IRELAND

4TH NATIONAL REPORT TO THE CONVENTION ON BIOLOGICAL DIVERSITY

EXECUTIVE SUMMARY

Ireland has a relatively low number of native species compared with continental Europe. However, despite this, many of Ireland's habitats are internationally important because of their scarcity elsewhere in Europe and the unique species communities found within them.

Chapter 1 describes the status, trends and threats for each of nine broad habitat categories. The majority of the Ireland's EU annex habitats have an unfavourable overall conservation status, in particular raised and blanket bogs, sand dune systems, fens and mires, natural grasslands, and woodlands. Although the range for most of the above-mentioned habitats is favourable, the structure and functions and future prospects will require considerable management effort to improve their condition and reduce the impacts of pressures. Additional pressures on a number of species and habitats are likely to arise if Ireland undergoes climatic changes according to predictions.

A low proportion of EU annex species were assessed as having a 'bad' overall status, and most of these species are dependent on freshwater for at least some parts of their life cycles. The critical situation of some of the more sensitive species underlines the urgency of improving water quality in key areas.

Chapter 2 provides an outline and summary assessment of Ireland's first National Biodiversity Plan (NBP) 2002-2006. Actions where good progress has been made include:

- Designation of Sites of Community Importance (SCIs), with an approximate area of 1,350,000 ha. Marine SCIs occupy approximately 330,000 ha. Marine areas covering approximately 428,000 ha are proposed for designation. One hundred and forty seven (147) SPAs have been designated to date, covering over 280,000 ha., including 66 marine SPAs covering 80,000 ha.

- Substantial progress has been made in monitoring of protected habitats and species, and in the development of a comprehensive Irish Biodiversity Database.

- Conservation planning: To date, 295 draft Conservation Management Plans have been produced for SCIs and 4,372 Commonage Framework Plans have been prepared, covering 439,840 ha.

- Conservation measures: Progress has been made with agri-environmental measures to halt and reverse biodiversity loss in habitats suffering from over-grazing.

- The legislative basis for biodiversity conservation has been greatly strengthened with the adoption of national and European legislation dealing with a wide range of environmental issues, including biodiversity conservation.

Actions where some progress has been made but further work is necessary include:

- Implementation of measures to conserve habitats and species: Priorities for the immediate future include improvement in the status of priority habitats and species assessed as 'bad'; improvement in the status of non-priority habitats assessed as 'bad'; and improvement in the knowledge base on the occurrence and status of habitats and species.

- Actions to halt and reverse deterioration in water quality.

- Conservation of marine fisheries.

- Actions to address the threats from alien invasive species.

Chapter 3 assesses the extent of sectoral and cross-sectoral integration of biodiversity considerations.

Section 3.1.1 describes sub-programmes under the National Development Plan 2007=2013 that have financed measures which have a significant positive effect on biodiversity conservation, including:

- The Natural Heritage Sub-Programme, which has supported the purchase of Natura 2000 sites, habitat-rich sites and designated raised bogs; compensation to landowners in designated areas; conservation planning; species and habitats monitoring; and research.

- The Water Services Investment Programme 2004-2006, which targeted 869 water and sewerage schemes in Ireland and involved improvement, expansion and rehabilitation of wastewater treatment and networks. The budgeted expenditure was €5 billion.

- The Agriculture and Food Sub-Programme, which encompasses the agricultural measures included in Ireland's 2007-2013 Rural Development Strategy and Programme, viz: Rural Environment Protection Scheme; National Nitrates Action Programme; Farm Waste Management Support; and Forestry and environment measures.

Section 3.1.2 describes a number of other programmes and measures of significance for biodiversity.

The impacts of incentives are assessed in Section 3.1.4, including agricultural and forestry incentives, tax incentive schemes and the Biodiversity Fund.

Mainstreaming of biodiversity (Section 3.1.5) is slowly beginning to be accepted, mainly due to the need to meet EU plan and programme reporting requirements. Poorly-developed inter-departmental structures and lack of dedicated personnel are regarded as the main obstacles to fuller recognition and implementation of mainstreaming at

government level.

Chapter 4 identifies four key areas where progress has been made towards achieving the 2010 Target, including designation of protected areas; monitoring and research; conservation planning; and maintenance and improvement of water quality.

General conclusions, which draw together the main findings of the previous chapters, are provided in Section 4.3.

Appendices to the report comprise:

Information concerning the reporting party and the preparation of the national report (Appendix 1);

Further sources of information (Appendix 2);

Progress towards targets of the Global Strategy for Plant Conservation and the Programme of Work on Protected Areas (Appendix 3)

References are listed following the appendices.

CHAPTER 1

OVERVIEW OF IRELAND'S BIODIVERSITY STATUS, TRENDS AND THREATS

1.1 IRELAND'S BIODIVERSITY: INTRODUCTION

Ireland's biodiversity is a product of its glacial history, complex geology and oceanic climate, coupled with a long history of human influence. As Table 1.1 indicates, Ireland has a depauperate flora and fauna compared with continental Europe because of its geographic isolation. Despite the low number of species, many of Ireland's habitats are internationally important due to their scarcity elsewhere in Europe and the unique species communities found within them.

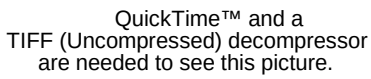
Table 1.1 Species diversity for major groups in Ireland

Taxonomic Group	Approximate number of species	Number of legally protected species
Vascular plants	c. 900 native; c. 1,108 established aliens	68
Bryophytes	c. 584 mosses; 228 liverworts; 3 hornworts	19
Algae	700-1,000 freshwater; 579 marine	4
Lichens	c. 1,000	1
Lichenicolous fungi	150	
Fungi	>3,500	
Mammals	c.35 terrestrial; 2 seals; 24 cetaceans	26 terrestrial + all seals & cetaceans
Birds	c.450 observed	All (except for derogations for hunting and public health and safety)
Reptiles	2; 1 turtle, but 3 others occasionally observed	1 + all turtles
Amphibians	3	3
Freshwater fish	28	11
Invertebrates	c.18,107 documented	8

Source: Kingston (2009)

Ireland's richest biodiversity survives in the areas indicated in Map 1.1, below. The areas outlined in brown and shaded in blue represent sites designated or proposed for

designation as Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) under the EU Birds and Habitats directives respectively. Freshwater and marine coastal habitats form a substantial component of the overall important areas. Native woodlands survive only as small fragments. Habitats of particular significance because of their scarcity both in Ireland and Europe include limestone pavement (e.g. the Burren in Co. Clare), turloughs, active peatlands, intact sand dune and machair systems, and some species-rich grasslands.



Map 1.1 Ireland's protected areas network

1.2 HABITATS: STATUS, TRENDS AND THREATS

An overview of Ireland's habitats and their status, trends and threats is presented under the broad categories listed below, according to the classification in *A Guide to Habitats in Ireland* (Fossitt, 2000). Habitats referred to under these broad categories include Annex 1 habitats listed in the EU Habitats Directive. Annex 1 habitats are grouped under each broad habitat category according to Fossitt (2000), Appendix 1, which lists Ireland's habitats alongside the corresponding Annex 1 habitats. This approach has been adopted in this report since much of the currently available information on status, trends and threats pertains to Annex 1 habitats.

1.2.1 Freshwater
1.2.2 Grassland and Marsh
1.2.3 Heath
1.2.4 Peatlands
1.2.5 Woodland and scrub
1.2.6 Exposed rock and caves
1.2.7 Cultivated and built land
1.2.8 Coastland
1.2.9 Marine

Much of the information below is taken from *The Status of EU Protected Habitats and Species in Ireland* (NPWS, 2008)[1]. Four parameters were used to assess the conservation status of annexed habitats in the above-mentioned report: range; area; structure and functions; and future prospects. Each of these was classified as being "favourable" (good); "unfavourable — inadequate" (poor); "unfavourable — bad" (bad); or "unknown". Good, poor and bad status were colour-coded green, amber and red respectively, and the coding is also used in this report. Lists of research projects, monitoring, and conservation measures are included in Chapters 2 and 3.

1.2.1 Freshwater

Lakes
Ireland has over 12,000 lakes, most of which are less than 0.05 km^2, and 100 of which are greater than 1 km^2. Irish lakes are predominantly natural salmonid waters indicative of good ecological status and are frequently used for public water supplies. The latest survey of Irish lakes by the Environmental Protection Agency (EPA) showed that the majority (383 or 85.3%) of the 449 lakes examined during 2004-2006 were of satisfactory water quality, an improvement of 3.3% compared with 2001-2003. ‘Satisfactory’ includes both oligotrophic and mesotrophic. However, most Annex 1 lake habitats require oligotrophic conditions. A worrying trend of increasing productivity has been noted in many

[1] see http://www.npws.ie/en/PublicationsLiterature/ConservationStatusReport/ and also the backing documents (i.e. the detailed scientific appraisal) for the Conservation Status Report unless otherwise referenced

oligotrophic lakes. The water quality of the remaining 66 lakes was less than satisfactory (Clabby *et al.*, 2008). Fifty one lakes were classified as eutrophic in varying degrees. Of these, 21 were classified as moderately eutrophic and 30 as strongly or highly eutrophic compatible with a strong to high level of pollution and a marked degree of impairment of beneficial use. The remaining 15 lakes were classified as hypertrophic, i.e. the most enriched status and characterized by very high levels of algal growth consistent with a very high level of pollution and impairment of use (Clabby *et al.*, 2008). The water quality of some of the larger Midland lakes (Derg, Ree, Ennell and Derravaragh) has improved slightly.

Despite the relatively favourable data for water quality in general, nutrient enrichment (as mentioned above) and colonisation by alien invasive species pose significant threats to the habitat quality of a number of lakes. Other threats include sport and leisure activities (lowland lakes) and peat cutting, overgrazing and afforestation (upland oligotrophic and dystrophic lakes).
A number of Ireland's lakes are internationally important for wildfowl and waders and these have been designated as Special Protection Areas under the EU Birds Directive. Over twenty SPAs include lakes which are used by significant concentrations of wildfowl and waders; Lough Corrib and Lough Iron are two of the most important of these.

Rivers and streams
There are 93,000 km of river and stream channel length in Ireland, based on the 1:50000 series of Ordnance Survey Maps, with more than 50% being first order streams and tributaries (Freshwater Ecology Group and Compass Informatics, 2007). According to the latest EPA survey, the majority of rivers were assessed as salmonid quality. However, a considerable length is affected by slight or moderate pollution; some 18 per cent (2401.5 km) is classed as slightly polluted/eutrophic; a further 10 per cent (1324 km) as moderately polluted but less than one per cent (63.5 km) is currently subject to a serious degree of pollution. The proportion of unpolluted and slightly polluted channel length has increased compared to the previous two survey cycles (Toner *et al.*, 2005) and there has been a reduction in the number of moderately polluted and serious polluted channel lengths (Clabby *et al.*, 2008). However, the steady decline since the 1970s in the highest quality sites gives cause for concern (EPA, 2008).

Almost two-thirds of the rivers assessed by the EPA are at risk of failing to meet the environmental objectives required by the EU Water Framework Directive. The main pressures of eutrophication, overgrazing, excessive fertilisation, afforestation and colonisation by introduced alien invasive species show little sign of declining.

Irish rivers fall into the following European Union Habitat classification types: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, and Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation. The former is widespread throughout Ireland, including both moss and higher plant dominated communities, but its status is assessed as 'bad'. The latter has a limited yet favourable distribution and its status has been classed as 'good'.

Turloughs, virtually unique to Ireland, are temporary lakes considered to be of high conservation value for their plant, invertebrate (both terrestrial and aquatic) and bird communities. There are 235 known turloughs and a further 244 sites which may also fit that classification. Turloughs are listed as a priority habitat in the EU Habitats Directive and 71 sites are currently designated as SACs. Turloughs are mainly restricted to the limestone areas of Counties Roscommon, Galway and Clare. They generally flood in winter and dry out in summer, flooding and draining via connections in groundwater, such as springs and swallow holes.

Historically, the main threat to turloughs was from arterial and field drainage for agriculture, although this pressure has declined in recent times (Sheehy Skeffington and Gormally, 2006). Turloughs now face a new threat from abandonment of land and cessation of small-scale traditional farming practices in the west of Ireland (Good and Butler, 2001; Sheehy Skeffington and Gormally, 2006). Pollution from agricultural effluent, especially from groundwater, and septic tanks, are additional threats.

Canals, constructed in the late 18th and early 19th centuries, now provide habitats for a wide variety of wildlife. Canals simulate natural lakes and ponds, supporting a variety of cyprinid fish, and bankside vegetation which can include some rare plant species. For this reason, certain stretches of the Grand and Royal canals, for example, have been included in Ireland's network of protected areas but no assessment is available.

The conservation status of Annex 1 lake and river habitats in Ireland is summarised below:

Codes	Habitat Names (summarised)	Range	Area	Structure & Functions (Condition)	Future Prospects	Overall
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	Chenopodion rubri	Good	Good	Good	Good	Good

1.2.2 Grassland and marsh

The bulk of Ireland's land area is covered by **grasslands** of all types. However, most grassland has been heavily modified for agricultural and development purposes or has declined due to abandonment. Species-rich grasslands of conservation value such as those on eskers (sinuous ridges of sand and gravel) are found in parts of the Midlands. Traditional hay meadows, critically important for the endangered Corncrake (*Crex crex*) and for plant species diversity are mainly found in the north and west. Lowland wet

grasslands exist throughout the country, although the best examples occur along the banks of the larger rivers such as those of the Shannon, Munster Blackwater, Moy and Suir catchments. Lowland wet grasslands are also vital for the survival of the Corncrake, and breeding and wintering wildfowl and waders.

Species-rich upland grasslands are found on free-draining acid soils that may be dry or humid but not waterlogged. The best examples are found in association with calcareous bands through the mainly acidic bedrock. The Cuilcagh Mountains of Cavan and Leitrim provide the best examples. There is also a more species-poor acid grassland found in upland areas, where the soils are wetter and poor in nutrients and minerals.

Marsh is found on level ground near river banks, lakeshores, and in other places where mineral or shallow peaty soils are waterlogged, and where the water table is close to ground level for most of the year.

The conservation status of Annex 1 grassland and marsh habitats is summarised below:

Codes	Habitat Names (summarised)	Range	Area	Structure & Functions (Condition)	Future Prospects	Overall
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

The main threats to **orchid-rich grassland** (semi-natural dry grassland) are abandonment of traditional farming on marginal land, and reclamation. **Species-rich *Nardus* grasslands** are threatened by over-grazing and abandonment of traditional farming, leading to succession over time to dry heath. ***Molinia* meadow**, a widespread but localised wet grassland habitat, has been reduced in area over the last century by agricultural intensification and more recently by abandonment of pastoral systems, leading to rank vegetation and scrub encroachment, similar to the pressures on hay meadows. The main threats to **hydrophilous tall herb** habitat are from the spread of invasive alien species, arterial drainage and agricultural improvement at the river edge.

1.2.3 Heath

Wet heath is widespread in the uplands and in the west of Ireland but large areas have been degraded by overstocking. Despite conservation measures, recovery is reported to be slow. **Dry heath** is also widespread, and was traditionally maintained by low intensity management including grazing and/or burning. The main threats to the habitat are afforestation, over-burning, over-grazing, under-grazing and bracken invasion. **Alpine**

and sub-alpine heath is confined mainly to the summits and slopes of mountains above 350 metres, but in the north and west occurs at lower levels and in the Burren at sea level. The habitat is increasingly under threat from afforestation, burning, grazing and leisure activities. **Juniper scrub** is mainly confined to the west of Ireland and is under threat from overgrazing, burning, agricultural expansion and poor regeneration. The conservation status of Annex 1 heath habitats is summarised below:

Codes	Habitat Names (summarised)	Range	Area	Structure & Functions (Condition)	Future Prospects	Overall
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

1.2.4 Peatlands

Peatlands have suffered serious losses due to drainage, peat extraction, afforestation and overgrazing over the last five decades. Peatlands once covered approximately 1.3 million hectares, or 16% of the land area. Currently, only 19% (220,000 ha) of the original area remains intact.

Raised bogs are accumulations of deep acid peat that originated in shallow lake basins or topographic depressions. They are poor in mineral nutrients and sustained mainly by rainwater with a level generally higher than the surrounding area. The vegetation is dominated by *Sphagna* hummocks that allow for the growth of the bog. Raised bogs are most abundant in the lowlands of central and midwest Ireland. The habitat has been heavily exploited. It is estimated that there has been a 99% loss of the original area of actively growing raised bog, and one-third of the remaining 1% has been lost in the last 10 years. Although the best examples of raised bogs are now designated as Natura 2000 sites, deterioration of the hydrological conditions caused by peat cutting, drainage, afforestation and burning severely threatens the viability of the habitat at most locations.

Degraded raised bogs are those in which the natural hydrology of the peat body has been disrupted and which has led to the surface drying out and/or species change or loss, but are still capable of regeneration if the hydrology can be repaired. Almost all raised bogs contain large areas classified as degraded.

Blanket bog occurs on flat or sloping land with poor surface drainage in cool, wet oceanic climates. Blanket bog occurs on lowlands and uplands on the Atlantic coast and elsewhere it is restricted to the uplands. It is dependent to a large degree on maintenance of surface water flow patterns at a landscape level and hence is dependent on sensitive land management practices. Extensive areas have been removed or highly modified, mainly through reclamation, peat extraction and afforestation, but also through erosion.

Fens are peat-forming systems fed by groundwater or moving surface waters. They occur in river valleys, poorly-drained basins or hollows, and beside open stretches of water,

such as lake margins or river floodplains. Fens may also be associated with the fringes or other parts of acid bogs where there is enrichment of the water supply. Like most peatland habitats in Ireland, fens have suffered a decline in quality, mainly due to peat extraction, drainage for cropland, infilling, and fertiliser pollution and eutrophication. Only limited measures have been introduced to address these damaging activities.

The conservation status of Annex 1 peatland habitats in Ireland is summarised below:

Codes	Habitat Names (summarised)	Range	Area	Structure & Functions (Condition)	Future Prospects	Overall
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	Rhyncosporion Depressions	Good	Good	Good	Good	Good
7210	Cladium Fens*	Good	Good	Bad	Bad	Bad
7230	Alkaline Fens	Good	Good	Bad	Bad	Bad

In addition to EU-protected habitats, other peatland habitats include cutaway and cutover peatland. **Cutover peatlands**, resulting from traditional hand cutting, are thought to provide important habitats for a variety of fauna, and require surveys. They often exist as small islands amongst intensive farmland or industrial peatland. They are usually unprotected and are threatened by dumping, burning, afforestation and renewed mechanical peat harvesting. **Cutaway peatlands** result from large-scale, industrial harvesting but have significant potential biodiversity value if rehabilitated. Bord na Móna, the Irish Peat Development Board, has set aside 10,000 ha of cutaway peatland for rehabilitation at a number of raised and blanket bog sites. While this will not revert to bogland habitat it is expected to become a mosaic of habitats of high nature value. Bord na Mona intend to dedicate a much larger area for this purpose as peat production ceases.

1.2.5 Woodlands and scrub

Natural or ‘ancient’ woodland vegetation is now very rare in Ireland and most stands of trees have been modified and managed to some extent over centuries. According to the National Woodland Survey, the total area of native woodland was estimated to be 132,990 hectares in 2004-2006 (Perrin *et al*., 2008). The largest single area of native woodland is in Killarney National Park, while smaller amounts are conserved in Glenveagh and Wicklow Mountains National Parks. In addition, sizeable areas are in private ownership and protected in SACs. Four Annex 1 woodland habitats occur in Ireland. **Old oak woodland**, which is very fragmented, occurs throughout the country on acidic soils, mainly in upland areas. The area has declined slightly due to clearance although new woodland is developing where grazing pressure has decreased. **Alluvial forests** occur in areas that flood periodically along rivers and by lakeshores; they are fragmented and have declined in area. **Yew woodlands** have a very restricted distribution, with only ten known sites in the south-west. All three of these habitat types

are threatened by the spread of alien invasive species. **Bog woodlands** are closely associated with raised bogs and found mostly in the central and north midlands. They are threatened by drainage, peat cutting, burning and development, although in the long term, they may expand as peatland cutaway re-floods.

Details of the National Woodland Survey can be found at:
http://www.npws.ie/en/CurrentResearchProjects/HabitatSite/NativeWoodlands/

The conservation status of Annex 1 woodland habitats is presented below:

Codes	Habitat Names (summarised)	Range	Area	Structure & Functions (Condition)	Future Prospects	Overall
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

A number of woodland habitats other than semi-natural woodlands occur in Ireland. These are categorised in Fossitt (2000) as highly modified and/or non-native woodland. They include mixed broadleaved woodland, mixed broadleaved/conifer woodland, mixed conifer woodland, conifer plantation, scattered trees and parkland, scrub/transitional woodland and hedgerows.

