Chapter 7:
Nature

Nature

1. Introduction

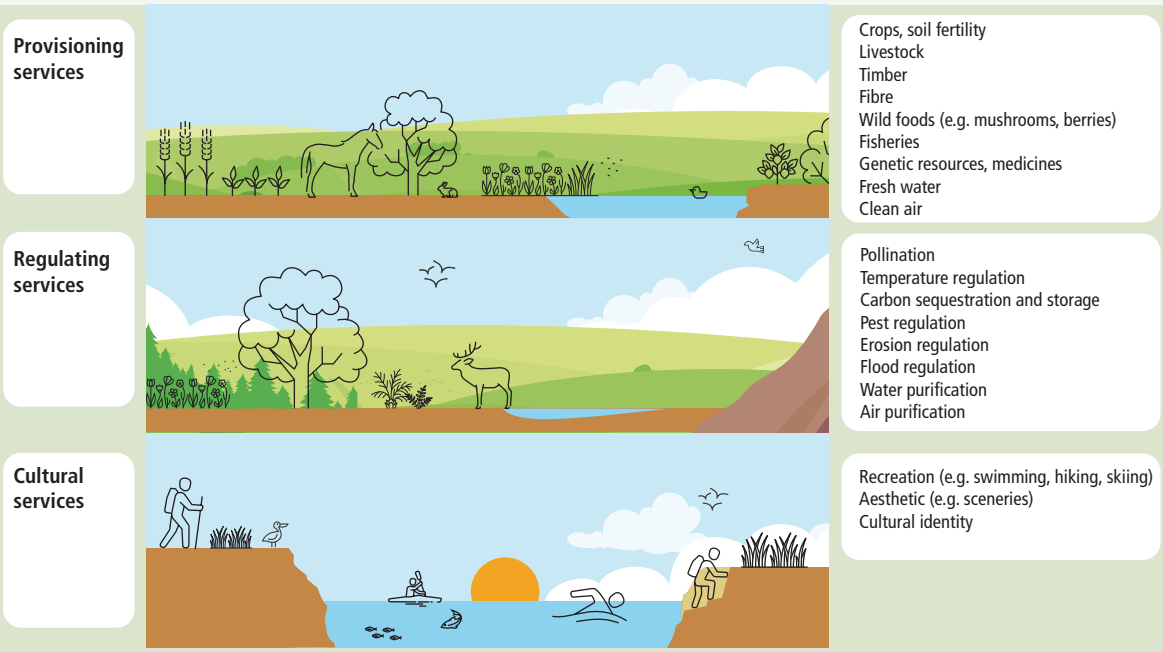
The terms 'nature' and 'biodiversity' are often used interchangeably. Nature is all life on Earth, together with the living systems of which it is a part, for example geology, water and climate. Biodiversity, meaning biological diversity, describes the variety of life forms on Earth. Biodiversity is also multi-layered and includes genetic diversity (the difference between two people), species diversity (the difference between the red squirrel and the grey squirrel) and habitat diversity (the difference between a bog and a calcareous grassland) (NPWS, 2024). Nature and biodiversity are essential to humanity and need to be protected.

Without nature and its diversity of life and habitats, our planet would be unable to function properly or provide clean water, clean air, food and raw materials (Topic Box 7.1). Our ability to respond to and prevent future environmental challenges, such as climate change, natural disasters and pandemics, would also be challenged. Nature is also the foundation of the world's economy. Over half of the global gross domestic product is dependent on materials and services that are delivered by ecosystems. For example, raw materials are needed for industry and construction, and genetic resources are vital for farming and medicine. Spending time in our natural environment and around nature, in our 'green' and 'blue' spaces, promotes wellbeing (Chapter 14).

Topic Box 7.1 Ecosystems

Ecosystems are communities of living organisms interacting with each other and their environment (e.g. air, water, rocks and soils). They provide a series of services and benefits for humans. Examples of these services and benefits for humans include clean air and water, food, raw materials (e.g. timber, medicines), opportunities for recreation, such as angling and sea swimming, and a sense of place. These are referred to as ecosystem services, of which three different types exist: provisioning, regulating and cultural (Figure 7.1). Nature and biodiversity play a key role in the functioning of ecosystems and their ability to provide ecosystem services. The value of nature and benefits from ecosystem services extend far beyond that which can be measured in financial terms.

