peatlands, which may be sensitive to impacts from, for example, fertiliser application, drainage, sedimentation and acidification (e.g., Allott *et al.*, 1997; McGarrigle and Clenaghan, 2004). An ecosystem management approach should be adopted to maximise the socio-environmental benefits of such forests which may include their removal and subsequent restoration of important peatlands. Coillte has already undertaken some bog restoration projects (under the EU Life-Nature programme), including removal of forestry, in recent years and is currently developing a decision support system to help forestry managers redesign afforested western peatlands in a socioeconomically and environmentally sustainable manner (Tiernan, 2008a, 2008b).

The review of the Forestry Act, which has been ongoing for several years, needs to be completed and the obligation to replant should be removed where it can be shown that plantations are not socioeconomically or environmentally sustainable.

In relation to agriculture, additional measures are required to prevent intensification or abandonment of high nature value farmland and support its restoration, as well as

to protect designated sites such as those in Natura 2000. Increased cooperation between the NPWS and DAFF in the protection of designated sites and in the evolution of agri-environment schemes will be important. For example, the further development of NPWS guidelines on habitat/site management and their implementation, at least in part, through agri-environment schemes, and the introduction of additional targeted measures in REPS to enhance biodiversity should be considered. Appropriate assessment is required to ensure that the very substantial expenditure on measures such as Commonage Framework Plans, REPS and cross-compliance is delivering benefits for biodiversity and to investigate whether these measures can be improved (see e.g. Finn *et al.*, 2004).

Monitoring and inventory of biodiversity are the tools we use to assess its conservation status and the effectiveness of the measures introduced to protect it, and in recent years a significant number of national surveys for certain species groups and habitats have been undertaken throughout the island of Ireland involving government bodies, NGOs, research institutions and members of the general public (e.g. Preston *et al.*, 2002). However, significant information gaps remain in relation to our knowledge of biodiversity in

Ireland and of how it may respond to, for example, climate change, land-use change, present and future sectoral policies or biodiversity protection measures. These issues require increased support for biodiversity research (see, for example, Biochange Project, [www.biochange.ie](http://www.biochange.ie)), monitoring and data management, and strengthening of the flow of information from research and science to policy-makers and the general public so that potential impacts can be avoided or managed. In this context the establishment of the National Biodiversity Data Centre is a welcome development (see box).

One powerful information tool is the use of biodiversity indicators. At EU level, the European Commission is developing a headline set of biodiversity indicators with the European Environment Agency, to assess achievement of the 2010 target (European Environment Agency, 2007). Further development of indicators is needed at national level to inform the public and decision-makers on biodiversity, the effectiveness of conservation measures and progress made in halting biodiversity loss.

There is a need for more comprehensive geographic information on biodiversity to be readily accessible to planning authorities and other relevant agencies to ensure that biodiversity concerns are taken into account in the discharge of their statutory functions. Biodiversity guidance and training should be provided to all relevant statutory bodies and other interested parties. Increasing urbanisation of Irish society poses particular challenges for planners to integrate biodiversity into modern urban infrastructure and provide space and opportunities for people to appreciate biodiversity in their

## National Biodiversity Data Centre

The Irish National Biodiversity Data Centre was officially opened in January 2007 on the Carriganore Campus of the Waterford Institute of Technology. The centre's objectives include the collection, management and dissemination

of biological records, as well as promoting education, research and training in biodiversity. This initiative complements the Centre for Environmental Data and Recording (CEDaR), which was established by the Ulster Museum, Belfast in 1995.



immediate environment. Ireland is fortunate in that many of its cities and towns are located in or near areas of high biodiversity value and this offers possibilities for sensitive planning to increase public awareness and enjoyment of biodiversity, while ensuring its protection.

Ireland as a whole also has obligations to act to protect global biodiversity. We all bear responsibility for this, as our lifestyles rely heavily on imports from developing countries, the production and transport of which may often accelerate the loss of biodiversity through, for example, increasing demands on natural resources, contributing to GHG emissions, and facilitating spread of invasive alien species (EC, 2006a). It is estimated that the ecological footprint of man (a measure of human demand on the earth's ecosystems) currently exceeds the earth's biocapacity by about 25 per cent. Ireland's ecological footprint is estimated to be slightly larger than its total biocapacity (CO<sub>2</sub> emissions making up over half of our footprint), with an ecological footprint per person of over twice the global average (WWF, 2006). If we are to make a difference nationally we must

establish our credibility by protecting national biodiversity, while redoubling our efforts to protect global biodiversity through development assistance, trade relations and contributing to effective international governance.

While halting the loss of biodiversity and putting it on the road to recovery are important milestones, there is a need to look beyond 2010 towards a longer term vision as a framework for policy. This vision should take account of our interdependence with nature and the need for a new balance between development and the conservation of the natural world (EC, 2006a).

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