According to Ireland's National Forest Inventory, current forest coverage amounted to 696,664 ha in 2007, of which 55% is State-owned and 45% is in private ownership (http://www.agriculture.gov.ie/nfi). Much of Ireland's forested area is plantation. Although plantations are poor substitutes for native woodland, and although they have contributed to pressures on a range of protected habitats and species, they provide niches for a number of the more common mammal and bird species, some invertebrates and fungi. Since 2003, the rate of afforestation, once the highest in Europe, has dropped dramatically (c. 8,000 ha in 2006).

Scrub is a broad category that includes areas that are dominated by at least 50% cover of shrubs, stunted trees or brambles. Scrub frequently develops as a precursor to woodland and is often found in inaccessible locations, or on abandoned or marginal farmland. Scrub may cover over 50,000 hectares and includes hazel scrub, found in limestone areas such as the Burren.

Ireland's abundant **hedgerows** provide niches for a number of common woodland plant and animal species. Until the 1990s, hedgerows were regularly cleared for agriculture in the more intensively-farmed areas, and this has reduced biodiversity in the wider countryside. Incentives have been available to farmers to conserve and manage hedgerows since the introduction of the REPS in 1994. Current legislation prohibits cutting and other damaging activities during the bird nesting season (further details are included in Chapters 2 and 3).

1.2.6 Exposed rock, caves and disturbed ground

Exposed rock includes all natural or artificial exposures of bedrock and loose rock with the exceptions of rocky shores. Siliceous scree, siliceous rocky slope and calcareous rocky slope habitats are under threat from outdoor recreational activities. The effects of these activities and the damage by grazing in the past have not yet been fully assessed in terms of impacts to the area and structure and function of the habitats. **Limestone pavement**, a priority habitat, has its best and most extensive expression in the Burren, Co. Clare, which is proposed for inscription as a World Heritage Site {http://whc.unesco.org/en/tentativelists/308). Elsewhere, limestone pavement is found in Counties Galway, Mayo, Roscommon and Sligo. The landscape, flora and associated fauna have evolved in response to millennia of farming. Limestone pavement supports a very rich flora and fauna and a variety of vegetation types. The habitat has reduced slightly in area (current overall extent: 31,000 ha) through quarrying and agricultural reclamation. Reduced farming activity is causing the spread of scrub, resulting in the loss of some typical flora. Silage effluent and slurry from intensive agriculture, and poorly treated domestic/municipal wastewater, threaten groundwater. Those **caves** that host important numbers of lesser horseshoe bats are an EU-protected habitat. These particular caves have been assessed as having a 'good' conservation status.

Codes	Habitat Names (summarised)	Range	Area	Structure & Functions (Condition)	Future Prospects	Overall
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

Disturbed ground is a broad habitat category that may host habitats of biodiversity interest, including:

- Natural or artificial exposures of sand, gravel or till
- Spoil and bare ground
- Recolonising bare ground
- Refuse and other waste

Exposures of sand provide a habitat for bird species such as the Sand Martin and niches for some rare ruderal plant species. Rocky ledges in redundant quarries offer nesting and roosting space for species such as Kestrel, Peregrine Falcon and Chough, the latter two species which are listed in the annexes to the EU Birds Directive. Rare, vagrant gull species can be found feeding on landfill sites in winter. In urban areas, recolonising bare ground can be important for wildlife and may support a diverse flora, typically with a high proportion of non-native species (Fossitt, 2000).

1.2.7 Cultivated and built land

Significant areas of Ireland are occupied by cultivated land and man-made constructions. Traditional arable cropping has almost disappeared, along with the plant species dependent on this practice. The extinction of the Corn Bunting from Ireland in the 1980s is thought to be linked to a decline in traditional mixed farming and less intensive cereal cultivation.

Stone walls may support a diverse flora (with abundant lichens, mosses and ferns) and invertebrate fauna. In Ireland, bats rely heavily on buildings, occupied and derelict, for roosting. Many bat species have adapted well to man-made structures including abandoned mines, bridges and buildings. A study in 1999 recorded five species of bats roosting in bridges: Daubenton's, Natterer's, whiskered, long eared and pipistrelle (Sheil, 1999).

1.2.8 Coastland

Lagoons, saltmarsh, sand dune and sea cliff habitats are included in this broad habitat category.

Coastal lagoons are distributed around the west and south coasts. They are currently threatened by drainage and nutrient enrichment from agriculture and domestic effluents. Saltmarshes are stands of vegetation consisting of a small number of specialist species that can tolerate the salt content of the substrate, occurring along sheltered coasts, mainly on sand or mud, and which are flooded periodically by the sea. There are four separate Annex 1 saltmarsh habitats of conservation interest in Ireland[2] (see table below). The main pressures on saltmarshes are the spread of *Spartina anglica* (common cord-grass), along with over-grazing, infill and reclamation, and in the case of halophilous scrub, from outdoor recreational activities.

Sand dunes are hills of wind blown sand that have become progressively stabilised by a cover of vegetation. Irish sand dunes are species-rich habitats for plants and invertebrates. There are eight separate Annex 1 sand dune habitats in Ireland (see table below). Dune systems are in a constant state of change, and maintaining their natural dynamism is essential to ensure a favourable conservation status. Impacts on sand dune habitats include:

- removal of beach material, which exacerbates the process of natural erosion;
- motorised recreational activities and high visitor pressure on some sites;
- currently, over-grazing and under-grazing are the greatest threats to fixed grey dunes, along with recreational activities and pressure for development;

[2] A fifth saltmarsh habitat, *Spartina* swards (1320), is created by an alien species and is considered to be the product of damage to other habitats.

- in the case of decalcified *Empetrum* dunes, threats include agricultural improvement, over-grazing and under-grazing, restructuring of farm holdings and sand quarries.

According to a national survey of sand dunes, carried out between 2004-2006, the total remaining dune resource (all dune habitats) is now estimated to cover approximately 10,850 ha.
http://www.npws.ie/en/media/NPWS/Publications/Reports/Media,6710,en.pdf

Machair is a sand dune habitat globally restricted to the northwest coasts of Ireland and Scotland, and is listed as a priority habitat in Annex 1 of the EU Habitats Directive for Ireland only. It is characterised by herbaceous vegetation that is often species-rich and shares elements of sand dune communities and calcareous grassland. Machair is an important habitat for bird species, including the endangered Corncrake. Much of Ireland's machair has been impacted by restructuring of agricultural holdings, as unenclosed commonages were divided, fenced and farmed much more intensively. Other threats include conversion to playing pitches, recreation, trampling and vehicular impacts, housing, and coastal protection works.

Sea cliffs, both hard (rocky) and soft (sedimentary) are distributed around the Irish coastline but are less frequent on the east coast. A number of sea cliffs are very important for their seabird colonies (including gannets, auk and gull species). Despite their relative inaccessibility, pressures and threats to the habitat include recreational pressures, golf courses and housing, dumping, and peat cutting. In some cases, coastal protection works interfere with the natural functioning of sea cliffs, particularly soft cliffs prone to erosion.

The conservation status of Annex 1 coastal habitats is summarised below:

Codes	Habitat Names (summarised)	Range	Area	Structure & Functions (Condition)	Future Prospects	Overall
1150	Coastal Lagoons*	Good	Poor	Bad	Poor	Bad
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	*Spartina* Swards	Good	Poor	Good	Poor	Poor
1330	Atlantic Salt Meadows	Good	Poor	Poor	Poor	Poor
1410	Mediterranean Salt Meadows	Good	Good	Poor	Poor	Poor
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
2IAO	Machair*	Good	Poor	Bad	Bad	Bad

1.2.9 Marine

Ireland's coastal marine environment is home to a wide variety of marine habitats and a corresponding diversity of marine plants and animals.

A total of 21 **sandbanks** have been identified around Ireland, mainly in the Irish Sea. Shallow sandy sediments are typically colonised by a burrowing fauna of worms, crustaceans, clams and echinoderms. Sandbanks support populations of sand-eels, contributing to the importance of the habitat as feeding areas for seabirds. Potential threats include aggregate and coal extraction, and wind farm development, all of which could affect the integrity of sandbanks.

Estuaries are located on all parts of Ireland's coastline. The largest is the Shannon Estuary, which constitutes approximately 50% of the national resource. Ireland's estuaries are important for, *inter alia*, commercial fishing, and a number of estuaries are internationally important as feeding, roosting and wintering sites for waders and wildfowl. The EPA reports that the quality of most estuarine waters is high and that there has been little change since the early years of this decade. However, a number of estuaries, mainly in the south-east and south, continue to display symptoms of nutrient enrichment and have been classed as eutrophic (EPA, 2008; EPA, 2004). Some 80 estuaries are considered to have favourable future prospects but this figure does not reflect area and some of the larger estuaries are considered to face significant pressures. The main threats come from aquaculture, fishing, coastal development, and water pollution.

Shallow inlets and bays are large indentations of the coast where, in contrast to estuaries, the influence of freshwater is generally limited. The NPWS lists 80 sites; the two largest sites are the Shannon Estuary and Dingle Bay. These shallow indentations are generally sheltered from wave action and contain a great diversity of sediments and substrates with a well-developed zonation of benthic communities, generally having a high biodiversity. The main threats arise from aquaculture, fishing, dumping of wastes and water pollution.

Intertidal **mudflats and sandflats** are submerged at high tide and exposed at low tide and are normally associated with inlets, estuaries or shallow bays. The high biomass of invertebrates in such sediments often provides an important food source for waders and wildfowl. The main threats include aquaculture, fishing, bait digging, removal of fauna, land reclamation, and invasive species. In the longer term, there is some concern about the impact of hard coastal defence works built in response to a predicted rise in sea level.

Reefs on Ireland's coastline and continental shelf may have a rocky substrate (non-biogenic reefs) or be constructed by animals (biogenic reefs). Non-biogenic reefs are found both intertidally and subtidally, from sheltered waters through areas moderately exposed to swell and wave action, to waters exposed to the full forces of Atlantic waves. The shallowest biogenic reefs are intertidal, including honeycomb reefs made by the

polychaete worm *Sabellaria alveolata* and reefs made by mussel *Mytilus edulis*. Underwater biogenic reefs in Ireland include a small number of serpulid reefs, and sabellaria reefs. Cold water corals occur at depths from 200 to 1600 metres. Those found to date tend to occur with carbonate mounds that rise up from the sea floor. These are found close to the continental shelf slope and on the Rockall Bank. The full extent of the impact of fisheries on Ireland's reefs has not yet been documented.

Twenty three (23) **sea caves**, some of which are completely under water, have been identified from Hook Head in Co. Wexford to Malin Head, Co. Donegal. Based on the limited available information, sea caves support a wide variety of species and the communities present are characterised by sponges, coelenterates, bryozoans, and ascidians.

Codes	Habitat Names (summarised)	Range	Area	Structure & Functions (Condition)	Future Prospects	Overall
1110	Sandbanks	Good	Good	Good	Poor	Poor
1130	Estuaries	Good	Good	Unknown	Poor	Poor
1160	Large Shallow Inlets and Bays	Good	Good	Unknown	Poor	Poor
1140	Tidal Mudflats and Sandflats	Good	Good	Poor	Poor	Poor
1170	Reefs	Good	Unknown	Poor	Poor	Poor
1210	Annual Vegetation of Drift Lines	Good	Poor	Good	Poor	Poor
8330	Sea Caves	Good	Unknown	Good	Good	Good

1.2.10 Potential impacts of climate change on Ireland's habitats

Coll *et al*., (2009), in their assessment of the impacts on biodiversity in Ireland, examined the structural connectivity of Ireland's protected areas network and made a qualitative assessment of the vulnerability of habitats to climate change, while taking into account the significant remaining uncertainties in current predictions of future change at regionally and locally relevant scales. Having considered the already poor future prospects for a large proportion of EU annex habitats, the authors concluded that the most vulnerable habitats appear to be peatlands (active raised bog, blanket bog, and Cladium fens), petrifying springs, turloughs and bog woodland. Additional habitats requiring further climate change impacts research include coastal lagoons, dune habitats, orchid-rich grassland, species-rich *Nardus* grassland, residual alluvial forests and yew woodlands (Coll *et al*., 2009).

Potential impacts of climate change on species of flora and fauna, sourced from recent publications, are included in Sections 1.4.6 and 1.5.7 below.

1.3 SPECIES: STATUS, TRENDS AND THREATS

The following sections provide an overview of Ireland's floristic and faunal biodiversity, and status and threats. The overview draws on a number of key sources, including current national inventories; the national report in accordance with Article 17 of the EU Habitats Directive: *The Status of EU Protected Habitats and Species in Ireland* (NPWS, 2008); and national Red Lists.

Information on status, trends and threats to those species listed in the annexes to the EU Habitats Directive is taken from *The Status of EU Protected Habitats and Species in Ireland* http://www.npws.ie/en/PublicationsLiterature/ConservationStatusReport and the backing documents (i.e. the detailed scientific appraisal), unless otherwise referenced. Four parameters are used to assess the conservation status of species: range, population, area of suitable habitat and future prospects. A traffic light system is applied to each parameter, which is classified as being "favourable" (good); "unfavourable — inadequate" (poor); "unfavourable — bad" (bad); or "unknown". Good, poor and bad status are colour-coded in the assessment green, amber and red respectively. The coding is also used in this report. Conservation measures are described in Chapters 2 and 3.

1.4 FUNGI AND FLORA: DESCRIPTION, STATUS AND THREATS

The number of species of native Irish plants and fungi is considerably less than in mainland Europe. This inventory summarises the current knowledge of Irish wild fungi, lichens, algae, bryophytes, and vascular plants. It should be noted that there is under-recording of the lower plants; therefore, the true picture of Irish floral diversity is unknown. Table 1.2 lists the number of plant species in each major group.

Table 1.2 Ireland's Floristic Biodiversity – Estimated Number of Species

Taxonomic Group	Estimated 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	Approximately 1,700 freshwater and terrestrial; approximately 580 marine;
Lichens	957
Lichenicolous fungi	150

Sources: Botanic Gardens, 2008; DAHGI, 1998

The National parks and Wildlife Service provides a checklist of protected and rare species in Ireland. See
http://www.npws.ie/en/media/NPWS/Publications/Checklist_species.pdf

1.4.1 Fungi

Approximately 3,500 species of fungi have been recorded in Ireland, although it is believed that the true figure is closer to 7,800 species. Using the latter estimate, Ireland could hold about 0.5% of the world's fungal flora. No conservation assessment, checklist or detailed inventory exists for Irish fungi. The major threats to fungal diversity in Ireland, on the basis of limited information, include loss of old deciduous woodland and old grassland due to changes in farming and forestry, air pollution and site development.

Fungi have a variety of important roles: some are used commercially (e.g. yeasts in brewing and baking, moulds for producing antibiotics, such as penicillin, edible cultivated and wild mushrooms), while others are essential to the survival of many plants and ecosystems (e.g. mychorrhyzal fungi, which fix atmospheric nitrogen). Commercial leguminous plants, such as peas and beans, are able to fix nitrogen because they have symbiotic mychorrhyzae in their root nodules. Certain Irish fungi are pathogenic (e.g. potato blight, *Phytophthora infestans*, and Dutch Elm Disease). Finally, fungi are used as bio-indicators, e.g. certain species of ectomychorryzal fungi are sensitive to air pollution, similar to lichens. Some local harvesting of wild edible fungi occurs.

1.4.2 Lichens

Ireland has 1,050 lichen taxa, belonging to 223 genera, compared with 1,700 species in Britain and 5,000 in Europe. Ireland has 30% of the total number of European lichen taxa, which makes it important internationally. Of the 1,050 species, 34 are regarded as threatened in Europe. One group of lichens, *Cladonia* subgenus *cladina*, is listed in Annex V of the EU Habitats Directive. Their conservation status is assessed as 'poor' because the condition of the habitats in which Cladonia species occur was considered inadequate.

An IUCN Red List for Irish lichens is expected to be published as a result of the Lichen Ireland recording scheme which is nearing completion. Habitats of particular importance for lichens are broadleaved and yew woods, lowland wood pastures and parkland, calcareous grasslands, peatlands, rivers and streams, sand dunes, machair, limestone pavement and splash zones above the high tide mark on coasts. Air pollution, particularly from air-borne nitrogen inputs, is probably the greatest threat to the Irish lichen flora. Since Ireland has comparatively low amounts of air pollution, this could account for the greater abundance of certain species in Ireland relative to continental Europe. Lichens have been used extensively as indicators of air quality in Ireland.

1.4.3 Algae

The total number of Irish algal species is unknown. Of the seaweeds: green algae (Chlorophyta) account for 83 species, brown algae (Phaeophyta) 147, and red algae (Rhodophyta) 294. In total, 524 species of marine macro-algae and 181 species of marine phytoplankton have been recorded. There are 25 species of stoneworts, or about 10% of the global figure. There are an estimated 700-1,000 species of desmids (freshwater micro-algae).

Maerl, a calcareous alga, lives in shallow waters and forms maerl beds, composed of a thin veneer of living algae, beneath which is a deposit of dead maerl gravel. Biodiversity in maerl beds is often very rich. Two species are listed in Annex V of the EU Habitats Directive: *Lithothamnion coralliodies* and *Phimatolithon calcareum*. The status of both species is assessed as 'poor' due to fishing impacts, their extremely slow growth, and doubt about recovery if removed.

Stoneworts are a group of relatively large algae that grow mainly in calcareous fresh water and in brackish lagoons. Of the Irish species listed in the Checklist of protected and rare species in Ireland, 2 are Extinct (*Chara mucosa* and *Tolypella prolifera*); 3 are Rare (*Chara denudata, C. tomentosa* and *Nitella mucronata*); 5 are Vulnerable (*Chara canscens, Lamprothamnium papulosum, Nitella gracilis, Nitella tenuissima, and Tolypella intricata)*; 2 are Indeterminate (*Chara connivens* and *Nitella spanioclema).* http://www.npws.ie/en/media/NPWS/Publications/Checklist_species.pdf

The micro-algae form the phytoplankton, which has a vital role in marine and freshwater ecology; they provide the 'soup' of minute drifting plants on which marine animals depend for food. Phytoplankton in the oceans also has a vital role in climatic regulation as one of the world's largest carbon 'sinks'. Accelerated algal growth arising from increasing nutrient levels has led to eutrophication and resulting loss of beneficial uses in many inland lakes and a number of estuaries and coastal bays. Freshwater micro-algae, such as desmids, are used by the EPA as key indicators of water quality.

Since there is no overall picture of species diversity in marine algae, their conservation status cannot be stated. However, the main threats, particularly to the micro-algae, are excessive UV radiation resulting from atmospheric ozone depletion and water pollution, and pollution and aquatic habitat destruction in the case of the stoneworts.

1.4.4 Bryophytes

Ireland has an estimated 815 bryophyte taxa, compared with 1769 in Europe, and thus holds about 46% of the European flora (and 4% of the world flora), making it internationally important for bryophytes. Ireland is particularly rich in mosses and liverworts because of its mild, wet climate and relatively unpolluted atmosphere. Bryophytes form a large and conspicuous part of the vegetation in some regions of Ireland, competing effectively with vascular plants to cover large areas of bog, sand-dune

and mountain slope. Bryophyte communities and species are also important components of many Irish habitats, including woodlands on the oceanic west coast where they are abundant as ground cover and as epiphytes.

A new Irish Red List of bryophytes is currently in preparation and is due for publication in 2010. Provisional evaluation of the Irish bryophyte flora indicates that 241 taxa are under consideration for Red Listing (30% of the flora), including 45 taxa that are thought to have become Regionally Extinct (not seen, despite searching, since before 1970). Of major concern, and of global significance, is the wide scale loss of montane hepatic mat community, due to over-stocking and soil erosion, exemplified by the decline in the liverwort *Adelanthus lindenbergianus* (now confined to tiny populations at 10 sites in western Ireland, a single site in Scotland, and elsewhere found only in montane southern Africa, the South American Andes and a few southern hemisphere islands).

Two bryophytes are listed on Annex II of the EU Habitats Directive; the liverwort *Petalophyllum ralfsii* (petalwort), a species of dune slacks and machair, of which Ireland hosts the largest known populations in the world; *Hamatocaulis* (*Drepanocladus*) *vernicosus* (slender green feather moss), a species of poor fens and upland flushes. In addition to these species, a further 17 species of bryophyte are protected under the Flora (Protection) Order, 1999. The species *Leucobryum glaucum* (white cushion moss) and all species of the genus *Sphagnum*, are listed on Annex V of the EU Habitats Directive and thus require management measures to control their exploitation.