Figure 7.1 Examples of ecosystem services that support human society



Source: EEA, 2021a

When the variety of habitats, species, genetic resources or communities is reduced we lose nature and biodiversity. It is estimated that up to 1 million animal and plant species are now threatened with extinction, more than ever before in human history (IPBES, 2019). Globally, the loss of nature and biodiversity is higher than at any point in recent history and is continuing at an unprecedented rate, so much so that it could be considered that we are in the midst of a sixth global mass extinction event (IPBES, 2019; Finn *et al.*, 2023). Human activities are the primary driver behind biodiversity loss (IPBES, 2019). Bar-On *et al.* (2018) estimate that humanity has resulted in the loss of 83% of wild animals since civilisation began.

Ireland has significant international and legal obligations to protect nature and biodiversity.[1] The European Union (EU) Habitats and Birds Directives have resulted in the creation of a network of sites for habitat and species protection, the Natura 2000 network. The network consists of Special Protection Areas (SPAs) protected under the Birds Directive and Special Areas of Conservation (SACs) protected under the Habitats Directive. Ireland also has a network of Natural Heritage Areas (NHAs), which are given protection under the Wildlife (Amendment) Act (2000). These are areas considered important for the habitats present or which hold species of plants and animals whose habitat needs protection. To date, 148 peatlands have been designated as NHAs and there are a further 630 proposed NHAs, which are afforded limited protection before formal designation[2]. Ireland has Marine Protected Areas in our marine and coastal areas, which are discussed further in Chapter 8. Despite this, we have seen significant declines in nature and biodiversity and their related social, political and economic consequences (NPWS, 2024), so much so that a biodiversity emergency was declared by Dáil Éireann in 2019 (Topic Box 7.2).

Topic Box 7.2 National biodiversity emergency and the Citizens' Assembly on Biodiversity Loss

When Dáil Éireann declared a national biodiversity emergency in May 2019, Ireland was one of the first countries in the world to do so. In response, a national Citizens' Assembly on Biodiversity Loss and a Children and Young People's Assembly on Biodiversity Loss were established.

National Citizens' Assembly on Biodiversity Loss

The Citizens' Assembly on Biodiversity Loss was convened to examine how the State could improve its response to biodiversity loss and to bring forward proposals in that regard. The assembly comprised 100 members: 99 randomly selected members of the public and an independent chairperson appointed by the Taoiseach.

Following deliberation, 159 recommendations were agreed and published in April 2023 (Citizens' Assembly, 2023). These included a call on the Oireachtas to accept the full range of recommendations and implement them without delay to curb the crisis and allow the conservation and restoration of biodiversity for the people of Ireland both present and future. The assembly also indicated overall disappointment with the State's failure to address biodiversity loss, particularly with the lack of implementation and enforcement of national biodiversity legislation (Citizens' Assembly, 2023).

Sector-specific recommendations focused on agriculture, freshwaters, marine and coastal environments, peatlands, forestry, woodlands, hedgerows, protected sites, protected species, invasive species, and urban and built environments. The assembly acknowledged the role of farmers as custodians of the land who possess a rich knowledge and understanding of the environment. It recommended that the agricultural industry be supported in conserving and restoring biodiversity.

Children and Young People's Assembly on Biodiversity Loss

Ireland's first Children and Young People's Assembly on Biodiversity Loss called for biodiversity to be at the centre of decision-making and for children and young people to be included in responding to biodiversity loss.[3]

1 www.npws.ie/legislation/irish-law (accessed 1 April 2024).

2 www.npws.ie/protected-sites/nha (accessed 18 April 2024).

3 cyp-biodiversity.ie/ (accessed 1 April 2024).

The Oireachtas Joint Committee on Environment and Climate Action advised that the calls to action set out by the assembly should be examined and considered for implementation by the relevant government departments.