Threats to bryophytes include damage and/or destruction of habitat, over-exploitation, pollution, and loss of habitat suitable for bryophyte colonisation through ecological succession (e.g. growth of scrub). Peat exploitation is still a threat to Ireland's few remaining intact *Sphagnum* bogs. The predicted trend towards drier, warmer summers as a result of climate change could also affect bryophytes of bogs, as well as the montane species that are currently on the edge of their range In Ireland.

1.4.5 Vascular Plants

The total number of vascular plant species in Ireland is currently 1,309, and includes natives (815 species, although this figure may be higher) and those introduced species which are well-established in the wild. Ireland's flowering plants account for less than 5% of the known species in the world and only 11% 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. About half of the Irish vascular plant species are widespread throughout Europe.

The main current threats to vascular plants in Ireland arise from the trend away from traditional to intensive farming, housing and infrastructural development, and water pollution. The most widespread and serious impacts arise from changing farming practices such as conversion of old grasslands, drainage, and heavy applications of nitrogen fertilisers. Climate change poses a serious potential threat to Ireland's flora. At

least 171 native plant species in Ireland appear to be particularly vulnerable to predicted climatic change during the period 2007 to 2050 (see 1.4.6 below).

Table 1.3 lists the numbers of Red Data Book vascular plants in each of five threat categories by broad habitat group. 'Endangered' means that the species is likely to become extinct if the causes of decline continue to operate. 'Vulnerable' means that the species is likely to move into the 'Endangered' category in the near future if the causes of decline continue. 'Rare' means small populations not at present endangered or vulnerable. 'Indeterminate' means a species which is endangered, vulnerable or rare but there is not enough information to place it in a precise category. Ireland's National Red List for vascular plants (Curtis and McGough, 1988) is scheduled to be updated in the near future.

Table 1.3 Numbers of species of Irish Red Data Book vascular plants in each of five broad habitat types.

Biome	Endangered	Vulnerable	Rare	Indeterminate	Extinct
Coastal	1	6	9	1	3
Grassland	1	13	31	2	
Wetland	3	11	34		2
Woodland		9	3	1	
Artificial	1	5		1	3
Totals	**6**	**44**	**77**	**5**	**8**

Source: Curtis and McGough, (1988)

1.4.6 Potential impacts of climate change on native plant diversity in Ireland

Assessments have been made as to whether each native species of vascular plant in the Irish flora is likely to be impacted by climate change. The assessments revealed that, conservatively, there are at least 171 native plant species (20% of the total native flora) that appear to be particularly vulnerable to climate change during the period 2007 to 2050. Of a total of 143 threatened species currently included in the Irish threatened plants list, 74 species (52%) may have their situation made potentially worse due to climate change. In addition, 28 (3%) species that are currently not threatened in Ireland are likely to become so due to climate change.

It is also likely that plants of woodlands, long-lived species (such as trees) and species that are abundant in Ireland are generally less likely to be threatened by climate change, at least not by 2050. Species that occur in widespread and stable habitats may also be

only marginally affected, such as those of hedgerows and grasslands. Species that occur in habitats that are already subject to periodic drought and / or inundation may also be relatively adaptable and resistant to climate change, such as submerged aquatics, species from dry walls and well drained rocky places (Wyse Jackson, 2007)

1.4.7 Conservation of plant genetic resources

Many threatened plant species in Ireland occur outside protected areas and several are restricted to single small populations. Genetic Heritage Ireland initiated a project in 1994 to collect and store seeds of selected threatened Irish plants and **The Irish Threatened Plant Genebank** was established. The genebank is housed in the Trinity College Botanic Gardens, Dublin, and 165 collections from all over Ireland, representing 59 species of plants, were made. These species included 50% of Ireland's endangered species, 48% of vulnerable species and 31% of rare species. Many of the species housed in the genebank, while of no direct commercial value, are important as their numbers are limited in the wild and many of their habitats are disappearing. The threatened plant genebank also contains seeds of crops such as rye (*Secale cereale*) and rare species of barley (*Hordeum secalinum*). The rye seeds stored in the genebank are from an old landrace of rye thought to have originated on the Aran Islands off the west coast of Ireland, where the seed has been hand-saved for generations.

An important collection of indigenous **potato** varieties dating from Famine times (1840s) is maintained at the Department of Agriculture, Food and Rural Development Potato Centre in Co. Donegal. Many commercially successful potato varieties were developed through the Teagasc Potato Breeding Programme in Oakpark, Co. Carlow.

Old indigenous varieties of **rye, bristle oats, wheat** and **barley** were once commonly cultivated in Ireland. Some of these old varieties are still in cultivation on a small scale in the west of Ireland. Genetic Heritage Ireland and Irish Seedsavers Association initiated a project in 1997 to promote the conservation and sustainable utilisation of these important Irish cereal varieties.

An important collection of **apple** germplasm is maintained at University College Dublin along with a collection of old apple cultivars in the Lamb-Clarke Irish National Historic Apple Collection. These old apple varieties are potential sources of natural pest and disease resistance.

(Source: Genetic Heritage Ireland http://www.tcd.ie/Botany/GHI/genebank.html)

The Second Irish National Report on the **State of Plant Genetic Resources for Food and Agriculture in Ireland** (DAFF, 2009) describes Ireland’s plant genetic resources for food and agriculture, including agricultural crops, pasture plants, vegetables, fruit crops and wild plants of potential use for food. The report focuses on the changes that occurred in Ireland’s plant genetic resources in the ten year period following the first Report of 1996. The Report was prepared by the Department of Agriculture, Fisheries and Food

(DAFF) and submitted to the Food and Agriculture Organisation (FAO) in response to the Commission on Genetic Resources for Food and Agriculture's decision to adopt the second report of the State of the World's Plant Genetic Resources for Food and Agriculture at its Twelfth Regular Session in 2009. The report was still in draft form at the time of writing. The report concluded that:

- there remains a need for more concentrated measures for *in situ* and on-farm conservation;

- there is a need to create a centralised national genebank facility. It is intended that this facility will provide for the safe duplication of all valuable *ex situ* holdings in the country and act as a coordinating centre for plant conservation activities;

- there is a recognition of the need to promote the utilisation of plant genetic resources as an effective method in achieving sustainable conservation of agro-biodiversity;

- while there has been considerable progress made in conserving plant genetic resources in some areas in Ireland over the past ten years, much needs to be done in other areas.

Examples of plant genetic resource projects funded by the Department of Agriculture, Fisheries and Food from 1996-2007 can be found at:
http://www.agriculture.gov.ie/ruralenvironment/geneticresources/conservationofgeneticresourcesforfoodandagriculture/animalandplantgeneticresourcesprojects/1996-2007/

1.5 FAUNA: DESCRIPTION, STATUS AND THREATS

A taxonomic inventory of Irish fauna was published in 2009 (Ferriss *et al*., 2009). This report provides a taxonomic overview of the animal species known to occur in Ireland. Records have been found for approximately 19,122 species but this figure is likely to be a significant underestimate of the true diversity of Irish fauna. Many species remain to be discovered, in particular small, cryptic animals and species that live in areas that have not been fully surveyed (e.g. deep-water marine species). Table 1.4 provides an overview of the number of animal species in Ireland.

Table 1.4 Number of species of fauna in Ireland according to Purcell (1996) and Ferriss *et al*., (2009)

Phylum	Class	Number (Purcell, 1996)	Number (Ferriss *et al*., 2009)
Kingdom Bacteria			?
Kingdom Protozoa			614
Kingdom Animalia			
Myxozoa		n/a	? (>2)
Placozoa		n/a	?
Porifera		225	290
Cnidaria		263	302
Ctenophora		3	3
Mesozoa		n/a	?
Platyhelminthes		>254	300
Gnathostomulida		n/a	?
Gastrotricha		>3	6
Rotifera		315	306
Kinorhyncha		5	5
Loricifera		n/a	0
Cycliophora		n/a	0-2
Acanthocephala		.13	14
Entoprocta		<34	4
Nematoda		579	172
Nemertea		39	40
Nematomorpha		2	3
Bryozoa		199	206
Phoronida		4	1-3
Brachipoda		?4	14
Mollusca		688	1,088
Priapulida		1	1
Sipuncula		<13	23
Echiura		6	7
Annelida	Polychaeta	342	404

	Aphanoneura	2	2
	Oligochaeta	>160	179
	Hirudinea	14	32
Tardigrada		41	42
Pogonophora		>15	1
Arthropoda	Arachnida	860	1,109
	Pycnogonida	>19	20
	Subphylum Crustacea	1,774	1,775 (+27)
	Subphylum Myriapoda	59	74
	Entognatha	214	210
	Insecta	7,162	11,260
Echinodermata		73	192
Chaetognatha		14	15
Hemichordata		<12	3
Chordata	Subphylum Urochordata	<105	72
	Subphylum Cephalochordata		1
	Myxini		2
	Cephalaspidomorphi	3	3
	Elasmobranchii		55
	Holocephali		5
	Actinopterygii	243	363
	Amphibia	3	3
	Reptilia	1	7-8
	Aves	161-403	444
	Mammalia	55	62
Total		**>14,616**	**>19,122**

Source: Ferriss *et al*., (2009)

1.5.1 Red Lists: Fauna

Three hundred and fifty three (353) Irish species are included in the 2008 IUCN Red List (IUCN, 2008). Of these, 27 species are listed as Threatened; nine as Critically Endangered, seven as Endangered and eleven as Vulnerable (see Table 1.5). The majority of Irish species in the IUCN Red List are vertebrates, which is due to the fact that all birds, mammals and amphibians species in the world and freshwater fishes of Europe have been assessed by IUCN. However, the vast majority of invertebrates found in Ireland have not yet been assessed. The nine Critically Endangered species are: Balearic Shearwater *Puffinus mauretanicus*, Eskimo Curlew *Numenius borealis* (regionally extinct in Ireland), Angel Shark *Squatina squatina*, Blue Skate *Dipturus batis*, Common Sturgeon *Acipenser sturio* (possibly extinct from Ireland), European Eel *Anguilla anguilla*, Killarney Shad *Alosa killarnensis*, Melvin Charr *Salvelinus grayi* and Blunt-snouted Charr *Salvelinus obtusus* (Ferriss *et al*., 2009).

Table 1.5 Number of Irish animal species assessed in the IUCN Red List and their threat category

Description	IUCN Red List Category	No. of species
Threatened	Critically Endangered Endangered Vulnerable	9 7 11
Lower risk	Least Concern Lower Risk/conservation dependant Near Threatened	285 3 20 0
Not enough information	Data Deficient Extinct	17 1
Total		353

Source: IUCN Red List, 2008 and quoted in Ferriss *et al.,* (2009)

The National parks and Wildlife Service provides a checklist of protected and rare species in Ireland. See http://www.npws.ie/en/media/NPWS/Publications/Checklist_species.pdf

1.5.2 Invertebrates

Although the vertebrates are the most familiar and well-known group of animals, Ireland's faunal diversity is largely made up of invertebrates. The arthropods are the largest group, with at least 11,260 species of insect, 1,775 species of crustacean and 1,107 species of arachnid known to occur in Ireland. A relatively high number (1,088) of mollusc species have also been recorded (Ferriss *et al.*, 2009).

The Red List of non-marine molluscs (Byrne et al, 2009) includes 2 as Regionally Extinct, 5 Critically Endangered, 14 Endangered, 26 Vulnerable, and 6 Near Threatened. Ireland's non-marine molluscan fauna is of international importance. Ten species have populations of significant international worth, having large proportions of their global population in Ireland. Seven species have been listed on the global IUCN red list, e.g. *Myxas glutinosa* and *Quickella arenaria*, both of which are endangered in Ireland. Six species are protected under the EU Habitats Directive, but only the Kerry slug, *Geomalacus maculosus*, is not considered threatened in Ireland. However, the Irish population of the Kerry Slug is of particular international importance as the species is restricted to south-west Ireland and northern Iberia, and the Iberian populations are severely threatened. The bivalve, *Margaritifera durrovensis* (Nore Freshwater Pearl Mussel), is critically endangered and listed in Annexes II and IV of the EU Habitats Directive. The only known population worldwide is found in the Nore River. Its decline is thought to be linked to poor water quality. The main pressures on non-marine molluscs include habitat loss, for example through drainage, and reduced water quality.

Among the most numerous animal group in Ireland, the arthropods are protected species and/or species that have limited distributions in Ireland or Europe.

- The white-clawed crayfish *Austropotamobius pallipes* is widespread in lowland lime-rich streams and lakes. Ireland's population is internationally important because it remains free of the plague carried by American crayfish species, which is now found in the rest of Europe.

- Spiders include *Hyptiotes paradoxus*, *Sitticus floricola*, *Dipoena melanogaster* and *Baryphyma duffeyi*.

- Millipedes include *Nanogona polydesmoides* and *Ophyiulus pilosus*.

- The mayfly genera *Ecdyonurus* and *Rhithrogena* and the stoneflies such as *Perla bipunctata* and *Dinocras cephalotes* are used as indicators of unpolluted waters. The stoneflies *Capnia atra* and *Diura bicaudata* are glacial relict species.

- The Irish damselfly *Coenagrion lunulatum* is a northern European species in decline due to pollution and drainage. The water bug *Sigara fallenoidea* is not found in Britain but occurs in Canada, and is found in a number of Irish lakes.

- Dragonflies

- Beetles include the relict species *Noterus crassicornis* and *Carabus clatratus*, *Pyopterus nigroruber*, the ladybird *Hippodamia tredecimpunctata*, and the machair click beetle *Selatosomus melancholicus.* The Red List of Water Beetles shows that, of the wetland species, 8 are considered Regionally Extinct, 8 Critically Endangered, 11 Endangered, 22 Vulnerable, and 24 Near Threatened (Foster et al, 2009).

- The hoverfly *Cheilosia ahene* is unknown anywhere between the Burren and the Vosges mountains of eastern France. The threatened wetland soldier fly *Oxycera falleni* is known from Wicklow and Denmark but nowhere else in between. The tufa-spring moth fly *Telmatoscopus (Panimerus) goodi* is so far only known from Ireland.

- Three species of caddis flies are recorded in Ireland but are unknown in Britain, while *Limnephilus pati* is very rare and threatened in Europe.

- The marsh fritillary, *Euphydras aurinia*, is the only Irish butterfly species protected under the EU Habitats Directive. Once widespread, this species declined severely during the 20th century due to loss of uncultivated grasslands, overgrazing on remaining habitat, and its requirement for extensive habitat area and wildlife corridors. It is now considered one of the most endangered species in Europe and the Irish population is therefore of international importance.

- A Red List of Irish bees (Fitzpatrick et al, 2006) shows that of the 102 Irish species, 6 are critically endangered, 10 are endangered, and 14 are vulnerable.

Eight of Ireland's invertebrates species are listed in the annexes to the EU Habitats Directive. Their conservation status is summarised below:

Code	Species Name	Annex	Range	Population	Suitable Habitat	Future Prospects	Overall
1013	Geyer's Whorl Snail *(Vertigo geyeri)*	II	Good	Poor	Poor	Poor	Poor
1014	Narrow-mouthed Whorl Snail *(Vertigo angustior)*	II	Good	Poor	Poor	Poor	Poor
1016	Desmoulin's Whorl Snail *(Vertigo moulinsiana)*	II	Bad	Bad	Poor	Bad	Bad
1024	Kerry Slug (*Geomalacus maculosus*)	II, IV	Good	Good	Good	Good	Good
1029	Freshwater Pearl Mussel (*Margaritifera margaritifera*)	II, V	Good	Bad	Bad	Bad	Bad
1990	Nore Freshwater Pearl Mussel (*Margaritifera durrovensis*)	II, V	Bad	Bad	Bad	Bad	Bad
1092	White-Clawed *Crayfish (Austropotamobius pallipes*)	II, V	Poor	Poor	Poor	Poor	Poor
1065	Marsh Fritillary (*Euphydryas aurinia*)	II	Good	Poor	Poor	Poor	Poor

1.5.3 Vertebrates: Fish

Of the 428 freshwater and marine fish species recorded in Irish waters to date, eight fish species are listed in Annex IV of the EU Habitats Directive. These comprise three lamprey species — sea lamprey, river lamprey and brook lamprey; three species of shad — allis shad[3], Killarney shad and twaite shad; pollan; and Atlantic salmon. While the conservation status of the sea lamprey is considered 'poor' due to weirs blocking upstream migration, the status of the other two lamprey species is considered 'good'. The status of the twaite shad, restricted mainly to the larger rivers of the south-east coast, is considered 'bad'. Numbers of pollan, confined to five large Irish lakes, are at critically low levels and its status is therefore considered as 'bad'. The Atlantic salmon has suffered from water pollution and over-fishing and the population has declined by 75% in recent decades. Recent conservation measures such as a ban on drift netting and the slight improvement in water quality give some cause for optimism, although the conservation status overall has been assessed as 'bad'.

The Arctic char, which is not legally protected, is now confined to deep mountain lakes in the west, from Donegal to Kerry. Populations in the midlands and east of the country became extinct in the 19th century, due mainly to pollution and competition from introduced species.

Commercially important marine fish species
Many commercially important fish species in Irish waters are heavily exploited. In terms of individual stocks, it is estimated that as much as 75 per cent is being harvested beyond safe biological limits. Stocks of herring *(Clupea harengus)* remain low and selected

[3] The allis shad is now believed to be vagrant in Ireland

spawning areas off the south coast of Ireland are closed on a rotational basis to protect the spawning shoals. The combined Northeast Atlantic mackerel stock is currently being harvested at unsustainable levels. There are serious concerns about the sustainability of stocks of blue whiting *(Micromesistius poutassou).* Cod *(Gadus morhua)* stocks in Atlantic waters are considered to be in a state of collapse and are expected to decline further. Recovery plans were established for Irish Sea cod in 2000 and west of Scotland cod in 2004, but both have been ineffective. It is likely that severe measures, such as multi-year closures in certain areas, will be required to ensure the longer-term sustainability of cod stocks. Whiting *(Merlangius merlangus)* stocks are also in a severe state of decline in the Irish Sea. The status of the haddock *(Melanogrammus aeglefinus)* in the Irish Sea is uncertain, and while low in historic terms, there is some indication that recruitment has increased and this has led to an increase in the size of the spawning stock.

Deepwater species targeted include ling *(Molva molva)*, blue ling *(Molva dipterygia)*, forkbeard *(Phycis blennoides)*, black scabbard *(Aphanopus carbo)*, *(Hoplostethus atlanticus)*, redfish (*Sebastes* spp.) and Greenland halibut *(Reinhardtius hippoglossoides)*. In European waters, landings of deepwater species increased substantially during the 1990s, and in the early 2000s there was a further rapid increase in landings when deepwater species were targeted by the Irish fishing fleet. Since 2003, landings of certain species have plummeted due to the collapse in several deepwater stocks and the introduction of TAC and quota restrictions.

Source: *Ireland's Environment 2008* (EPA, 2008), based on data from the Marine Institute (http://www.marine.ie/Home) and the International Council for the Exploration of the Sea (ICES).

1.5.4 Vertebrates: Amphibians and reptiles

Three species of amphibian occur in Ireland: common frog (*Rana temporaria*); natterjack toad (*Bufo calamita*); and smooth newt (*Triturus vulgaris*). The conservation status of the common frog, listed under Annex V of the EU Habitats Directive and Annex III of the Berne Convention, has been assessed as 'poor' because of the threats posed to its habitat by drainage and intensive urban and suburban development around cities. The natterjack toad is listed under Annex IV of the EU Habitats Directive. Its range contracted significantly in the early years of the 20th century and a recent monitoring study indicated that its range is at risk of contracting further. Conservation measures including pond creation and managed grazing in Co. Kerry are underway but may take many years to achieve success, and therefore the conservation status of the species has been assessed as 'bad'.

Ireland has only one species of native terrestrial reptile, the viviparous lizard (*Lacerta vivipara*) and one species of introduced terrestrial reptile, the slow worm (*Anguis fragilis*). Four species of marine turtle — leatherback, loggerhead, Kemp's Ridley and hawksbill — have been recorded in Irish waters, and a fifth, the green turtle, might occur, although records are unverified. Of the marine turtles, the leatherback occurs regularly in Irish waters (Ferriss et al, 2009).