Oireachtas Joint Committee on Environment and Climate Action

The Oireachtas Joint Committee on Environment and Climate Action examined the recommendations of the Citizens' Assembly report on biodiversity loss and, in turn, published its report in December 2023 (JCECA, 2023). It had engaged extensively with stakeholders to ensure that the biodiversity crisis in Ireland would be addressed in a meaningful way. Among its key recommendations were to change fundamentally the approach to environmental governance and enforcement taken across government departments, to place the fourth iteration of the National Biodiversity Action Plan on a statutory footing and for the state to play a leading and supportive role in the adoption and implementation of the EU Nature Restoration Law (see section 4).

2. The status of protected nature in Ireland

In Ireland, the National Parks and Wildlife Service (NPWS) provides a 6-yearly update on the assessment of the conservation status of habitats and species in Ireland protected under the EU Habitats Directive (92/43/EEC, Article 17), with the most recent being in 2019 (NPWS, 2019a). That report indicated that, of Ireland's 59 habitats listed in the directive, most have an unfavourable status with almost half showing ongoing declines, including marine, peatland (Figure 7.2), grassland and woodland habitats (NPWS, 2019a).

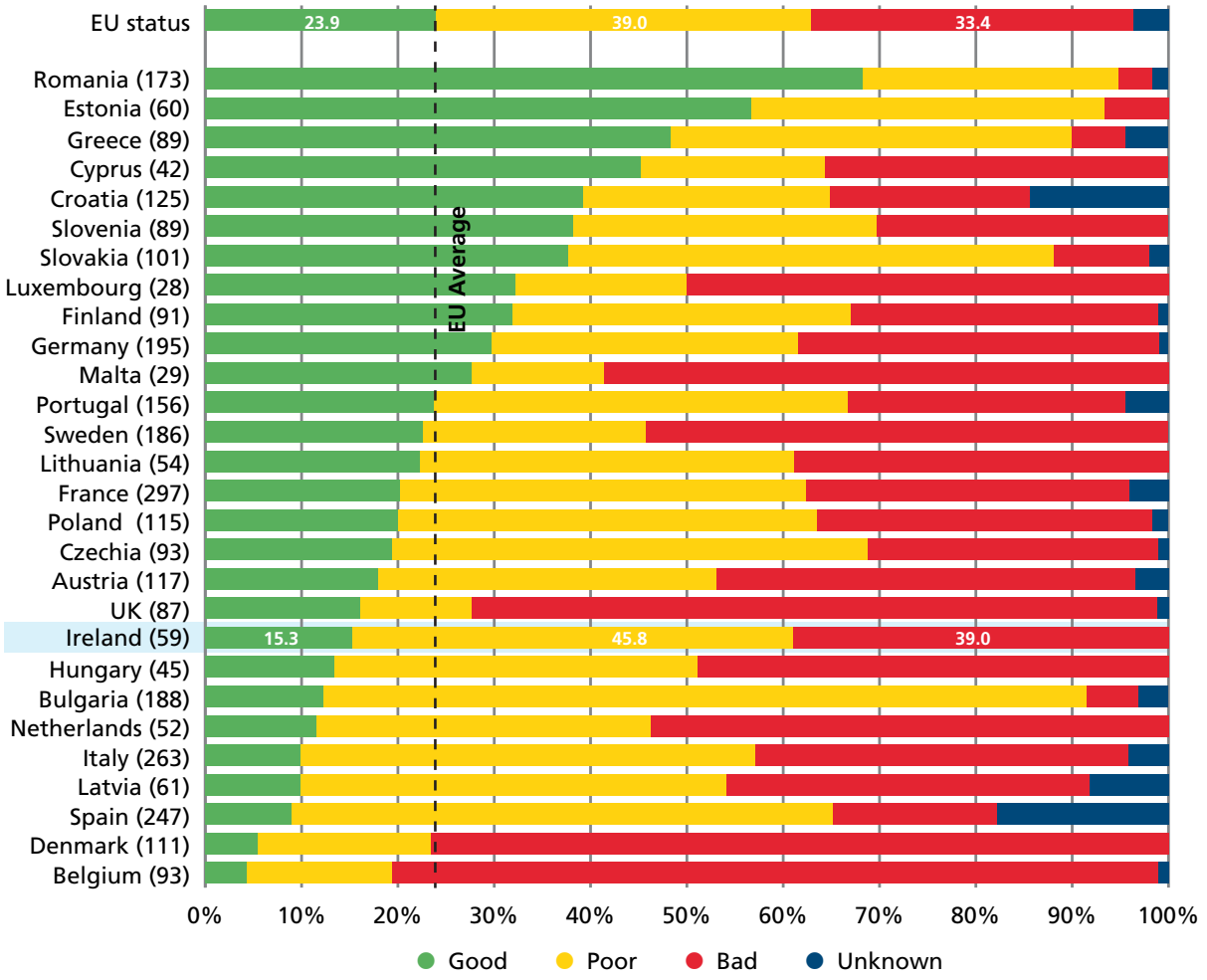
Ireland also falls below the EU average when it comes to the number of habitats reported as being in 'good' conservation status (Figure 7.3). In a European assessment covering the period 2013-2018 (EEA, 2020), Ireland comes 20th out of 28 Member States (including the UK). The European Environment Agency (EEA) assessment also reported on Ireland's 60 species listed in the directive. It highlights that the majority of species (72%) protected under the EU Habitats Directive are stable or increasing. Overall, 57% of Irish species assessed have a good conservation status (Figure 7.4), which is above the EU average (30.4%).[4] The EEA's latest 'State of nature in the EU' report (2020) shows alarming results from the 2013-2018 reporting period (Topic Box 7.3).

Figure 7.2 Intact Irish peatland, Clara bog, Co. Offaly

Credit: ©Tina Claffey

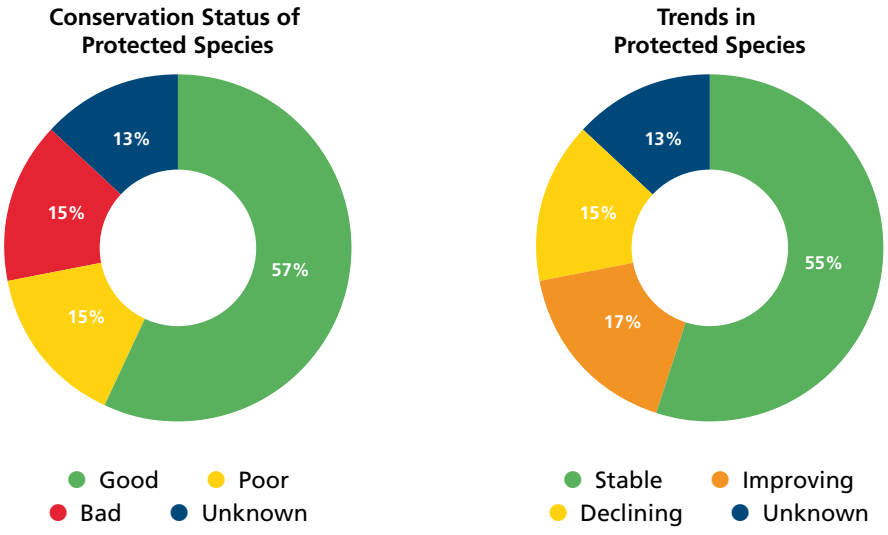
4 Conservation status of species under the EU Habitats Directive (accessed 18 April 2024).

Figure 7.3 Conservation status of protected habitats at EU Member State level, 2013-2018



Source: EEA, 2021b

Figure 7.4 Summary of the assessment results for (left) the status of and (right) trends in species populations protected under the EU Habitats Directive in Ireland



Source: NPWS, 2019a

Species such as the pine marten and otter have shown increases, with the pine marten showing an increase in range (NPWS, 2019a). Some key species, however, are declining. One of the species of greatest concern is the pollution-sensitive freshwater pearl mussel (Figure 7.5). Only a few rivers have populations that include juvenile individuals; populations without young individuals are likely to die out (NPWS, 2019a). The next update on the assessment of the conservation status of protected habitats and species in Ireland is due in 2025.