1.5.5 Vertebrates: Birds

The island of Ireland is especially important for wintering waterbirds, hosting an estimated 1.15 million during the period 1999/2000 to 2003/2004. These estimates were derived for 42 species (27 wildfowl and allies and 15 wader species) (Crowe et al, 2008). This paper reported a decline in the numbers of wintering waterbirds during the above period, consisting of a 5% decline in wildfowl and an 11% decline in waders. Of the 39 species for which trends were measured, 18 showed annual declines in excess of 2%, while ten species had increased. Numbers of the remaining 11 species were relatively stable. For many species, the trends measured appear to be continuations of longer-term changes since the 1970s. The full report is available at: http://www.birdwatchireland.ie/Portals/0/pdfs/iw_IrishWinteringWaterbirdEstimates.pdf

Ireland also hosts important populations of breeding and wintering seabirds. Ireland has the largest breeding numbers of Storm Petrels in the world, and several successful Roseate Tern breeding colonies. The status and trends for seabirds have been published for Britain and Ireland by the UK Joint Nature Conservation Committee (JNCC). Numbers of seabirds breeding in Britain and Ireland have risen steadily over the last 30 years from around 5 million in 1969-70, to over 6 million in 1985-88, to almost 8 Million in 1998-2002. Twenty five (25) species of seabird currently breed in Britain and Ireland. The coastal populations of 13 species have increased in size by more than 10%, three have decreased by more than 10% and five have changed by less than 10% (Mitchell et al, 2004).

The Countryside Bird Survey (CBS), a joint project between Birdwatch Ireland and National Parks and Wildlife Service, has been in operation since 1998. Its primary aim is to monitor breeding bird populations. The latest CBS report covered the period 1998 to 2007 (Coombes *et al.*, 2009). The total number of species recorded was 145. Trend analyses were undertaken on 57 species. Some 25 species showed increasing trends over the 10-year period since 1998, nine species declined, while the remaining 23 species remained relatively stable. The significant trends reported are largely consistent with those elsewhere in Europe, especially in the UK and western Europe. The full report is available online at: http://www.birdwatchireland.ie/LinkClick.aspx?fileticket=Lrh7v4I%2bgKM%3d&tabid=280

Twenty-five (25) regularly occurring bird species in Ireland are listed in Annex 1 of the EU Birds Directive. They include Bewick's[4] and Whooper Swan, Greenland White-Fronted and Barnacle geese, Corncrake, Golden Plover, Bar-tailed Godwit, five species of tern, birds of prey including Hen Harrier, Peregrine, Merlin, and Nightjar, Kingfisher and Chough.

[4] Bewick's Swan has now almost stopped wintering in Ireland, apparently due to climate change

The current red list of Birds of Conservation Concern (see Table 1.6) lists those species whose population or range has declined rapidly in recent years; and those that have declined historically and not shown a substantial recent recovery. The current Amber list of Birds of Conservation Concern lists those species with an unfavourable conservation status in Europe; those whose population or range has declined moderately in recent years; those whose population has declined historically but made a substantial recent recovery; rare breeders; and those with internationally important or localised populations. The Red, Amber and Green lists can be accessed at http://www.birdwatchireland.ie/Ourwork/SurveysProjects/BirdsofConservationConcern/tabid/178/Default.aspx

Table 1.6 Red list of Birds of High Conservation Concern

Black-necked Grebe #	**Red-necked Phalarope #**
Common Scoter * #	**Roseate Tern * #**
Red Grouse *	**Barn Owl ***
Grey Partridge * #	**Nightjar * #**
Quail #	**Ring Ouzel #**
Corncrake * #	**Twite * #**
Lapwing *	**Yellowhammer ***
Curlew *	**Corn Bunting * #**

* declining breeder
# historical decline
Source: Birdwatch Ireland

In general, the outlook for raptors has improved in Ireland. The Buzzard has spread through much of the country in the past 20 years, and the Peregrine Falcon population is high. Three raptor species, formerly extinct in Ireland, have been reintroduced in the last decade: Golden Eagle (in 2001); Red Kite (in 2007); and White-tailed Sea Eagle (in 2007). Details of the reintroduction projects and monitoring are provided online at www.goldeneagle.ie

All bird species occurring in Ireland are protected under both the EU Birds Directive [79/409/EEC] and the Wildlife Act, 1976 (including amendments made in S.I. 283/1980 and S.I. 397/1985). See http://www.npws.ie/en/media/NPWS/Publications/Checklist_species.pdf

Derogations exist for those species causing damage to crops, livestock, fauna and public health. See http://www.environ.ie/en/Legislation/Heritage/NatureConservation

Hunting of certain bird species is permitted under the Wildlife Acts 1976 and 2000, as set out in the Open Seasons Order. The provisions of the Order currently in force together with a list of quarry species are contained in S.I. No. 394. See http://www.irishstatutebook.ie:80/2003/en/si/0394.html

1.5.6 Vertebrates: Mammals

Currently, 62 species of mammal are recorded as occurring in Ireland or in Irish waters. Ireland has 25 extant terrestrial mammal species (14 native species and 9 post-1500 introductions) (Marnell *et al*., 2009). Twenty seven (27) aquatic mammal species are known to occur in Ireland: three pinnipeds (grey seal, common seal and walrus, a vagrant species); and to date, 24 cetacean species have been recorded in Irish waters (Ferriss et al, 2009; and http://www.iwdg.ie/downloads/biodiversity.pdf).

The Red List of Irish terrestrial mammals lists 20 species as of least concern. However the black rat (*Rattus rattus*) is considered as Vulnerable; Leisler's bat, otter and red squirrel as Near Threatened. (Marnell *et al*., 2009).

A number of Irish terrestrial and aquatic mammal species are listed in the EU Habitats Directive. Ten species of bats are listed in Annex IV and the lesser horseshoe bat is also listed in Annex II. The conservation status of all these bat species is considered to be 'good'. The Irish hare (*Lepus timidus hibernicus*), a distinct endemic sub-species of the mountain hare, is experiencing pressure from loss of suitable habitat and hunting and consequently its status is considered 'poor'. The population of the otter is estimated at between 10,000 and 20,000 adults. A net population loss of 23.7% was recorded between the first national survey in 1980/81 and the most recent survey in 2004/05. Although still widespread, surveys suggest that otter densities have declined since 1980, and the status of the species is therefore considered 'poor'. The pine marten, once widespread, suffered a serious decline due to deforestation in the 17th century and persecution in the 19th century. However, the species has increased in distribution in recent years due to the large increase in forest area since the 1980s, statutory protection, and deliberate release. Its status is considered 'good'.

The status of both the grey seal and common seal is considered to be 'good'. The walrus has been recorded infrequently but does not breed in Irish waters. Nearly one-third of the world's known whale, dolphin and porpoise species have been recorded in Irish waters (Wilson and Berrow, 2006). Eleven whale species listed in annexes to the EU Habitats Directive have a conservation status assessed as 'unknown'. The conservation status of the bottle-nosed dolphin, common dolphin and harbour porpoise has been assessed as 'good'. The Irish Whale and Dolphin Group operate a recording scheme for cetacean sightings and strandings, available online at www.iwdg.ie. In 1991, the Irish government declared all Irish waters, to the exclusive economic zone, a whale and dolphin sanctuary.

1.5.7 Potential impacts of climate change on Ireland's fauna

Reference has been made in previous sections to pressures and threats that are ongoing and are well-known. Climatic changes that are predicted to occur over the course of this century represent an additional potential threat to Ireland's fauna. The effects of climate change may already be evident in relation to certain species. Several examples include

the spread of the Little Egret, a bird first recorded breeding in Co. Cork in 1997 but now found in almost every coastal county, and the arrival of the Cattle Egret in 2008. Both bird species were originally confined to southern Europe (http://www.birdwatchireland.ie/News/ClimaticAtlaspredictschangestoourbirdlife/tabid/494/Default.aspx). The migrant hawker dragonfly (*Aeshna mixta*), first recorded in Ireland in 2000, has now spread north and west along Ireland's coast (see Figure 1.1).

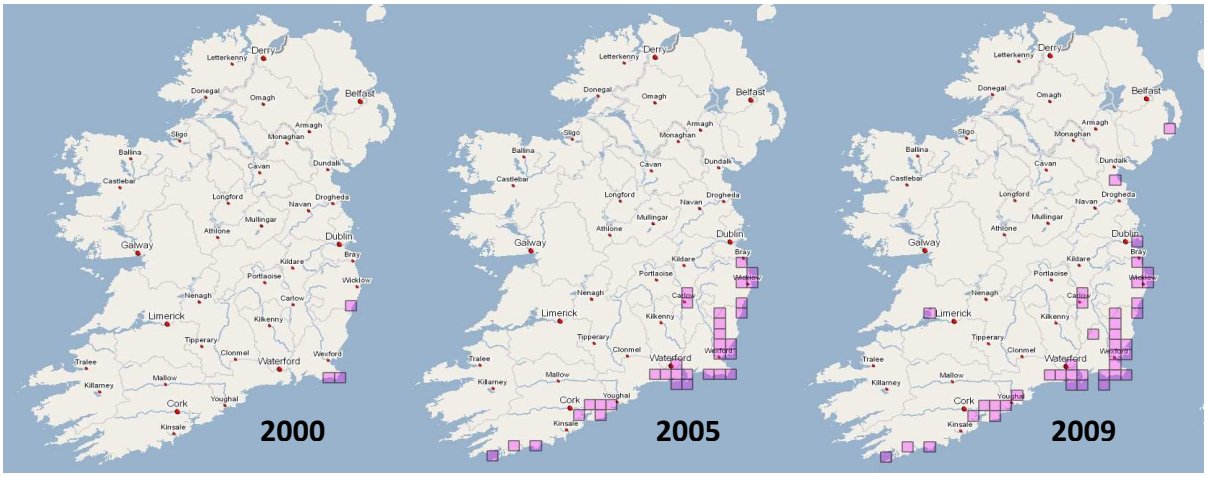


Figure 1.1 Spread of migrant hawker dragonfly across Ireland
(*Source: Kingston, 2009*)

Other species likely to benefit from climate change include the lesser horseshoe bat and natterjack toad (Kingston, 2009). However, the potential impact of climate change on fauna in general gives cause for concern. For example, Huntley et al (2007), in a major study of the potential impact of climate change on European birds, predicted that the potential future range of the average European bird species will shift by nearly 550 km north-east by the end of the 21st century and will reduce in size by 20 per cent compared to the current range. A number of bird species, such as Curlew, Red Grouse and Long-eared Owl, could be lost from Ireland.

1.5.8 Domestic animal breeds

The following is a summary list of the domestic animal breeds listed in the Rare Breeds Directory for Ireland.

Sheep
The Galway sheep is the only indigenous sheep breed. The Rare Breeds Directory includes: Soay, Wiltshire horn, grey faced Dartmoor, Castlemilk moorit, Lincoln longwool and banwen, Kerryhill; Welsh badger face, Dorset down, Shetland, Dartmoor greyface, Portland, Rough fell, Friesland, whiteface woodland, Hampshire down, Herdwick and Wensleydale.

Cattle
The Rare Breeds Directory includes Kerry, Maol, Dexter, Gloucester, shorthorn, highland, Jersey, Galloway, Shetland, whitepark and longhorn.

Deer
Red, Fallow and Sika deer are farmed, with most of the stock coming from the wild or parks.

Pigs
Most pigs in Ireland are derived from two breeds: the landrace and the large white. The Irish pig is now extinct. The Rare Breeds Directory lists: Gloucestershire old spot, Berkshire, British saddleback, British lop, Tamworth and large black.

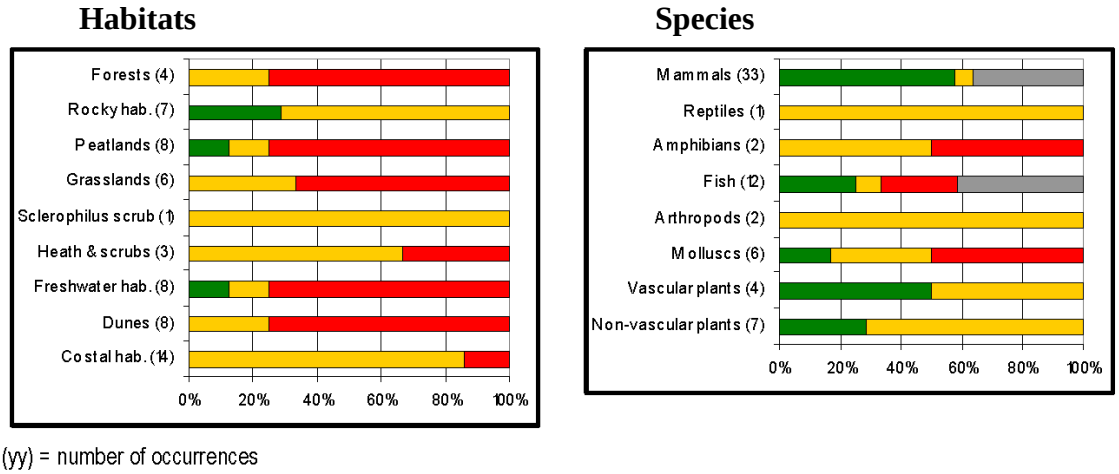
Horses
Five breeds are included in the Rare Breeds Directory: Irish Draught, Connemara pony, Kerry bog pony, Eriskay and Exmoor. The native Irish breeds of horses are the Irish Draught horse, the Connemara pony, and the Kerry Bog pony.

Examples of animal genetic resource projects funded by the Department of Agriculture, Fisheries and Food from 1996-2007 can be found at:
http://www.agriculture.gov.ie/ruralenvironment/geneticresources/conservationofgeneticresourcesforfoodandagriculture/animalandplantgeneticresourcesprojects/1996-2007/

1.6 SUMMARY OF CONSERVATION STATUS, TRENDS AND THREATS FOR HABITATS AND SPECIES IN IRELAND

The results presented in *The Status of EU Protected Habitats and Species in Ireland* (NPWS, 2008) can be taken as an indicator of the status of Ireland's biodiversity in general, since Habitats Directive annex habitats and species are found throughout Ireland, and cover most of Ireland's biodiversity hotspots (see also Map 1.1).

Figure 1.1 summarises the overall conservation status for EU annex habitats by broad habitat types and EU annex species by major groups.



(yy) = number of occurrences

Source: EIONET National Summary: Ireland
http://circa.europa.eu/Public/irc/env/monnat/library?l=/habitats_reporting/reporting_2001-2007/ms-reports_summaries/national_sumarypdf_11/_EN_1.0_&a=d

Figure 1.1 Summary of overall conservation status for EU annex habitats by broad habitat category (left) and EU annex species by major group, excluding birds (right). Colour-coding: Green = 'good' status; amber = 'poor' status; and red = 'bad' status.

The graphs in Figure 1.1 illustrate the main conclusions of the report, which are listed below:

- A low proportion of species were assessed as having a 'bad' overall status. This includes three species of mollusc, three fish and one amphibian. These species are all dependent on freshwater for at least some parts of their life cycles. The critical situation of some of the more sensitive species, such as the freshwater pearl mussels, underlines the urgency of improving water quality in key areas.

- A majority of those species assessed as having 'poor' overall status are also water dependent.

- All of the listed bat species were assessed as having a 'good' status.

- A large proportion of the cetacean species were assessed as having an 'unknown' status, as the distribution and populations of these elusive species are still poorly understood.

- The majority of the Ireland's important habitats have an unfavourable overall conservation status, in particular raised and blanket bogs, sand dune systems, fens and mires, natural grasslands and woodlands.

- Although the range for most of the habitats was assessed favourably, the structure and functions and future prospects, in particular, will require considerable management effort to improve condition and reduce the impacts of pressures.

The specific pressures and threats to the habitats and species have been described in sections 1.1 to 1.4, above. The key general threats to Ireland's EU protected habitats and species are:

- **Direct damage**, such as peat cutting, drainage and infilling; buildings and infrastructure; reclamation of wetlands such as bogs and fens; and removal of sand and gravel.
- **Over-grazing** and **under-grazing** of grasslands, peatlands, and coastal habitats.
- **Pollution** of both surface water and groundwater by nutrients or silt.
- **Unsustainable exploitation** of water, sand, peat, fish and other natural goods and services.
- **Invasion by alien species** of plants and animals.
- **Recreational pressure** in areas which were previously undisturbed.

Birds were excluded from the Article 17 Conservation Status Report but bird habitats and species are experiencing similar general pressures and threats. Additional pressures on a number of species and habitats are likely to arise if Ireland undergoes climatic changes according to predictions.

1.7 BENEFITS AND COSTS OF BIODIVERSITY IN IRELAND

The Department of Environment, Heritage and Local Government recently commissioned a study to identify the nature and scale of the benefits that Irish society derives from biodiversity (DoEHLG, 2008). The report presents an assessment of the benefits of selected ecosystem services in the principal social and economic sectors. Based on a preliminary estimate, the authors set the value of Ireland's ecosystem services in terms of their productive output and human utility to be over €2.6 billion per annum. This estimate

omits other significant services including waste assimilation provided by aquatic biodiversity and benefits to human health.

Agriculture
The value of soil biota to nutrient assimilation and recycling is placed at €1 billion per year, but greater reliance on pollination, such as for clover-based forage or the production of oilseeds, could give an additional value to this ecosystem service of €220 m per year. Baseline pest control is worth €20m per year before savings on pesticides of an estimated €2 m per year. The public utility benefits of sustainable farming have been put at a minimum of €150m per year.

Forestry
The level of ecosystem services from forestry is valued at €55m per year, but could rise to €80m per year if more environmentally sensitive forestry is practiced, and more if broadleaf forestry is expanded.

Fisheries
The current quayside fish catch is worth €180m per year, but could be twice this amount if fish stocks were managed sustainably. Aquaculture and the seaweed industry are valued at over €50m per year. This excludes the assimilation value of waste by rivers.

Water
The authors distinguish between the huge external cost of water pollution and the value of the ecosystem service. A tentative value of the ecosystem services provided by biodiversity to freshwater resources is placed at up to €385m per year.

Human welfare and health
This value of biodiversity to human welfare is estimated at being at least €330m per year. The value of ecosystem services to health remains unquantified but is very considerable.

Policy costs are estimated to be €370m per year, but only a proportion of these are truly incurred on protecting biodiversity. For example, the National Parks and Wildlife Service spends around €35m per year directly on biodiversity protection (See Chapter 2.2).

A partial comparison of the marginal benefits of ecosystem services with current policy costs is provided in Tables 1.7 and 1.8 below. From the figures presented, it is clear that Ireland is spending very little on biodiversity protection compared to the value of the benefits that Ireland's society and economy receive from them. Domestic and international funding dedicated to priority activities is described in Chapter 2.2.

Table 1.7 Marginal benefits of ecosystem services in Ireland (DoEHLG, 2008)

BENEFITS	Marginal value of status quo	Threats/comments
Agriculture	Over €1200 million per year	Potentially significantly greater benefits from more sustainable agriculture
Forestry	€55 million per year	Non-market benefits increasingly being recognised
Marine	€230 million per year	Potentially significantly greater benefits from more sustainable resource management. Waste assimilation not included.
Human welfare	€920 million per year	Selected benefits only
Health	Unknown	Tens of millions

Source: (DoEHLG, 2008)

Table 1.8 Current environmental policy costs

POLICY COSTS	Marginal annual cost	Comments
Agriculture	€180 million per year	Excluding a nominal proportion which is non-environment.
Forestry	€15 million per year	Excludes additional premia costs (figures not forthcoming).
Marine	€30 million per year	Much neglected in the past, but expenditure likely to increase significantly.
Water quality	€65 million per year	Catchment management expenditure likely to increase and replace current emphasis on capital investment.
Roads (mitigation)	€40 million per year	Biodiversity mitigation being made, but little strategic assessment of biodiversity.
Human welfare	€260 million per year (or €40m net of above figures)	Increasing expenditure of environmental policies generally, but often correcting other policies.
Health	Negligible	

Source: (DoEHLG, 2008)

CHAPTER 2

CURRENT STATUS OF IRELAND'S NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS

2.1 IRELAND'S NATIONAL BIODIVERSITY PLAN 2002-2006 (NBP)

Ireland's NBP 2002-2006 included 91 actions, grouped under the following themes:

- Sectoral integration
- Legislation
- Protected Areas
- Species and Conservation
- Habitat and Ecosystem Conservation
- Countryside Conservation
- Conservation and Sustainable Use of Genetic Biodiversity
- Biosafety
- Knowledge: Identification, Monitoring and Research
- Public awareness and education
- EU, regional and international policies and obligations
- Focus on key sectors
  — Agriculture
  — Forestry
  — Inland waters
  — Marine and coastal.

The NBP set out the means by which the 91 actions would be implemented, followed by monitoring, review and the preparation of future plans. The NBP, which includes a full list of the actions referred to in this report, can be seen at:
http://www.npws.ie/en/media/NPWS/Publications/Media,4590,en.pdf

An interim review of the NBP was published in 2005 (DoE, 2005). See
http://www.npws.ie/en/media/NPWS/Publications/Media,3751,en.pdf

Ireland's Second NBP is in preparation and is due for publication in 2010. An assessment of progress in the implementation of the NBP 2002-2006 up to and including 2009 is presented in Section 2.2, below.