Figure 7.5 One of Ireland's longest-lived species, the freshwater pearl mussel, *Margaritifera margaritifera*, considered to be in bad status in Irish rivers and lakes

The EU Birds Directive (2009/147/EC, Article 12) reporting for Ireland (NPWS, 2019b), also published every six years, highlighted that approximately 30% of the breeding species assessed are estimated to have remained stable or increased in abundance over the long term. Such birds include the little egret, great spotted woodpecker, golden eagle, white-tailed eagle and red kite. In contrast, almost 20% of breeding bird species in Ireland for which there are available data are in long-term decline. For example, acute declines were recorded up to 2018 for some ground nesting bird species such as red grouse, whinchat, twite, dunlin, golden plover, curlew, corncrake and redshank. Unfortunately, there were still several species that had significant data gaps and were therefore not assessed. The next full update on the assessment of the conservation status of protected birds (Article 12) in Ireland is due in 2025. Meanwhile, recent reporting from the NPWS highlights serious declines (59% since 2000) in the hen harrier (*Circus cyaneus*) population, a medium-sized raptor typically found in upland areas in Ireland (Ruddock *et al.*, 2024). Estimates suggest that this iconic bird of prey could be extinct in Ireland within 25 years (Ruddock *et al.*, 2024).

While the 2019 updates on protected habitats and species (NPWS, 2019a) and protected birds (NPWS, 2019b) are welcome, it must be noted that these represent only protected flora and fauna, which account for a small percentage of our nature and biodiversity. Very little research or data collection has been undertaken on the status of our non-protected habitats and species that make up most of our flora and fauna. This may be obscuring the true scale of biodiversity loss and highlights the need for accurate and up-to-date data on a wider range of biodiversity in Ireland.

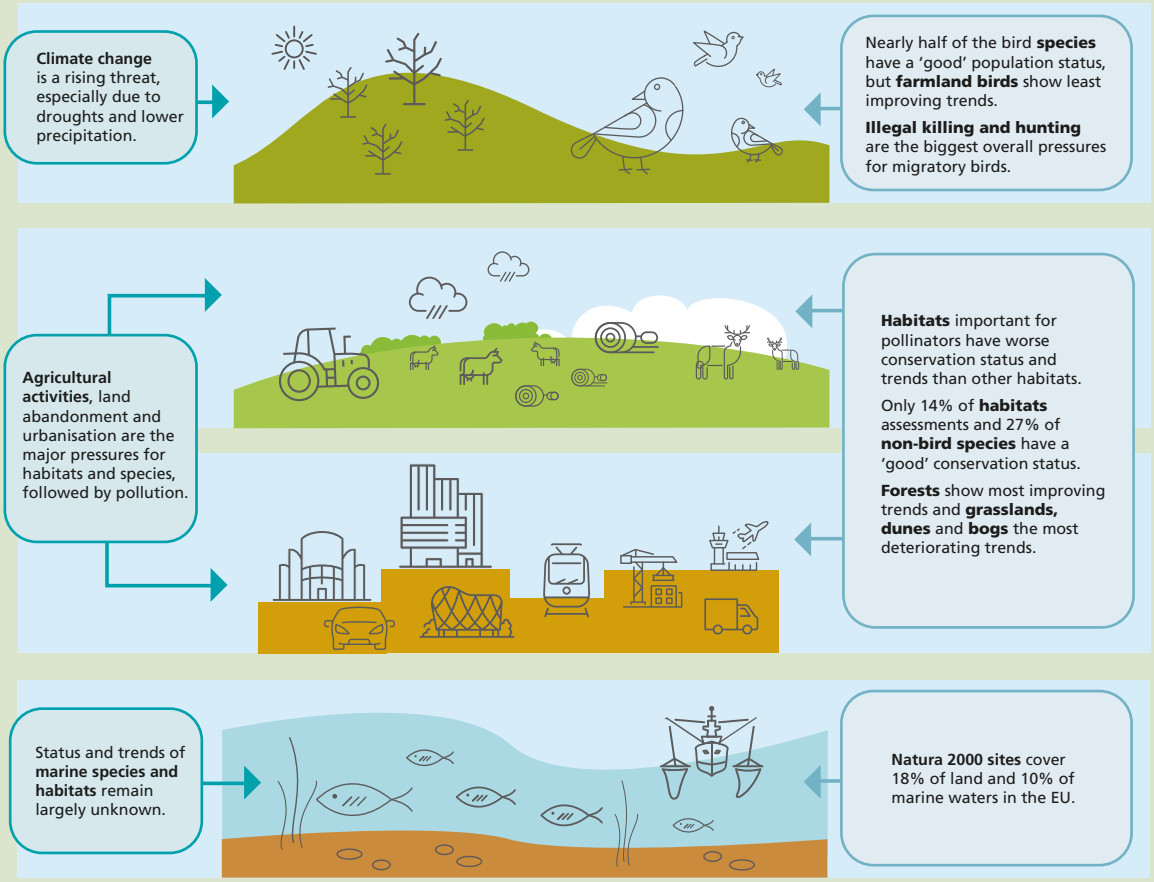
Some statistics from Irish biodiversity research are stark. For example, Fitzpatrick *et al.* (2007) found that more than half of Ireland's bee species had experienced substantial declines in numbers since 1980, with 30% of species considered threatened with extinction. Water quality is continuing to decline too, with almost half of freshwater systems in Ireland in poor or deteriorating condition (Chapter 6). Sixteen freshwater species, comprising ten aquatic insects, five snails and the European eel (*Anguilla anguilla*), are now considered critically endangered in Ireland (Kelly-Quinn *et al.*, 2020). Even more stark is that 11 species (eight water beetles, one stonefly and two snails), or 2.3% of the invertebrate species examined to date, are now considered extinct in Ireland (Kelly-Quinn *et al.*, 2020). Further information on some selected groups of Irish flora and fauna is provided below.