2.2 ASSESSMENT OF PROGRESS MADE IN THE IMPLEMENTATION OF THE NATIONAL BIODIVERSITY PLAN 2002-2006

A summary assessment of progress made in implementing the National Biodiversity Plan (NBP) 2002-2006 is provided below, with particular reference to priority actions, as requested by the Convention. Actions listed in the NBP are referred to in the text in brackets, viz: (Action, No.).

2.2.1 NBP actions where good progress has been made

Designation of Sites of Community Importance
Substantial progress has been made in designating Sites of Community Importance (SCIs), with an approximate area of 1,350,000 ha. Marine SCIs occupy approximately 330,000 ha. Marine areas covering approximately 428,000 ha are proposed for designation. One hundred and forty seven (147) SPAs have been designated to date, covering over 280,000 ha., including 66 marine SPAs covering over 80,000 ha (Action 17).

Development of biodiversity databases, monitoring and research
Substantial progress has been made in monitoring of protected habitats (Action 23) and species, and in the development of a comprehensive Irish Biodiversity Database (Action 41). The National Parks and Wildlife Service biodiversity databases are linked to the biodiversity database managed by the National Biodiversity Data Centre (NBDC), established in 2007. The NBDC acts a central hub for all biodiversity data in Ireland. (Action 42).

A **Site inspection Reporting Programme** has been established to record impacts to designated sites.

In Chapter 1, reference has been made to a number of research projects on species. Further examples of recent and current **research** and **monitoring** are listed below.

Terrestrial and freshwater research and monitoring

National Survey of Grasslands of Conservation Value (ongoing):
http://www.npws.ie/en/CurrentResearchProjects/HabitatSite/Grasslands/

National survey of native woodlands. Summary report:
http://www.npws.ie/en/media/NPWS/Publications/Reports/Media,6697,en.pdf
Main report:
http://www.npws.ie/en/media/NPWS/Publications/Reports/Media,6688,en.pdf
http://www.npws.ie/en/media/NPWS/Publications/Reports/Media,6689,en.pdf

Turloughs:
http://www.tcd.ie/Botany/turlough_conservation

Limestone pavement:
http://www.npws.ie/en/media/NPWS/Publications/IrishWildlifeManuals/IWM_43.pdf
National baseline monitoring survey of limestone pavement (ongoing):
http://www.npws.ie/en/CurrentResearchProjects/HabitatSite/LimestonePavement

Juniper survey:
http://www.npws.ie/en/CurrentResearchProjects/HabitatSite/Other

Commonage monitoring programme: monitors new grazing regimes in areas suffering from overgrazing. The programme includes monitoring of the state of SACs containing uplands and peatlands in non-commonage areas.

Bird monitoring, surveys and research:
Irish Wetland Bird Survey (monitoring wintering waterbirds nationally)
http://www.birdwatchireland.ie/Ourwork/SurveysProjects/IrishWetlandBirdSurvey/tabid/111/Default.aspx

Countryside Bird Survey (monitors population trends of common and widespread breeding birds nationally)
http://www.birdwatchireland.ie/Ourwork/SurveysProjects/CountrysideBirdSurvey/tabid/114/Default.aspx

Research has been carried out by the NPWS on the following bird species: Corncrake, Greenland White-fronted Goose, Red Grouse, Barnacle Goose, Feral Greylag Goose, Red-throated Diver, Barn Owl, Chough and Twite.
NPWS monitoring is undertaken annually for Corncrake and Greenland White-fronted Goose, and periodically for Hen Harrier.

Coastal and marine research and monitoring

Development of a Cetacean Action Plan for Ireland
Targeted Assessment of Harbour Porpoise in Inshore Waters
Monitoring of Bottlenose Dolphins in the Lower River Shannon cSAC
Monitoring of Harbour Porpoise in the Blasket Islands cSAC and/or Roaringwater Bay & Islands cSAC
Scoping Study for the Development of an Irish Cetacean Database
National Survey of Key Subtidal Habitats
Survey of Tidal Mudflats & Sandflats in cSACs
Benthic Survey of the River Barrow & River Nore cSAC
Review of Cost-Effective Seal Monitoring Techniques in Ireland
(http://www.npws.ie/en/Marine/MarineResearch/2008ResearchActivities)

Sea cliff survey (2004)

National survey of sand dunes: Summary report
http://www.npws.ie/en/media/NPWS/Publications/Reports/Media,6710,en.pdf
Full report:
http://www.npws.ie/en/media/NPWS/Publications/Reports/Media,6709,en.pdf

Vascular plants

Surveys carried out of rare, threatened and scarce vascular plants in Counties Leitrim, Longford, Roscommon and Sligo (2005), and Cavan, Clare, Galway, Limerick, Louth, Meath, Monaghan and Westmeath (2006).

Monitoring is ongoing for the following species:

Mammals: Irish hare, 7 bat species, otter, grey and common seals
Amphibians: Natterjack toad
Fish: Salmon
Invertebrates: Freshwater pearl mussel, white-clawed crayfish, *Vertigo angustior*, *V. geyeri* and *V. moulinsiana*
Plants: Marsh saxifrage, Killarney fern, slender naiad, petalwort, shining sickle moss, clubmosses

Assessment of protected sites

The status of all EU protected habitats and species in Ireland (excluding birds) was comprehensively assessed in 2007 (NPWS, 2008) (Action 26).

Conservation management planning

To date, 295 draft Conservation Management Plans have been produced for SACs/SPAs and 4,372 Commonage Framework Plans have been prepared, covering 439,840 ha.

Conserving biodiversity at the local level has been advanced by the appointment of a number of specialised Biodiversity Officers and Heritage Officers to local authorities (Action 11), leading to the production of Local Biodiversity Action Plans, of which 26 have been completed or are in the final stages of preparation (Action 10).

Conservation management

Progress has been made with agri-environmental measures to halt and reverse biodiversity loss in habitats suffering from over-grazing. Encouraging results have been reported from a number of over-grazed sites where new grazing management regimes have been put in place (Action 61).

The NPWS Farm Plan Scheme, introduced in 2005 is a compensation scheme that pays farmers for losses and for work done in designated areas only, in return for annual payments. Average payment per farmer was €7028 in 2009. The total area under the scheme was 4109 ha in 2009, and 173 plans have been approved to date.

Biodiversity issues have been increasingly integrated into national forestry policy since the 1st NBP was published. Biodiversity guidelines for all afforestation projects have been in place for a number of years (Action 67). Substantial areas of new broadleaf planting have been established since the annual broadleaf planting targets were increased (currently at 30%) (Action 65). The Native Woodland Scheme has supported the creation and restoration of over 2,800 ha. of native woodland on 136 sites (Action 76).

Arterial drainage
The statutory authority for arterial drainage, the Office of Public Works (OPW), has created a number of standard specifications for studies relating to flood risk management and flood relief in Ireland (Action 81). The OPW has carried out a series of environmental assessments in relation to European sites where they overlap with drainage operations and for annex species in the EU Birds and Habitats directives (Action 80). These assessments include investigation of opportunities for mitigation and enhancement. To date, assessments have been made for raised bogs, floating river vegetation, turloughs, salmon, otter, riparian birds and freshwater pearl mussel (http://www.opw.ie/en/FloodRiskManagement/BackgroundPolicy/EnvironmentalProtection).

Legislation
The legislative basis for biodiversity conservation has been greatly strengthened in recent years with the adoption of national and European legislation dealing with a wide range of environmental issues, including biodiversity conservation (Action 12).

The Wildlife Act, 1976 is the principal national legislation providing for the protection of wildlife in Ireland. The Act provides for, inter alia, the designation of Statutory Nature Reserves, Refuges for Fauna and Wildfowl Sanctuaries, and the protection of listed species of plants under the Flora Protection Order, 1999. Currently all bird species, 22 other animal species or groups of species and 86 species of flora are afforded protected status under the Act (but see Section 1.5.5 above for exceptions).

Under the Wildlife (Amendment) Act, 2000, the legislative basis for biodiversity conservation was strengthened by improvements to existing measures and the introduction of some new measures. The Act gives statutory protection for the designation of national areas of high biodiversity: Natural Heritage Areas (NHAs). The Act includes the majority of fish and aquatic invertebrate species that were excluded from the 1976 Act. Compliance with international agreements has been strengthened, including the Convention on International Trade in Endangered Species (CITES) and the African-Eurasian Migratory Waterbirds Agreement (AEWA). The Act also gives statutory recognition to the Government's responsibilities with regard to promoting the conservation of biological diversity, in light of Ireland's commitment to the Convention on Biological Diversity. Ireland is a signatory to other international conventions that influence national biodiversity policy and legislation, including:

- Ramsar Convention on Wetlands;
- Convention on Migratory Species (CMS or Bonn Convention);
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern

Convention); and
- Convention for the Protection of the Marine Environment of the North-East Atlantic.

See http://www.irishstatutebook.ie/2000/en/act/pub/0038/index.html

The EU Habitats Directive was transposed into Irish law in 1997 by means of the European Communities (Natural Habitats) Regulations, 1997, amended by statutory instruments S.I. 94/1997 and S.I. 378/2005. Under the Wildlife Amendment Act, 2000, the protective regime for Special Areas of Conservation confirmed that protection will in all cases apply from the time of notification of proposed sites. Section 31 of the European Communities (Natural Habitats) Regulations, 1997, requires that most works undertaken by the State within a European site must be subject to an appropriate environmental assessment.

The above legislation, which represents a fundamental shift in Ireland's approach to biodiversity conservation, has been incorporated into recent legislation on planning and development and water resource management, among others.

Under the Planning Act, 2000 and subsequent regulations, local authority Development Plans must include mandatory objectives for the conservation of the natural heritage and for the conservation of European sites, and any other sites which may be prescribed. Local authorities have also been given discretionary powers to set objectives for the conservation of a variety of other elements of the natural heritage, although these are seldom used.

The EU Water Framework Directive was transposed into Irish law in 2003 (S.I. 722/2003). The directive requires a new approach to managing water resources based on river basin management planning and makes provisions for the protection of EU-listed habitats and species. The European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272/2009) and the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (S.I. 296/2009) set improved water quality objectives and require the establishment of programmes of measures to achieve these objectives (Action 14).

Public awareness of biodiversity

The Rural Environment Protection Scheme (REPS), a nationwide agri-environment scheme in operation since 1994, has resulted in a much greater awareness of biodiversity issues among farmers. This is vital to the effectiveness of conservation measures, since farmers manage most of the terrestrial sites of biodiversity importance in Ireland. Awareness of biodiversity among the wider public is also vital to the success of the current NBP and the 2nd NBP, due for publication in 2010. 'Notice Nature', Ireland's public awareness campaign on biodiversity, won an EU award for best practice in communicating environmental issues in 2007 (Action 45). In 2006, the Biodiversity Forum, representative of all stakeholders, was established to consult with official bodies and receive input from interested parties on biodiversity issues (Action 9).

2.2.2 Actions where some progress has been made but where further work is needed

Habitat and species conservation
The overview of biodiversity status, trends and threats in Chapter 1 shows that the majority of Ireland's important habitats have an unfavourable overall conservation status. The key pressures and threats were also listed. The NPWS, in its conclusions to the Article 17 conservation assessment report (NPWS, 2008), listed four main objectives for biodiversity conservation in the next five years and beyond:

- To achieve an improvement in the status of priority habitats that were assessed as 'bad', in particular raised bog and certain types of grassland, but also blanket bog, lagoons, sand dune systems, and some woodland habitats.
- To achieve an improvement of the species assessed as 'bad', in particular the freshwater pearl mussel, but also Desmoulin's whorl snail, natterjack toad, and three fish species; salmon, twaite shad and pollan.
- To achieve an improvement in the status of non-priority habitats which were assessed as 'bad', in particular lakes, rivers and oak woodland.
- To achieve an improvement in the knowledge base on the occurrence and status of habitats and species.

Achievement of some of the above objectives will be assisted by the development of more effective **agri-environment schemes** that are focused on conservation objectives, the introduction of the Single Farm Payment, which has reduced the incentive to overstock, and a continuation of the collaborative approach between the NPWS and the Department of Agriculture, Fisheries and Food and other relevant official bodies. A collaborative approach between the NPWS, Fisheries Boards, and other agencies which are involved, is needed to achieve an improvement in the status of annex **fish species** (Action 82).

Deterioration in water quality is considered to be a major threat to a high proportion of protected wetland habitats and freshwater species. One of the principal aims of River Basin Management, required under the EU Water Framework Directive (WFD), is to improve water quality through a catchment-based approach that also requires the protection of aquatic ecosystems and in particular, protected habitats and species. Any standard or objective related to areas protected under the EU Habitats and Birds directives must be complied with by 2015. Eight River Basin District Management Plans are due for publication in December 2009 (Action 79). The achievement of good status in all Irish waters by 2015, as required by the WFD, will be a considerable challenge.

Conservation of **marine fisheries** is a major priority that needs to be addressed urgently. Stocks of a number of important commercial fish stocks are in decline or, in the case of some species (such as cod) in a state of collapse. This will require further efforts nationally and in the EU through the Common Fisheries Policy (Action 89).

The threat to Ireland's native biodiversity from alien species has been referred to frequently in Chapter 1. Controlling the spread of alien, invasive species is a major challenge, and involves cross-sectoral and cross-border cooperation by a range of responsible authorities, non-government organisations and landowners (Action 28). Control of the spread of rhododendron (*Rhododendron ponticum)* in native woodlands has been ongoing for many years and has met with some success. The Central and Shannon Regional Fisheries Boards recently reported that chub (*Squalis cephalus*), an invasive fish species, has been successfully eradicated from Ireland. The report *Invasive Species in Ireland* recommended a series of actions 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 (Stokes *et al*., 2004).

Red Data Books and Red Lists

Reference was made to red data books and red lists in Chapter 1. At the time of writing this report, National Red Data Books and Red Lists have been prepared or are in preparation for:

- Vascular Plants (1988)
- Stoneworts of Britain and Ireland (1992)
- Vertebrates: Threatened Mammals, Birds, Amphibians and Fish (due for publication 2009)
- Red List: Water beetles (2009)
- Red List: Irish Bees (2006)
- List of Birds of Conservation Concern
- Non-Marine Molluscs

All-Ireland Red Data Books and Red Lists are in preparation for: Molluscs, Mammals, Moths, Butterflies, Dragonflies, Vascular Plants, Bryophytes, and Seaweeds. The above are being prepared with the Environment Agency Northern Ireland (Action 25).

Cross-cutting issues (see also Chapter 3)

Halting and reversing biodiversity loss in Ireland must involve a cross-sectoral approach, where biodiversity is properly integrated into national and sectoral plans. Although biodiversity conservation has begun to be addressed in recent plans and programmes, for example in the National Development Plan 2007-2013, the Water Services Sub-Programme and the Rural Development Strategy and Programme (see Section 2.3), a collaborative approach involving all official agencies, local government, landowners and NGOs is a high priority (Actions 5, 7, 10).

Other actions

Strategy and planning for the use of cutaway bogs to enhance biodiversity is still at an early stage (Action 84). Several pilot projects in the Midlands have shown promising results. There is sizeable potential for the creation of a mosaic of habitats in extensive areas of worked-out bogs. (See also http://www.loughbooraparklands.com).

Other actions where further work is needed include:

- Progress towards best practice in aquaculture
- Enforcement of the Convention on Trade in Endangered Species (CITES)
- Full Implementation of International Conventions
- Integration of biodiversity consideration into Overseas Development Aid

2.2.3 Actions where little progress has been made and where substantial further work is needed

Such actions include:

- Sectoral Action plans (Action 7)
- Designation of Natural Heritage Areas other than bog (Action 16)
- Designation of new Nature Reserves (Action 19)
- Taxonomic capacity (Action 43)
- Strategy on access to genetic resources (Action 37)

2.3 DOMESTIC AND INTERNATIONAL FUNDING DEDICATED TO PRIORITY ACTIVITIES

2.3.1 Ireland's National Development Plan 2007-2013 (NDP)

Chapter 6 of the NDP includes three sub-programmes of most relevance to biodiversity:

i. The *Natural Heritage Sub-Programme* was allocated €167 million to fund the purchase of Natura 2000 sites comprising Special Areas of Conservation for habitats and species and Special Protection Areas for birds, as well as the acquisition of habitat-rich sites and designated raised bogs. Other measures include compensation to landowners in designated areas (e.g. de-stocking in commonages and NPWS Farm Plan Scheme); conservation planning; species and habitats monitoring; and research.

ii. In the *Water Services Sub-Programme*, €4.7 billion of investment was allocated to the upgrading and expansion of water treatment capacity, improving drinking water quality and supply, and improving, expanding and rehabilitating wastewater treatment and networks. Expenditure on upgrading wastewater treatment plants is contributing to biodiversity conservation by reducing nutrient inputs to inland and estuarine and coastal waters.

iii. The *Rural Development Strategy and Programme 2007-2013* is described in Section 2.2.2 below.

2.3.2 Rural Development Strategy and Programme 2007-2013 (RDP)

Under the RDP 2007–2013, €6 billion was allocated to agricultural support schemes. The recently introduced cross-compliance measures that are integral to all EU farm supports are intended to benefit biodiversity, but more targeted schemes such as the REPS and FEPS are likely to have a more positive impact.

Rural Environment Protection Scheme

Figures from the Department of Agriculture, Fisheries and Food show that almost €2.5 billion was spent on the REPS from 1994 to 2007 (DAFF), 2007). Thirty per cent of the land area of the country is covered by REPS agreements and involved 55,000 farmers (DAFF, 2007). The current number of REPS farmers now stands at 63,000 but is projected to fall to 54,000 in 2010. The REPS is gradually being phased out due to budgetary cutbacks forced by the current economic recession.

Forest Environment Protection Scheme

Since the beginning of the scheme in 2007, total grant payments to date amounted to €13,956,205, covering 4,084 ha. There are currently 352 participating farmers. No projected figures for future years are available.

2.3.3 Expenditure on terrestrial and marine environmental protection, including biodiversity protection

National Parks and Wildlife Service, Department of Environment, Heritage and Local Government

Direct current expenditure on biodiversity protection amounts to around €35 million per year (DoEHLG, 2008).

Marine fisheries conservation

General fisheries protection amounts to €25 million per year, with an additional €1.5 million to protect marine SACs. This is largely reimbursed by the EU under the Common Fisheries Policy.

The salmon drift netting ban compensation scheme cost an estimated €30 million.

The proposed new round of fisheries decommissioning is projected to cost €45 million, but does not have biodiversity objectives.

2.4 ADEQUACY OF THE CURRENT NBP TO ADDRESS THE IDENTIFIED THREATS TO BIODIVERSITY

The interim review of the current NDP (DoE, 2005) concluded that 23 actions had been implemented; there were 60 actions where implementation was ongoing and 8 actions where further action was required. The review included an independent assessment by a public body, Comhar, which has representation from a wide range of relevant interest groups. Comhar concluded that:

"*Progress on most actions in the Plan has been slow or minimal. It is difficult to audit the Plan due to a lack of prioritised targets within specified timescales. Where progress has been made in the implementation of some of the actions in the NBP it is largely in areas where the European Commission has exerted pressures on the Irish authorities to deliver on commitments made.*"

The lack of effectiveness of the NBP in relation to species protection was further illustrated by the ruling of the European Court of Justice that Ireland did not have in place a system of strict protection for Annex IV species listed in the EU Habitats Directive due to inadequate monitoring arrangements and deficient procedures to protect species from development projects (C-183/05). Work was ongoing in 2008 to secure closure of this case by identification of threats to the listed species and preparing plans to deal with those threats.

These criticisms notwithstanding, the summary of actions in the NBP included in this report shows that considerable progress has been made in a number of key areas since the 2005 Interim Review was made. However, it is clear that the 2nd National Biodiversity Plan must address some of the key actions that require further progress. The Biodiversity Forum of Comhar published a submission to the Government on the Second National Biodiversity Plan 2008-2013 (in preparation). The Forum's broad recommendations were:

- The knowledge base for biodiversity conservation needs to be built up.
- Biodiversity should be 'core' or 'mainstream' in decision-making at Government level.
- Public awareness needs to be substantially increased.
- Protected areas need to be expanded and their management and monitoring improved.
- Biodiversity conservation outside protected areas needs to be substantially improved through better planning, partnerships, incentives and enforcement.
- The effects of climate change, invasive species and bio safety need to be investigated and responses prepared in order to protect biodiversity in the island of Ireland.
- Ireland should aim to take a lead role in reversing loss of biodiversity, taking encouragement from successful national social and economic initiatives

Public awareness of biodiversity issues in Ireland lags behind that in most EU countries, despite the launch of a major awareness campaign in 2006: 'Notice Nature' (see: http://www.noticenature.ie/). A Euro barometer report on attitudes of Europeans to biodiversity, conducted in 2007, 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, 2007). This is partly because, until recently, Ireland was a relatively poor country and partly because of the perception that our biodiversity resource was more intact and less affected by development than in neighbouring countries. This poorly developed public awareness has impeded political momentum towards conservation, particularly when there are competing economic considerations, and has resulted in conservation being under-resourced.

A major obstacle to biodiversity conservation is that it is seen by the public as a cost rather than a benefit. This is partly because, until recently, legislation was enforced without accompanying incentives and compensation, and awareness-raising campaigns. It is also partly a problem with national accounting, which should begin the process of incorporating the huge benefits of ecosystem services as well as the policy costs associated with their conservation (see Chapter 1.6). In this respect, the NPWS report on the benefits and costs of biodiversity in Ireland represents progress towards a more advanced national balance sheet. Recently, the value of ecosystem services in maintaining water quality has begun to be recognised: the very considerable costs of not protecting water quality are becoming more apparent (DoEHLG, 2008).

2.5 CASE STUDIES OF SPECIES CONSERVATION MEASURES

Cases studies describing conservation measures for the Atlantic salmon, natterjack toad and Roseate Tern are presented below (see boxes). The relevant NBP actions are indicated.

Case study 1. Conservation of the Atlantic Salmon (*Salmo salar*) (NPB Action 82)

The salmon population in Ireland has declined by 75% in recent decades and although salmon still occur in 148 rivers, only 43 of these have healthy populations. In 2002, Ireland introduced an annual quota for the angling and commercial salmon fishery and reduced that quota progressively on an annual basis from 219,000 salmon in 2002 to 62,000 in 2007. In order to align fully with ICES and NASCO advice, the Government closed mixed stock fisheries in 2007. Harvest fisheries are now only allowed on stocks which are shown to have a surplus of fish over the conservation limit. Fisheries in estuaries are only permitted provided the stocks from individual rivers entering the estuaries are meeting conservation limits. A hardship scheme for drift net fishermen,

including all other commercial fishermen wishing to exit the fishery, was introduced in 2007 and provided a financial package for those affected. The 2008 allowable harvest has shown an increase to 86,000 salmon which includes both a commercial and angling harvest and is distributed on an individual river basis.

Salmon are now managed on a river-by-river basis, as opposed to a national or district basis. Rivers which have an identifiable surplus over the conservation limit are open for salmon and sea trout fishing. Rivers meeting in excess of 65% of the conservation limit are granted catch and release status subject to approval. Rivers for which there is insufficient scientific information or have a rod catch of less than 10 salmon remain closed. A scheme of rehabilitation of rivers was introduced, with priority given to rivers which were below the conservation limit in SACs, funded through the introduction of a salmon conservation component on all angling and commercial licence sales. The current objective is to encourage the recovery of stocks in those rivers not yet meeting their conservation limits and to manage all rivers in compliance with the EU Habitats Directive. In the face of decreasing marine survival, the challenge is to show an improvement in stocks in those rivers over the next few years through investment in habitat improvements and other initiatives.

The core policy goal being pursued by the Irish Government is to conserve the resource and facilitate its exploitation on an equitable and sustainable basis. The main challenges over the period 2008 – 2010 are in maintaining the regime introduced in 2007 and monitoring closely its impact on salmon stocks in order to maintain an equitable balance between conservation and exploitation. The programme will integrate with the River Basin Management Plans required under the EU Water Framework Directive.

(Source: Central Fisheries Board, *Wild Salmon Management in Ireland* (no date))

Case study 2. Conservation management of the natterjack toad (*Bufo calamita)* (NBP Action 26]

The natterjack toad, a Red Data Book and EU Habitats Annex IV species, has been declining steadily in Ireland from the early 20th century up to the present day, mainly due to loss of breeding ponds following land drainage. The natural range is confined to a small number of coastal sites on the Dingle and Iveragh peninsulas in Co. Kerry. Recent surveys put the population at c.12,000 adults. A study carried out between 2004-2006 indicated that the range is at risk of contracting further, with very poor and irregular breeding activity recorded at the most westerly part of the current range, despite the creation of two additional pools there in 2003.

The NPWS has launched a scheme to encourage farmers to conserve toads on their land. Farmers are invited to enter a 5 year agreement with the NPWS and in return receive annual payments related to the number of ponds they dig and for maintaining the ponds (e.g. through hand clearance of vegetation) and the surrounding sward (through grazing) in a suitable condition for natterjacks. €500 will be paid for the first two ponds in each

hectare. There has been an encouraging take-up for the scheme. In 2008, the first year of the programme, 25 farmers joined and 49 new ponds were dug. Ten additional farmers are expected to join in 2009, bringing the total number of new breeding sites to 69.

In the early 1990s, natterjacks were successfully translocated from Co. Kerry to The Raven Peninsula, Co. Wexford, a Statutory Nature Reserve on the south-east coast.

(Source: National Parks and Wildlife Service)

Case study 3. Roseate Tern Conservation (*Sterna dougallii)* (NBP Action 26]

The Roseate Tern, *Sterna dougallii,* is the rarest breeding seabird in northern Europe and is listed in Annex I to the EU Birds Directive, in Appendix II to the Berne Convention on the Conservation of European Wildlife and Natural Habitats (1979) and in Appendix II to the Bonn Convention on the Conservation of Migratory Species of Wild Animals (1979).

In 1988, Rockabill Island, located off north County Dublin, was designated a Special Protection Area under the Birds Directive, and a Statutory Refuge for Fauna under the 1976 Wildlife Act. When the lighthouse keepers left the island in 1989, a conservation NGO and the State cooperated to secure the Island for the terns. BirdWatch Ireland carries out wardening and scientific seabird monitoring of Rockabill with funding from NPWS.

The number of Roseate Tern nests has increased from 152 in 1989 to reach a peak of 1,052 nests in 2009. Rockabill is an internationally important breeding site, supporting ca 78% of the NE Atlantic breeding population. Other nesting sites are in Wexford in Ireland and in small scattered colonies in the UK and Brittany in France.

Similarly numbers of breeding Common Tern *Sterna hirundo* have also been increasing in recent years, peaking in 2007 with 1,411 nests. Arctic Terns *Sterna paradisaea* have also bred at Rockabill in low numbers since 1992. This breeding population had increased to 200+ pairs by 2004 and has remained relatively stable since. Other seabirds that are also included in the annual seabird monitoring programme at Rockabill are Kittiwake *Rissa tridactyla* and Black Guillemot *Cepphus grylle.*

(Source: National Parks and Wildlife Service)

CHAPTER 3

SECTORAL AND CROSS-SECTORAL INTEGRATION OR MAINSTREAMING OF BIODIVERSITY CONSIDERATIONS

3.1 EXTENT OF INTEGRATION OF BIODIVERSITY INTO SECTORAL AND CROSS-SECTORAL STRATEGIES AND PLANS

3.1.1 National Development Plan 2007-2013

The *National Development Plan 2007-2013* has a greater emphasis on, and a larger financial allocation for, measures that are relevant to biodiversity conservation than previous Plans. The Department of Finance is the lead Department in strategic economic planning. *Chapter 6: Environmental Sustainability* includes sub-programmes that have an influence on biodiversity conservation either directly or indirectly. These are briefly described below.

Natural Heritage Sub-Programme
This sub-programme is implemented by the National Parks and Wildlife Service of the Department of Environment, Heritage and Local Government. The measures being implemented include:

- Purchase of Natura 2000 sites and habitat-rich sites and designated raised bogs.
- Compensation to landowners in designated areas (e.g. de-stocking in commonages and NPWS Farm Plan Scheme)
- Conservation planning
- Species and habitats monitoring
- Research

Water Services Sub-Programme
The Water Services Investment Programme 2004-2006 targeted 869 water and sewerage schemes in Ireland and involved improvement, expansion and rehabilitation of wastewater treatment and networks. The programme is implemented by local authorities and coordinated by the Department of Environment, Heritage and Local Government. The budgeted expenditure was €5 billion. Sewage treatment schemes are of particular importance for biodiversity conservation, assisting in meeting water quality standards to comply with the EU Water Framework and Urban Wastewater directives.
http://www.environ.ie/en/Environment/Water/WaterServices/WaterServicesInvestmentProgramme

Agriculture and Food Sub-Programme
The Department of Agriculture, Fisheries and Food is the lead department. This programme encompasses the agricultural measures included in Ireland's 2007-2013 Rural Development Strategy and Programme, described in detail in 3.1.2, below.

- Rural Environment Protection Scheme
- National Nitrates Action Programme
- Farm Waste Management Support
- Forestry and environment measures

3.1.2 Rural Development Strategy and Programme 2007-2013 (RDP)

The Department of Agriculture, Fisheries and Food is the lead Department in Ireland for the current RDP. The Department web site has a dedicated section on biodiversity and the actions for which it is responsible:

http://www.agriculture.gov.ie/media/migration/ruralenvironment/environment/biodoiversity/Biodiversity%20page%20May2009%20final.pdf

The RDP includes the following measures of most relevance to biodiversity conservation:

Rural Environment Protection Scheme (REPS)
Farmers may choose from a wider range of farm management options than in previous REPS. These options, which are designed to enhance biodiversity, are in addition to the basic environmental management requirements of the Scheme. They include:

- Traditional Hay Meadows: assists in conserving and increasing diversity of wild plant species associated with this habitat
- Increasing Watercourse Margin: aims to improve water quality by protecting river margins from livestock damage and protecting riparian habitats.
- Nature Corridors: protection and enhancement of field margins to increase plant and animal diversity.
- Hedgerow Maintenance: hedgerows retained and managed; cutting prohibited during the bird nesting season.
- Traditional Irish Orchards: creation of orchards with native Irish apple varieties protects the genetic resource
- Conservation of Rare Breeds: Assisting farmers to rear animals of specific breeds native to Ireland, which are in danger of being lost to farming.
- LINNET Habitats (Land Invested in Nature, Natural Eco-Tillage): planting small plots of cereals in grassland areas as a source of over wintering food for finches and other bird species.

The current Scheme, REPS 4, was introduced in 2007. As of July 2009, no new entrants were allowed into the REPS and a smaller, revised scheme is expected to be put in place in 2010.

Biodiversity within Sustainable Forest Management (SFM)
The maintenance and enhancement of biodiversity is being pursued within the context of SFM, of which biodiversity forms an essential component.

Forest Biodiversity Guidelines
The Forest Biodiversity Guidelines apply to all forest operations and focus on how best to conserve and enhance biodiversity, through appropriate planning, conservation and management. The Forest Biodiversity Guidelines require approximately 15% of the forest area to be treated with particular regard to biodiversity. A target of 30% annual broadleaf afforestation has been set for the duration of the Rural Development Programme.

Forest Environment Protection Scheme (FEPS)
The FEPS aims to encourage the establishment of high nature value forestry on farms that participate in REPS. Farmers planting under FEPS will have to adhere to enhanced environmental objectives, which will focus on biodiversity, habitats, species mix, environmental impact and visual considerations. Expenditure on grant aid from 2007 to 2009 was €13.9 million, covering 4,084 ha.

Native Riparian Woodlands – A Guide to Identification, Design, Establishment and Management
The Forest Service and Woodlands of Ireland (a State/NGO body) are developing a series of information notes to address key issues relating to native woodland ecology and management and complement the Native Woodland Scheme.

Forestry and Freshwater Pearl Mussel Requirements
Ireland supports 46% of the EU Freshwater Pearl Mussel, *Margaritifera margaritifera* population. It is currently in serious decline throughout the island of Ireland and the rest of Europe. Ireland has the only known location of *Margaritifera durrovensis*, which is also in serious decline. Sedimentation and nutrient enrichment from a variety of land uses, including forestry, have contributed significantly to this decline. The Forest Service, in partnership with the NPWS and Coillte Teo, has developed *Forestry and Freshwater Pearl Mussel Requirements - Site Assessment and Mitigation Measure*. The *Requirements* apply to all forest activities within identified portions of the catchments of Freshwater Pearl Mussel populations in rivers designated as candidate Special Areas of Conservation (cSACs) for the species.

3.1.3 Other programmes and measures of significance for biodiversity

The Burren is the largest area of limestone pavement in Ireland and has many associated habitats and species. The **Burren LIFE Project** is largely funded by the EU LIFE programme, with a partnership between the NPWS, Teagasc (Irish Agriculture and Food Advisory Authority) and Burren farmers. The objective is to develop a new model for sustainable agriculture in the Burren in order to conserve the relevant habitats listed in Annex 1 of the EU Habitats Directive. It has carried out a valuable programme of work developing alternative landuse management systems that contribute to conserving habitats and also in fostering good relationships between the partners and, in particular, the farmers of the Burren. http://www.burrenlife.com

The Environmental Protection Agency (EPA) and the Council for Forest Research and Development (COFORD) co-funded the **BIOFOREST Research Programme** (2001 to 2006). The aims were to provide basic information on biodiversity in Irish plantation forests and illustrate the effects of different aspects of management on biodiversity within forests, with the overall objective to update forest policy and practice in relation to biodiversity management.

The BIOFOREST research team was comprised of the Department of Zoology, Ecology and Plant Sciences UCC, the Department of Botany TCD and Coillte. The study included four main groups of species: spiders, hoverflies, birds and plants. The individual projects concluded that, in general, forest plantations can make a significant positive contribution to biodiversity, but only if properly planned and managed. Fifty-seven recommendations were made, addressing different aspects of forestry, from strategic planning to localised planning and practice. The recommendations are being considered by the Forest Service in the formulation of forestry measures under the Rural Development Programme 2007-2013.

A new PLANFORBIO Programme 2007-23 aims to gather additional information to promote improved biodiversity conservation and enhancement in Irish plantation forests. The programme consists of four projects:

- Management of biodiversity in a range of Irish forest types.
- Achieving effective control of *Rhododendron ponticum*, a serious invasive alien plant in Irish native woodlands.
- Optimum scenarios for conservation of the Annex 1 species Hen Harrier in Ireland.
- Implementation of an assessment and monitoring programme for biodiversity in Irish and Scottish forests.

The aim of the **Agbiota** project, which ran from 2001 to 2005, was to develop national expertise in biodiversity research within the context of modern agriculture. The project was funded by the EPA under the National Development Plan.
http://www.ucd.ie/agbiota/index.htm

Sea Change: A Marine Knowledge Research and Innovation Strategy for Ireland 2007-2013 was launched in 2007. This strategy targets economic stimulation and diversification, research capacity, administration and improved environmental quality and management. http://www.marine.ie/home/research/SeaChange

PreCAST (Policy and Recommendations from Cetacean Acoustics, Surveying and Tracking) is a partnership between the Irish Whale and Dolphin Group and Galway Mayo Institute of Technology (GMIT), funded by the Marine Institute and National Parks and Wildlife Service. The three-year project, which began in 2008, involves offshore surveys to map cetacean distribution and relative abundance, obtaining passive acoustic monitoring data and carrying out satellite tracking of fin whales off the south coast of

Ireland. The collected data will be used in a GIS of the Celtic Sea to explore the relationship between cetaceans and their physical and biological environment. http://www.iwdg.ie/precast/?id=92

The National University of Ireland Galway (UCG) was the Irish partner in the **HERMES** project (Hotspot Ecosystem Research on the Margins of European Seas) which ran from 2005 to 2009. HERMES was an international, multidisciplinary research programme investigating Europe's deep marine ecosystems and their environment. http://ec.europa.eu/research/research-for-europe/environment-hermes_en.html
UCG is also a partner in the **CoralFISH** project (http://www.eu-fp7-coralfish.net) which involves assessment of the interactions between corals, fish and fisheries in order to develop monitoring and predictive modeling tools for ecosystem-based management in the deep waters of Europe and beyond. Research under this project has confirmed the existence of a major new coral reef province on the southern end of the Porcupine Bank off the west coast of Ireland.

3.1.4 Incentives

This report has already described compensation schemes provided for landowners to de-stock commonages to curb overgrazing and thus to assist in recovery of overgrazed sites. Other NPWS incentives include, for example, that for the recovery of the natterjack toad (Section 2.3.4, Case study 2). The positive and negative aspects of incentives other than those offered by the NPWS are briefly described below.

Agricultural incentives
Until recently, EU headage payments and the Ewe Premium encouraged overstocking and overgrazing of large areas of commonage, and intensification leading to direct loss of habitat and eutrophication.

The Single Farm Payment, introduced in 2005, has replaced the previous headage and premium schemes. This new scheme replaced output incentives with area-based payments. It is linked with cross-compliance measures (such as adherence to a code of good agricultural practice) and has reduced the incentive to overstock. The Single Farm Payment is synergistic with the REPS and NPWS Farm Plan Scheme.

The REPS pays farmers for measures which should be of benefit for nature although there is little clear evidence of what impact REPS has had to date on biodiversity. However, it has formed an important proportion of incomes for less-intensive farmers. It appears that the most positive, but indirect, impact of the REPS to date has been the reduction in water pollution through better stock and manure management. It also helps sustain pastoral farming in areas where land abandonment is most likely to occur. (http://www.teagasc.ie/publications/reps1999/paper1.asp).

Criticism of the REPS has included the low level of involvement of ecologists in making farm plans and a lack of proper auditing in order to evaluate the effects on biodiversity. A new agri-environmental scheme with a lower budget and an emphasis on capital projects has been proposed for 2010.

Forestry incentives
In the past, commercial afforestation grants were awarded without due consideration for biodiversity conservation. The annual rate of planting has declined dramatically in the last few years and the Afforestation Grant Scheme is no longer co-funded by the EU. There is still a widespread perception among forestry professionals and landowners that broadleaves are uneconomic. This perception has reduced the effectiveness of the larger grants and annual premiums offered for broadleaf afforestation.

The negative effects of commercial afforestation incentives have been somewhat reduced in recent years by the requirement to comply with Forest Service Biodiversity, Water and Harvesting guidelines, improved strategic planning and better communication and consultation by the Forest Service with the NPWS, Regional Fisheries Boards, local authorities and other official bodies.

The Native Woodland Scheme has contributed to the conservation and planting of 5000 ha of native woodland since its introduction, and is viewed by conservationists as a very positive measure. From 2002 to 2009, 526.80 ha of new native woodland have been established on 58 sites, and 2,324.44 ha of existing woodland have been restored on 136 sites. The NWS is currently suspended following recent budgetary cutbacks.

The FEPS (Forest Environment Protection Scheme) aims to encourage high nature value forestry on farms participating in the REPS. The FEPS was introduced in 2007 in response to criticism that afforestation grants and premiums conflicted with REPS objectives. An additional premium of up to €200/ha for five years is currently available, which when added to the annual 20-year forestry premium can provide a total annual payment of up to €773/ha for some participating farmers.

Forest Stewardship Council (FSC) certification can be regarded as an incentive. Coillte, which manages 444,000 ha or roughly two-thirds of the national forest estate, has been operating to FSC standards since 2001. Although it is difficult to quantify the benefits to biodiversity, certification has encouraged Coillte to conserve biodiversity to a higher standard than that required by national forestry policy.

The Biodiversity Fund
The objective of the Biodiversity Fund was to support site conservation and management to enhance biodiversity at the local level. The fund was administered by the Heritage Council and offered funding for capital projects for the management of sites to protect, conserve and enhance biodiversity up to a maximum of €50,000 per year and up to a maximum of 80% of total project costs.

Priority was given to projects that assist the management of sites which contain habitats of special conservation importance or which support threatened or vulnerable species. Priority was given to site management works that are part of a conservation management plan, or part of a larger scheme established to benefit Ireland’s biological diversity.

The scheme was open to individuals, non-profit organisations, local authorities, statutory institutions, academic institutions and private companies. Applications from community groups, offshore island communities and NGO groups or for projects assisting the conservation of the biological diversity of islands, were encouraged.

€700,000 was available for projects to be completed in 2008. Examples of funded projects include: clearing invasive species such as rhododendron from native woodlands; recreating spawning areas for salmon in rivers; the conservation of different native agricultural breeds of cattle such as Irish Moiled Cattle; the reintroduction of the Red Kite in Wicklow; creating ponds and wetland habitats; and protecting vulnerable sand dunes.

Other incentives
Tax incentives designed to stimulate development in certain areas, such as those for seaside resort areas (introduced in 1995), the Island Renewal Scheme (1996-1999), and the Upper Shannon region (1998-2004) contributed to the pressures on biodiversity in these areas. These schemes are unlikely to be renewed. The proposed scheme for the Mid-Shannon region, announced in 2007, has yet to be confirmed.

3.1.5 Adoption of the ecosystem approach (mainstreaming) and biodiversity

Until very recently, biodiversity policy was seen as independent of, and separate from, sectoral policies in Ireland. This was demonstrated in the sectors that have the most impacts on biodiversity: agriculture, forestry, fisheries and tourism/recreation. The current National Development Plan and the Rural Development Programme, for example, show that the ecosystem approach is slowly beginning to be accepted. This is mainly due to the need to meet EU plan and programme reporting requirements. Obstacles towards fuller recognition of mainstreaming at government level include poorly-developed inter-departmental structures and lack of dedicated personnel.

Some progress has been made at local government level with the employment of dedicated personnel (i.e. Biodiversity and Heritage Officers). 18 local authorities have now drafted Local Biodiversity Action Plans, and 8 more are in preparation. The main planning instrument of local authorities is the Development Plan. Recent plans have included better planning policies, objectives and zoning to protect biodiversity. These are most effective in relation to protection of designated sites (SACs, SPAs, and NHAs) from inappropriate development. However, the lack of an ecosystem approach is demonstrated by permissions to develop at the boundaries of designated sites or which otherwise indirectly threaten such sites. Although there is increasing recognition among local authorities of the need to conserve biodiversity in the wider countryside, as evidenced in Development Plans, in practice there can be strong local and national political and economic pressure to grant permission for developments in areas that are not protected by EU and national environmental legislation.

As already mentioned in Chapter 2.2.1 (Legislation Pages 49-50), the legislative basis for

biodiversity conservation has been strengthened considerably in the last decade. The legislation requires all State departments and official agencies to take measures to protect biodiversity. Section 31 of European Communities (Natural Habitats) Regulations, 1997 requires that most works undertaken by the State within Natura 2000 sites must be subject to an appropriate environmental assessment.

3.1.6 Environmental impact assessment (EIA) and biodiversity

The EU Environmental Impact Assessment Directive is implemented in Ireland by the Planning and Development Acts, the Planning and Development Regulations, 2001 to 2002 and the European Communities (Environmental Impact Assessment) Regulations, 1989-2000. The EU Habitats Directive requires that projects likely to have a detrimental impact on a protected habitat must be subject to an assessment of that impact. If that assessment is negative the project may only proceed if there is an absence of alternative solutions and, if there are no alternatives, where there are imperative reasons of overriding public interest. EIA has assisted in the making of modifications to certain large public projects such as motorways, to protect designated habitats and Annex species.

3.1.7 Strategic environmental assessment (SEA)

The EU Assessment of the Effects of Certain Plans and Programmes on the Environment ("the SEA Directive") was implemented in Irish law in 2004 by means of the Planning and Development (Strategic Environmental Assessment) Regulations 2004 (S.I. No. 436 of 2004). Successful implementation relies upon practitioners of SEA being able to apply best-practice techniques within an overall methodology that both allows compliance with the SEA Directive's requirements and fulfils its overall purpose of contributing to sustainable development. Three statutory environmental authorities have been designated under the SEA Regulations in Ireland:

- EPA
- Department of Environment, Heritage and Local Government (DoEHLG)
- Department of Agriculture, Fisheries and Food (DAFF)

The designated environmental authorities must (by reason of their specific environmental responsibilities) be consulted by competent authorities (plan/programme makers) during the environmental assessment process. The steps involved in the environmental assessment are:

- The preparation of an environmental report
- The carrying out of consultations
- The integration of environmental considerations
- The publication of information on the decision

The significant environmental effects of the implementation of plans/programmes are required to be monitored.

The current National Development Plan has not been subjected to SEA. However many of the programmes and policies that come under the auspices of the NDP either have or will be subjected to this process.

As of July 2008, a total of 117 SEAs were at various stages. Of the 11 sectors specified in the Directive, land use planning has had the most significant take-up. The EPA noted that, in particular, the forestry, tourism and transport sectors have yet to engage meaningfully in the process. The effectiveness of SEA will be evaluated during 2008/2009 through an EPA STRIVE research project (EPA, 2008). Examples of SEA carried out in Ireland include:

- Recent local authority development plans and regional plans.
- All River Basin Management Plans made under the EU Water Framework Directive (including two in Northern Ireland).
- Frontier Exploration Licences for the Porcupine Basin, which includes two SACs.

At this time, there is insufficient information to comment on the outcome of SEA in terms of the observed changes in status and trends of important biodiversity components. The authors of *Economic and Social Aspects of Biodiversity* (DoEHLG, 2008) remark that

"*…a strong framework for identifying, monitoring and targeting the critical ecosystem services which support development within each sector is still required*."

3.1.8 Ireland's Overseas Development Assistance (ODA) and Biodiversity

Irish Aid is the arm of the Department of Foreign Affairs that is responsible for ODA. The budget for Ireland's official ODA was €920 million in 2008.

Irish Aid has published an information booklet: *Biodiversity and Poverty Reduction* (http://www.irishaid.gov.ie/Uploads/3%20Environment%20and%20Bio-diversity.pdf) to accompany its Environment Policy for Sustainable Development.

Key strategies for implementing the policy are quoted as (a) mainstreaming, where the environment is recognised as a critical part of sustainable development and is taken into account in all policies, programmes, activities and funding decisions; and (b) partnership, where Irish Aid works with national governments, multilateral organisations, international agencies and civil society organisations to contribute to sustainable development. An example of the inclusion of biodiversity conservation in Irish ODA is provided in the box, below.

Role of Irish Aid in relation to biodiversity conservation in the Bale Mountains, Ethiopia

The Bale Mountains in Ethiopia are one of the most unique and threatened landscapes in the world. The mountains provide water for 12 million people in the adjacent lowlands, a habitat for endangered endemic species and hydro-electricity for over 7 provincial towns. Deforestation due to agricultural expansion and population pressure threatens to

degrade the area and wipe out the livelihoods of millions of people. Irish Aid is part of a consortium working with local government and communities in Oromia region to develop a sustainable approach to managing and using the resources of the Bale massif. Communities are engaging in new livelihood activities such as bee keeping, the production of essential oils and eco-tourism, which use the resources available in the alpine forests without causing further environmental degradation.

(Source: Irish Aid, personal communication)

CHAPTER 4

CONCLUSIONS: PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN OF THE CONVENTION

In this chapter, key information and findings from previous chapters have been drawn together to assess how actions taken to implement the Convention in Ireland have contributed to achieving progress towards the 2010 target and the goals and objectives of the Strategic Plan of the Convention.

4.1 PROGRESS TOWARDS THE 2010 TARGET

Progress in the implementation of the NBP has been described in Chapter 2.2.1. Key areas where progress has been made include:

- Designation of protected areas;
- Monitoring and research;
- Conservation planning; and
- Maintenance and improvement of water quality.

One of the main reasons for the progress made in these areas is the need to meet the legal requirements of the EU Habitats and Birds Directives and other relevant directives. Adequate, targeted measures for biodiversity conservation can only be implemented with sufficient knowledge of conservation status and the nature, scale and frequency of occurrence of threats. Ireland was deficient in knowledge of biodiversity until recently, hence the considerable resources devoted to monitoring and research during this decade. The latest report on the conservation status of habitats and species in Ireland (NPWS, 2008) shows that the status of many annex habitats is 'poor' or 'bad', while that for annex species is only slightly better. The report did point out, in mitigation, that the status of many Annex habitats was expected to be unsatisfactory in the first place, since they would not otherwise have been listed in the EU Habitats Directive.

Now that Ireland is developing a better knowledge and understanding of its national biodiversity resource, targets can be made and plans drawn up to implement actions to achieve those targets. To date, Ireland has produced 295 draft Conservation Management Plans for SACs and SPAs, management plans for 6 National Parks and 4,372 Commonage Framework Plans, covering 439,840 ha.

Chapter 2.4 examined the adequacy of the National Biodiversity Plan 2002-2006 to address the identified threats to biodiversity. However, the Plan is difficult to audit due to a lack of prioritised targets within specified timescales.

"Protect the components of biodiversity"

Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes

Target 1.1: At least 10% of each of the world's ecological regions effectively conserved.

Some fourteen per cent of the national land area is currently under protection.

Target 1.2: Areas of particular importance to biodiversity protected

Some fourteen per cent of the national land area is covered by designated areas, including Natura 2000 sites and Natural Heritage Areas. Statutory Nature Reserves cover 14,250 ha and National Parks amount to 64,171 ha. These designations cover most of the areas of particular importance for biodiversity in Ireland.

Goal 2. Promote the conservation of species diversity

Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups.

Species action plans have been prepared for Red Squirrel (2008, All-Ireland) Vesper bats (updated 2009, All-Ireland): Otter (updated 2009): Killarney Fern (2008, All-Ireland): Kerry Slug (2008): Irish Hare (2005, All-Ireland): Corncrake (2005, All-Ireland): Pollan (2005, All-Ireland): Irish Lady's Tresses (2005, All-Ireland): and Natterjack Toad (2002).

Draft species Action Plans are in preparation for: Cetaceans; Freshwater Pearl Mussel.

Target 2.2: Status of threatened species improved

Examples of species where the status has been improved include the Atlantic salmon and Roseate Tern.

Goal 3. Promote the conservation of genetic diversity

Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.

Rare Breeds directory lists all rare breeds of livestock in Ireland (see Chapter 1.4.8).

Ireland has collections of potatoes, old indigenous varieties of cereals, a collection native forage ecotypes and collections of old apple cultivars. The Irish Threatened Plant Genebank contains seeds of crops such as rye (*Secale cereale*) and rare species of barley (*Hordeum secalinum*).

Public arboreta include The National Botanic Gardens, John F Kennedy Arboretum, Fota and Kilmacurragh. There are also a number of private collections of native and exotic tree and shrub species.

Regional Fisheries Boards are currently involved in projects aimed at conserving genetic diversity of Irish native trout.

"Promote sustainable use"

Goal 4. Promote sustainable use and consumption.

Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity.

The Forest Service has adopted the principles of Sustainable Forest Management (SFM) to underpin national forestry policy and actions. Coillte Teoranta, the State Forestry Board, has also adopted SFM. Coillte is responsible for 444,000 ha of public forest land that is managed according to Forest Stewardship Council standards.

Water quality of lakes and rivers has improved slightly during the latest reporting period (see 1.3.2). A number of lakes have shown improvements in trophic status. Commercial harvesting and angling of salmon is now strictly controlled and the 2008 allowable harvest has shown an increase to 86,000 salmon (see 2.5, Case Study 1).

No significant changes in the status of estuarine waters has occurred during most of this decade. Little evidence of elevated nutrient levels in any of Irish coastal and offshore areas assessed, with nutrient concentrations consistently below the OSPAR thresholds (see 1.3.1).

Target 4.2. Unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced.

Ireland's ecological footprint has been calculated by the Worldwide Fund for Nature as 6.2 global hectares per person in 2001, the fifth highest in the EU-25 (WWF, 2005).

Target 4.3: No species of wild flora or fauna endangered by international trade.

The Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000 implement the EU Wildlife Trade Regulations under the Convention on International Trade in Endangered Species (CITES). They lay out the terms and conditions for possession, use and trade in protected species that are native to Ireland, but also those that are non-native species listed under the EU Regulations implementing CITES. (http://www.npws.ie/en/WildlifePlanningtheLaw/CITES/CITESintheEUIreland)

"Address threats to biodiversity"

Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.

Target 5.1. Rate of loss and degradation of natural habitats decreased.

Legislation and some structures have been put in place to meet this target. These include: legislation to protect Natura 2000 sites and NHAs;
agri-environmental and forestry measures (Chapter 3.1.2 and 3.1.4).

Goal 6. Control threats from invasive alien species

Target 6.1. Pathways for major potential alien invasive species controlled.

The NPWS commissioned the report *Invasive Species in Ireland* (Stokes *et al*., 2004). Specific habitat types threatened by invasives include freshwater rivers, ponds, mesotrophic lakes, native woodland, lowland heath, coastal floodplain, coastal salt marsh and coastal sand dunes. Native species threatened include red squirrel, white-clawed crayfish, red deer and earthworms. Ten key actions are listed. The Invasive Species in Ireland joint NPWS/Northern Ireland Environment Agency project began in 2006 and aims to take action on the key actions of the report on the island of Ireland.

Target 6. 2. Management plans in place for major alien species that threaten ecosystems, habitats or species.

A programme to control *Rhododendron ponticum* in native woodlands, and in particular in National Parks, has been operational for many years. The Central and Regional Fisheries Boards are active in controlling alien invasive fish and aquatic plant species.

Goal 7. Address challenges to biodiversity from climate change, and pollution

Target 7.1. Maintain and enhance resilience of the components of biodiversity to adapt to climate change.

Connectivity and resilience are only beginning to be accepted in terms of actions at local and national level.

Target 7.2. Reduce pollution and its impacts on biodiversity

Most Irish rivers and lakes are of good quality and a slight improvement in overall status has been reported by the EPA in the latest reporting period. However, there is cause for concern over the steady decline in the highest quality rivers and lakes.

No significant changes in the status of estuarine waters have occurred during most of this decade.

"Maintain goods and services from biodiversity to support human well-being"

Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods

Target 8.1. Capacity of ecosystems to deliver goods and services maintained.

The implementation of agri-environmental and organic farming measures, the Single Farm Payment and the Nitrates Action Programme are intended to make agriculture more sustainable. Soil conservation measures are included as conditions in the requirements of farm payment schemes. All forestry in Ireland is subject to the principles of Sustainable Forest Management. Stocks of many commercial marine fish species are seriously over-exploited and further measures are necessary at national and EU level. Most freshwater rivers and lakes are of good status but overall quality needs to be improved to meet the conditions of the Water Framework Directive.

The forthcoming results of the TEEB Study will trigger a review of all related policies and programmes.

Target 8.2. Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained.

As above at 8.1

"Protect traditional knowledge, innovations and practices"

Goal 9 Maintain socio-cultural diversity of indigenous and local communities

Target 9.1. Protect traditional knowledge, innovations and practices.

Ireland does not currently produce specific indicators under this goal. However, the Irish Department of Community, Rural and Gaeltacht Affairs has as one of its core objectives the promotion of social, physical and economic development of Gaeltacht (native Irish-speaking) areas and to strengthen Irish as the principal community language in the Gaeltacht. The Department estimated in 2007 that about 17,000 people lived in strongly Irish-speaking communities and about 10,000 people lived in areas where there was substantial use of Irish.

Target 9.2. Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit-sharing.

As above at 9.1

"Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources"

Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

Target 10.1. All access to genetic resources is in line with the Convention on Biological Diversity and its relevant provisions.

Within the various sub-domains of Genetic Resources currently different conditions apply in terms of access and benefit sharing. In the case of Plant Genetic Resources for Food and Agriculture (PGRFA) Ireland as a contracting party to the International Treaty (IT) in PGRFA makes use of the Multilateral System (MLS) of Access and Benefit-sharing and the Standard Material Transfer Agreement, which were established by the IT.

Target 10.2. Benefits arising from the commercial and other utilization of genetic resources shared in a fair and equitable way with the countries providing such resources in line with the Convention on Biological Diversity and its relevant provisions

See response at 10.1 above

"Ensure provision of adequate resources"

Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention

Target 11.1. New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.

According to Irish Aid, Ireland's official ODA was €920 million in 2008.

Target 11.2. Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.

See Target 11.1 above.

4.2 PROGRESS TOWARDS THE GOALS AND OBJECTIVES OF THE STRATEGIC PLAN OF THE CONVENTION

Goal 1: The Convention is fulfilling its leadership role in international biodiversity issues.

1.1 The Convention is setting the global biodiversity agenda.

This is an issue for the CBD to comment on. Ireland has done, and will continue to do, all it can in support of the CBD in achieving this objective.

1.2 The Convention is promoting cooperation between all relevant international instruments and processes to enhance policy coherence.

As above at 1.1.

1.3 Other international processes are actively supporting implementation of the Convention, in a manner consistent with their respective frameworks.

As above at 1.1.

1.4 The Cartagena Protocol on Biosafety is widely implemented.

The Cartagena Protocol on Biosafety is incorporated into EU legislation through a wide range of legislative measures governing the use of GMOs within the European Union. The cornerstone of this legal framework is Directive 2001/18/EC on the deliberate release into the environment of genetically modified organisms. It is supplemented by Regulation 1946/2003 on the transboundary movement of GMOs. This Regulation was transposed into Irish law under the Genetically Modified Organisms (Transboundary Movement) Regulations 2004 (S.I. No. 54 of 2004) which gives effect to the Regulation.

1.5 Biodiversity concerns are being integrated into relevant sectoral or cross-sectoral plans, programmes and policies at the regional and global levels.

Biodiversity concerns are included in Ireland's National Biodiversity Plan, the National Development Plan 2007-2013, Rural Development Programme 2007-2013 and many recent local authority development plans.

As a member of the EU, Ireland participates in regional and sub-regional decisions on, and implementation of, the CBD.

1.6 Parties are collaborating at the regional and subregional levels to implement the Convention.

As above at 1.6

Goal 2: Parties have improved financial, human, scientific, technical, and technological capacity to implement the Convention.

2.1 All Parties have adequate capacity for implementation of priority actions in national biodiversity strategy and action plans.

Section 2 of this Report details measures and actions under Ireland's National Biodiversity Plan.

Section 3.1.1 describes sub-programmes under the National Development Plan 2007-2013 that have financed measures which have a significant positive effect on biodiversity conservation, including:

- The Natural Heritage Sub-Programme, which has supported the purchase of Natura 2000 sites, habitat-rich sites and designated raised bogs; compensation to landowners in designated areas; conservation planning; species and habitats monitoring; and research.

- The Water Services Investment Programme 2004-2006, which targeted 869 water and sewerage schemes in Ireland and involved improvement, expansion and rehabilitation of wastewater treatment and networks. The budgeted expenditure was €5 billion.

- The Agriculture and Food Sub-Programme, which encompasses the agricultural measures included in Ireland's 2007-2013 Rural Development Strategy and Programme, viz: Rural Environment Protection Scheme; National Nitrates Action Programme; Farm Waste Management Support; and Forestry and Environment Measures.

- The National Parks and Wildlife Service spent around €35m per year directly on biodiversity protection (DoEHLG 2008) (See Chapter 2.2).

2.2 Developing country Parties, in particular the least developed and the small island developing States amongst them, and other Parties with economies in transition, have sufficient resources available to implement the three objectives of the Convention.

Irish Aid is the arm of the Department of Foreign Affairs that is responsible for ODA. The budget for Ireland's official ODA was €920 million in 2008.

The Department of the Environment, Heritage and Local Government contributes approximately €5.75m, in four year cycles, to the Global Environment Fund, the financial mechanism of the CBD

2.3 Developing country Parties, in particular the least developed and the small island developing States amongst them, and other Parties with economies in transition, have increased resources and technology transfer available to implement the Cartagena Protocol on Biosafety.

As above at 2.2

2.4 All Parties have adequate capacity to implement the Cartagena Protocol on Biosafety.

Ireland became a party to the Protocol in 2004. Relevant provisions of the EU Regulatory framework on GMOs were transposed onto Irish law as S.I. No. 54 of 2004 – Genetically Modified Organisms (Transboundary Movement) Regulations 2004. The Environmental Protection Agency has been designated as the focal point for the purposes of the regulation and as the Competent Authority for both contained use and deliberate release of GMO's into the environment.

The Food Safety Authority and Department of Agriculture and Food are the competent authorities for food and processing and for feed and processing, respectively.

2.5 Technical and scientific cooperation is making a significant contribution to building capacity.

There is increasing cooperation between the relevant national official agencies (e.g. NPWS, Marine Institute and EPA) to achieve capacity building.

Goal 3: National biodiversity strategies and action plans and the integration of biodiversity concerns into relevant sectors serve as an effective framework for the implementation of the objectives of the Convention.

3.1 Every Party has effective national strategies, plans and programmes in place to provide a national framework for implementing the three objectives of the Convention and to set clear national priorities.

Ireland's Second National Biodiversity Plan is currently in preparation. It is expected to have prioritised targets with timescales for action on a wide range of biodiversity issues.

3.2 Every Party to the Cartagena Protocol on Biosafety has a regulatory framework in place and functioning to implement the Protocol.

The Cartagena Protocol on Biosafety is incorporated into Irish legislation through a wide range of legislative measures governing the use of GMOs. The Environmental Protection Agency is the Competent Authority in Ireland that implements GMO regulations on the following aspects:

1. The contained use of Genetically Modified Organisms (GMOs)
2. The deliberate release of GMOs into the environment for research and development purposes (field trials – Part B releases) and for cultivation purposes – Part C releases.
3. The Transboundary Movement of GMOs.

The Department of Agriculture and Food is responsible for:

- Regulating seed for cultivation
- Regulating animal feed that contains or is derived from GMOs
- Developing a national strategy to ensure the co-existence of GM crops with other crops
- Licensing of pesticides for use on crops including GM crops.

The Department of Health and Children has responsibility for policy matters concerning genetically modified food.

3.3 Biodiversity concerns are being integrated into relevant national sectoral and cross-sectoral plans, programmes and policies.

The process of integrating biodiversity concerns into national sectoral and cross-sectoral in plans, programmes and policies has begun, for example in Ireland's National Development Plan 2007-2013, Rural Development Programme 2007-2013 and many recent local authority development plans.

3.4 The priorities in national biodiversity strategies and action plans are being actively implemented, as a means to achieve national implementation of the Convention, and as a significant contribution towards the global biodiversity agenda.

Considerable progress has been made in assessing conservation status of EU listed habitats and species, and in ongoing monitoring and research. Progress has also been

made in conservation management planning for EU annex habitats, and a number of species action plans have been made. Considerable resources are devoted to maintaining and improving water quality in freshwater and marine ecosystems in order to meet the requirements of the Water Framework Directive, and also the Convention.

Goal 4: There is a better understanding of the importance of biodiversity and of the Convention, and this has led to broader engagement across society in implementation.

4.1 All Parties are implementing a communication, education, and public awareness strategy and promoting public participation in support of the Convention.

Public awareness of biodiversity is low in Ireland. Existing and recent campaigns (such as 'Notice Nature') need to be built upon by a more comprehensive approach involving all sectors, with leadership provided by the Government.

4.2 Every Party to the Cartagena Protocol on Biosafety is promoting and facilitating public awareness, education and participation in support of the Protocol.

Information about the Protocol on Biosafety and the safe use of GMOs is provided on the Environmental Protection Agency web-page.

4.3 Indigenous and local communities are effectively involved in implementation and in the processes of the Convention, at national, regional and international levels.

Effective involvement of local communities is infrequent and patchy and often develops around single issues. The non-governmental sector is small and lacks a strong public support base.

4.4 Key actors and stakeholders, including the private sector, are engaged in partnership to implement the Convention and are integrating biodiversity concerns into their relevant sectoral and cross-sectoral plans, programmes and policies.

A number of Departments are beginning to integrate biodiversity concerns into their relevant sectoral and cross-sectoral plans, programmes and policies. These include the Department of Agriculture, Fisheries and Food, the Department of Education and the Department of Foreign Affairs. All local authorities include biodiversity in their recent development plans.

4.3 CONCLUSIONS

Considerable progress has been made in Ireland in the designation of areas for protection of nature, in the knowledge base, and in awareness, particularly in Government ministries, official agencies and local authorities.

The full implementation of the EU Birds and Habitats Directives is specifically listed in the Irish Programme for Government. The designation of sites under the EU Habitats and Birds Directives, and the designation of further areas under national law, represents a major effort and will have long-lasting benefits.

Considerable progress has also been made in building up the knowledge base for biodiversity in Ireland, as described in Chapters 1 and 2. In the past, the deficiency in knowledge was one of the factors that impeded conservation.

To date, comprehensive information on status, trends and threats to biodiversity in Ireland is available mainly for protected habitats and species and, in particular, those listed in the annexes to the EU Habitats and Birds directives. The overall status of many such habitats was assessed as 'poor' or 'bad'. Notwithstanding this, it should be emphasised that the status of most EU annex habitats was expected to be unsatisfactory to begin with, since they would not otherwise have been listed in the directive.

There is a mixed picture on the status of species. A low proportion of EU annex species was assessed as having a 'bad' conservation status. There are still many bird species on the red and amber lists, although the Hen Harrier, Roseate Tern and Chough have been removed from the Red List of Birds of Highest Conservation Concern. Three bird species — the White-tailed Sea Eagle, Golden Eagle and Red Kite — have been reintroduced to Ireland, although it is still too early to assess the success of these projects. Conservation measures undertaken for the Atlantic salmon in Irish waters appear to be having some initial success.

The major pressures and threats to Ireland's biodiversity are similar to those faced by many other European countries. They comprise direct damage, over-grazing, unsustainable exploitation, pollution, and invasion by alien species. Despite the overall improvement in water quality for the period 2004-2006, deterioration of rivers and lakes of the highest water quality represents the major threat to biodiversity in freshwaters in Ireland. The unsustainable exploitation of commercial marine fish species is a major cause for concern and is being addressed at both national and EU levels. A number of marine research programmes and projects have been undertaken in Ireland in recent years, and these contribute to the knowledge base that will enable effective marine conservation measures to be taken.

A substantial body of legislation on biodiversity has been built up and, among other things, this has facilitated a range of conservation measures. Ireland is beginning to adopt the 'mainstreaming' approach to biodiversity conservation but, as the report points out, much more needs to be done. Although priority has had to be given to the conservation of

protected habitats and species, improved conservation measures for biodiversity in the wider countryside and marine environment need be put in place and implemented. Wider conservation measures are also needed to maintain the ecological structure and function of Ireland's protected areas.

Climate change as predicted by forecasts could place additional pressures on certain habitats, particularly peatlands, turloughs and bog woodlands. There are at least 171 native plant species, comprising 20% of the total native flora, that appear to be particularly vulnerable to climate change during the period 2007 to 2050. Climate change could also exacerbate the problems arising from the spread of certain alien invasive species. Although a number of measures to control alien species are being implemented, wider application of such measures is necessary on an all-island basis, supported by strengthened legislation.

A second National Biodiversity Plan will be published in 2010. Priorities for biodiversity conservation in the new Plan will include improvement in the status of potential habitats and species that have been assessed as "bad", and improvement in the knowledge base on the occurrence and status of habitats and species.

Appendix I

Information concerning reporting Party and preparation of national report

A. Reporting Party

Contracting Party	Ireland
NATIONAL FOCAL POINT	
Full name of the institution	National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government
Name and title of contact officer	Dr. Ciaran O'Keeffe Director, Science and Biodiversity Section National Parks and Wildlife Service Department of the Environment, Heritage and local Government
Mailing address	7 Ely Place Dublin 2 Ireland
Telephone	(00353) 1 888 3295
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E-mail	ciaran.okeeffe@environ.ie
CONTACT OFFICER FOR NATIONAL REPORT (IF DIFFERENT FROM ABOVE)	
Full name of the institution	As above
Name and title of contact officer	Mr. Jack Golden Assistant Principal Biodiversity Policy Unit
Mailing address	As above
Telephone	(00353) 1 888 3245
Fax	(00353) 1 888 3276
E-mail	jack.golden@environ.ie
SUBMISSION	
Signature of officer responsible for submitting national report	
Date of submission	14 May 2010

Appendix I

Information concerning reporting Party and preparation of national report

B. Process of preparation of national report

An independent environmental consultant was engaged by the National Parks and Wildlife Service of the Department of the Environment, Heritage and Local Government to draft the Report. The report was prepared in the main by using material already available from a variety of sources, both within the Department and elsewhere – see References at end of Report. A number of key stakeholders were consulted as appropriate, for example the Environmental Protection Agency and the Department of Agriculture and Food.

A well developed draft of the Report was submitted to the Biodiversity Forum of Comhar - The Sustainable Development Council (SDC) for observations and input. (Comhar is the Irish word for partnership).

The Biodiversity Forum oversees independent monitoring of progress in the ongoing implementation of the Convention on Biological Diversity and the National Biodiversity Plan, highlighting progress and bottlenecks and ensuring on-going input to the development of National Strategies to promote biodiversity conservation, including input into the 2nd National Biodiversity Plan, which is currently being prepared.

The biodiversity Forum is broadly representative of the key stakeholders with an interest in biodiversity, including farmers and rural dwellers, environmental NGOs and the voluntary sector, business, academic and professional interests. It also helps to promote biodiversity conservation on an all-island basis and includes representation from Northern Ireland.

APPENDIX 2

FURTHER SOURCES OF INFORMATION

The National Parks and Wildlife Service website provides a wide range of information on all aspects of biodiversity conservation in Ireland, including links to many other official and non-governmental organisations involved.

http://www.npws.ie/en

See also

http://www.noticenature.ie/

APPENDIX 3 - A

PROGRESS TOWARDS TARGETS OF THE GLOBAL STRATEGY FOR PLANT CONSERVATION AND THE PROGRAMME OF WORK ON PROTECTED AREAS

A. PROGRESS TOWARDS TARGETS OF THE GLOBAL STRATEGY FOR PLANT CONSERVATION

Summary targets for Ireland's National Strategy for Plant Conservation are listed in the Irish National Plant Conservation Strategy: http://www.botanicgardens.ie/gspc/gspc.htm. On the website, each target is hyperlinked and provides access to a web page of detailed actions, milestones and indicators. The targets are listed below.

"A. Understanding and documenting Ireland's plants and fungi"

Target 1: Widely accessible preliminary census lists of all wild plant species, and fungi, found in the Republic of Ireland.

Target 2: A preliminary assessment of the conservation status of all known plant species in Ireland completed and made widely available

Target 3: Comprehensive and documented suite of practical solutions based on new or tested models, case studies, research and other experiences available for plant conservation and sustainable use in Ireland.

"B. Conserving Ireland's plant wealth"

Target 4: At least 10 per cent of each of Ireland's plant habitats effectively conserved

Target 5: Protection of the most important areas for plant diversity in Ireland assured

Target 6: At least 30 per cent of production lands in Ireland managed consistent with the conservation of plant diversity

Target 7: Conservation of at least 60 per cent of Ireland's threatened plant species assured in situ

Target 8: All threatened Irish plant species in accessible ex situ collections, and all Critically Endangered and Endangered category species included in effective conservation management programmes

Target 9: Conserve the genetic diversity of all known indigenous traditional Irish varieties of crop plants, landraces and crop relatives as well as other socio-economically valuable plant species

Target 10: Management plans in place for at least 10 major alien species that threaten plants, plant communities and associated habitats and ecosystems in Ireland

"C. Using Ireland's plant diversity sustainably"

Target 11: No species of wild flora endangered by international trade

Target 12: All plant-based products derived from Irish wild plants harvested from sustainably managed sources

Target 13: Safeguard the traditional practices based on plant resources, and their associated knowledge that are sustainable, and that support local communities and their livelihoods in Ireland.

"D. Promoting education and awareness about plant diversity in Ireland"

Target 14: Ensure that plant conservation and biodiversity issues are incorporated into the formal educational curricula at all levels in Ireland and in informal education and national public awareness programmes.

"E. Building capacity for the conservation of Ireland's plants"

Target 15: The number of trained people working with appropriate facilities in plant conservation increased, as required, to achieve the targets of this Strategy

Target 16: A broadly-based Irish network for plant conservation established to achieve the targets for this strategy

APPENDIX 3 - B

PROGRESS TOWARDS TARGETS OF THE GLOBAL STRATEGY FOR PLANT CONSERVATION AND THE PROGRAMME OF WORK ON PROTECTED AREAS

B. Goals and Targets of the Programme of Work on Protected Areas

Summary responses to the Goals and Targets of the Programme of Work on Protected Areas are presented below, conforming with Annex V of the guidelines for national reports. Cross-references to the main report are included where appropriate, and hyperlinks to relevant web sites are provided.

Goals	Target
1.1. To establish and strengthen national and regional systems of protected areas integrated into a global network as a contribution to globally agreed goals.	Ireland's Natura 2000 sites now cover 11% of the national territory: • 423 SACs accepted by EU as Sites of Community Importance (SCIs), covering over 1,000,000 ha. Marine SCIs cover approx. 330,000 ha. • Approx. 428,000 ha of marine areas proposed for designation • 147 SPAs designated to date, covering approx. 280,000 ha and 66 marine SPAs covering over 80,000 ha.
1.2. To integrate protected areas into broader land- and seascapes and sectors so as to maintain ecological structure and function.	Integration of protected areas systems into wider land- and seascape has begun but is still at an early stage. This is being achieved mainly through agri-environment schemes and forestry schemes, and also through Local Biodiversity Action Plans.
1.3. To establish and strengthen regional networks, transboundary protected areas (TBPAs) and collaboration between neighbouring protected areas across national boundaries.	There is increased cooperation between relevant agencies in the Republic of Ireland and Northern Ireland on protected areas, all-island species action plans and river basin management planning.

Goals	Target
1.4. To substantially improve site-based protected area planning and management.	Site inspection Reporting Programme and Conservation Management Planning for Natura 2000 sites will improve protected area planning and management (See Table 2.1, Action 20 and 23)
1.5. To prevent and mitigate the negative impacts of key threats to protected areas.	Substantial body of legislation to protect biodiversity now exists. Better cross-sectoral integration is needed to take effective actions to prevent and mitigate key threats.
2.1. To promote equity and benefit-sharing.	Agri-environment schemes and other measures have been developed to pay landowners for costs arising from designation of priority areas.
2.2. To enhance and secure involvement of indigenous and local communities and relevant stakeholders.	An appeals procedure for landowners in Natura 2000 sites is in place. Consultation with local communities as part of conservation management plans for SACs exists. There is local public participation in the making of Local Area Plans and Development Plans.
3.1. To provide an enabling policy, institutional and socio-economic environment for protected areas.	*The Economic and Social Costs of Biodiversity: Benefits and Costs of Biodiversity in Ireland* was published by the Department of Environment, Heritage and Local Government, Dublin in 2008.
3.2. To build capacity for the planning, establishment and management of protected areas.	Site Inspection Reporting Programme and Conservation Management Planning for protected areas have been established. Substantial body of data already in existence for terrestrial biodiversity (National Biodiversity Data Centre, NPWS, National Botanic Gardens) and for marine biodiversity (Marine Institute and NPWS).
3.3. To develop, apply and transfer appropriate technologies for protected areas.	Developments in technologies for management and monitoring of priority areas are routinely published on state agency websites.

Goals	Target
3.4. To ensure financial sustainability of protected areas and national and regional systems of protected areas.	Substantial funding has been provided in the reporting period by the Irish Exchequer and the EU Rural Development Fund.
3.5. To strengthen communication, education and public awareness.	'Notice Nature" campaign launched in 2006. See: http://www.noticenature.ie/
4.1. To develop and adopt minimum standards and best practices for national and regional protected area systems.	Natura 2000 sites were selected on the basis of criteria laid down in the EU Habitats and Birds Directives. Conservation objectives for sites and site advisory information continue to be developed. Monitoring is carried out to meet reporting templates as agreed by EU Member States and the EU Commission.
4.2. To evaluate and improve the effectiveness of protected areas management.	Site Inspection Reporting Programme and Conservation Management Planning are improving effectiveness of protected areas management.
4.3. To assess and monitor protected area status and trends.	Site Inspection Reporting Programme for protected areas is in place. Ireland completed a comprehensive assessment of status and trends in 2008 (NPWS 2008).
4.4 To ensure that scientific knowledge contributes to the establishment and effectiveness of protected areas and protected area systems.	Substantial research has been undertaken and is continuing on habitats and selected species. See http://www.npws.ie/en/PublicationsLiterature/

REFERENCES

Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. and Regan, E.C. (2009) *Ireland Red List No. 2 – Non-Marine Molluscs*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Clabby, K.J., Bradley, C., Craig, M., Daly, D., Lucey, J., McGarrigle, M., O'Boyle, S., Tierney, D. and Bowman, J.J. (2008) *Water Quality in Ireland 2004–2006*. Environmental Protection Agency, Co. Wexford, Ireland.

Coll, J., Maguire, C., and Sweeney, J. (2009) Biodiversity and Climate Change in Ireland Briefing Paper. Submitted to Comhar SDC, January 2009.

Coombes, R.H., O. Crowe, A. Lauder, L. Lysaght, C. O'Brien, J. O'Halloran, O. O'Sullivan, T.D. Tierney, A.J. Walsh and H.J. Wilson. (2009) *Countryside Bird Survey Report 1998-2007*. BirdWatch Ireland, Wicklow.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P.A., Kershaw, M. and Musgrove, A.J (2008) Estimates and trends of waterbird numbers wintering in Ireland, 1994/95 to 2003/04. Bird Study (2008) **55,** 66–77. http://www.birdwatchireland.ie/Portals/0/pdfs/iw_IrishWinteringWaterbirdEstimates.pdf

Curtis, T.G.F and McGough, H.N. (1988) *The Irish Red Data Book: 1 Vascular Plants.* Wildlife Service, Ireland.

DAFF (2007) *Rural Environment Protection Scheme Facts and Figures 2007.* Department of Agriculture, Fisheries and Food, Dublin.

DAFF (2009) State of Plant Genetic Resources for Food and Agriculture in Ireland: Second Irish National Report on Conservation and Sustainable Utilisation of Plant Genetic Resources for Food and Agriculture. In draft.

DoE (2005) *Interim Review of the Implementation of the National Biodiversity Plan 2002-2006*. Dublin. Department of Environment, Heritage and Local Government, Dublin, Ireland.

DoEHLG (2008) *The Economic and Social Costs of Biodiversity: Benefits and Costs of Biodiversity in Ireland*. Department of Environment, Heritage and Local Government, Dublin.

European Commission (2007) *Attitudes of Europeans towards the issue of biodiversity.* Flash Eurobarometer Series No. 219. Report by The Gallup Organisation to the European Commission, Brussels.

EPA (2008) *Ireland's Environment 2008*. Environmental Protection Agency, Co. Wexford, Ireland.

Ferriss, S. E., Smith, K. G. and Inskipp, T. P. (editors) (2009) Irish Biodiversity: A taxonomic inventory of fauna. *Irish Wildlife Manual No. 38*. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Fitzpatrick, Ú., Murray,. T.E, Byrne, A., Paxton, R.J., and Brown, M.J.F. (2006) Regional Red List of Irish Bees. Environment and Heritage Service Northern Ireland and National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. http://www.npws.ie/en/media/Media,4860,en.pdf

Foster, G. N., Nelson, B. H. and O'Connor, Á. (2009) *Ireland Red List No. 1 – Water beetles.* National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Freshwater Ecology Group and Compass Informatics (2007) Conservation Assessment of Freshwater River Habitats in the Republic of Ireland. Trinity College, Dublin.

Good, J.A. and Butler, F.T. (2001) Turlough pastures as a habitat for Staphylinidae and Carabidae (Coleoptera) in south-east Galway and north Clare, Ireland. *Bulletin of the Irish Biogeographical Society,* **25,** 74-88.

Hickie, D. (2008). *Conserving Ireland's Biodiversity: A submission on the Second National Biodiversity Plan*. Biodiversity Forum Briefing Paper. Comhar SDC.

Huntley, B., Green, R.E., Collingham, Y.C., and Willis, S.G. (2007) *A Climatic Atlas of European Breeding Birds*. Lynx Edicions.

IUCN, (2008) 2008 IUCN Red List of Threatened Species. IUCN. www.iucnredlist.org

Kingston, N. (2009) Island Biodiversity in Ireland. In: Council of Europe (2009) Bern Convention Report on European Islands Biological Diversity (T-PVS/Inf(2009)13e). Directorate of Culture and Cultural and Natural Heritage, Council of Europe, Strasbourg.

Marnell, F., Kingston, N. and Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

NPWS (2008) *The Status of EU Protected Habitats and Species in Ireland*. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.
http://www.npws.ie/en/media/NPWS/Publications/Biodiversity/Media,6432,en.pdf

Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K. & Delaney, A. (2008) National Survey of Native Woodlands. Volume 1, Main Report. Unpublished report to the National Parks and Wildlife Service.

Purcell, P. (1996) *Biodiversity in Ireland: an inventory of biological diversity on a taxonomic basis: Fauna*. Unpublished report to the Heritage Policy Unit, Department of the Arts, Culture and the Gaeltacht.

Reid, N., Dingerkus, K., Montgomery, W.I., Marnell, F., Jeffrey, R., Lynn, D., Kingston, N. and McDonald, R.A. (2007) Status of hares in Ireland. *Irish Wildlife Manuals*, No. 30. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Sheehy Skeffington, M. and Gormally, M. (2006) Turloughs: A mosaic of biodiversity and management systems unique to Ireland *Acta Carsologica,* **36,** 217-222

Shiel, C. (1999) Bridge usage by bats in County Leitrim and County Sligo. The Heritage Council. March 1999.

Stokes, K., O'Neill, K. and McDonald, R.A. (2004) Invasive species in Ireland. Unpublished report to Environment & Heritage Service and National Parks & Wildlife Service. Quercus, Queens University Belfast, Belfast. http://www.npws.ie/en/media/NPWS/Publications/Media,3701,en.pdf

Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C., Clenaghan, C., Cunningham, P., Delaney, J., O'Boyle, S., MacCarthaigh, M., Craig M. and Quinn, R. (2005) *Water Quality in Ireland 2001–2003.* Environmental Protection Agency, Co. Wexford, Ireland.

Wilson, J. and Berrow, S. (2006) *A guide to the identification of whales and dolphins of Ireland*. The Irish Whale and Dolphin Group.

WWF (2005) *Europe 2005: The Ecological Footprint*. http://assets.panda.org/downloads/europe2005ecologicalfootprint.pdf

Wyse Jackson, P. (2007) The potential impact of climate change on native plant diversity in Ireland. *Botanic Gardens Conservation International*, Vol 4, No. 2 – July 2007. http://www.bgci.org/resources/article/0571)