The EEA's latest 'State of nature in the EU' report (2020) shows alarming results from the 2013-2018 reporting period (Topic Box 7.3).

Topic Box 7.3 State of Nature in the EU

The EEA says that many species and habitats in Europe face an uncertain future unless urgent action is taken to reverse the situation (Figure 7.6).

Figure 7.6: Summary of the state of nature in Europe

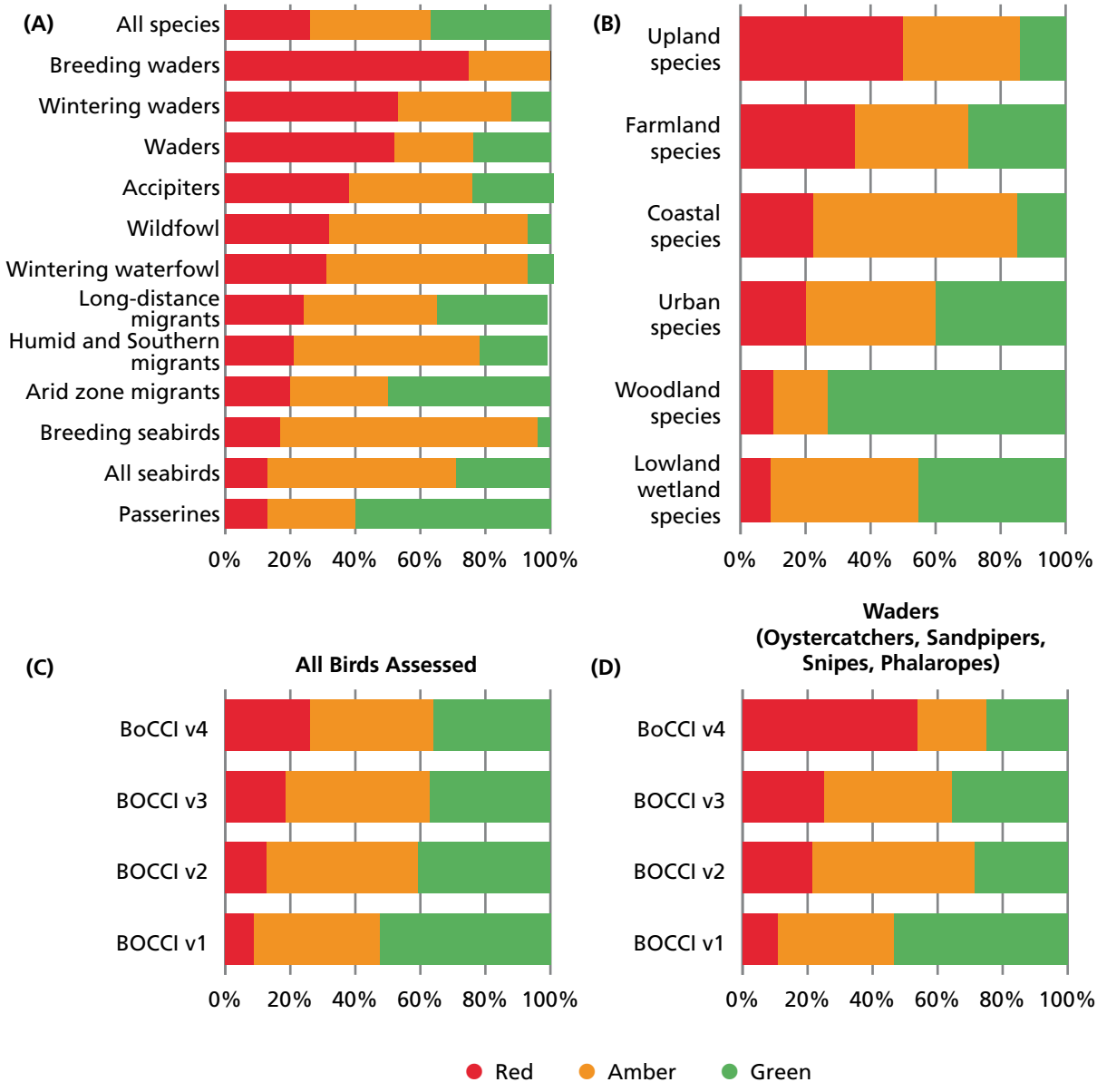


Source: Adapted from EEA, 2020

Birds of Conservation Concern in Ireland

Birdwatch Ireland and the Royal Society for the Protection of Birds Northern Ireland carried out the latest assessment of the conservation status of all regularly occurring birds on the island of Ireland, known as the Birds of Conservation Concern in Ireland (BoCCI) review. This assessment is separate from the EU Birds Directive requirements. The criteria on which the BoCCI review is based do, however, include conservation status at global and European levels and within Ireland. It assesses historical decline, trends in population and range, rarity, localised distribution and international importance. The latest BoCCI report included a range of national and global criteria and placed 26% of the 211 species assessed on the Red List, meaning that they are considered to be of high conservation concern (Gilbert *et al.*, 2021). Particularly affected are breeding waterbirds, and birds that use upland and farmland habitats (Gilbert *et al.*, 2021), but all habitats and bird groups are affected to some degree (Figure 7.7). More alarming is the fact that iconic species, some once common across the Irish landscape, such as the curlew, corncrake and hen harrier, are considered to be on the brink of extinction (for discussion of related conservation projects, see the section below on the Corncrake LIFE project and the Curlew Conservation Programme).

Figure 7.7 The proportion of species categorised as red, amber or green by the BoCCI assessment in 2021 and comparison with previous BoCCI assessments



Source: Reproduced with permission from BirdWatch Ireland and RSPB Northern Ireland

A) The proportion of species per taxonomic group.

B) The proportion of species per breeding habitat.

C) The percentage of species considered red, amber or green in BoCCI version 1 (Newton *et al.*, 1999), BoCCI version 2 (Lynas *et al.*, 2007), BoCCI version 3 (Colhoun and Cummins, 2013) and BoCCI version 4 (Gilbert *et al.*, 2021).

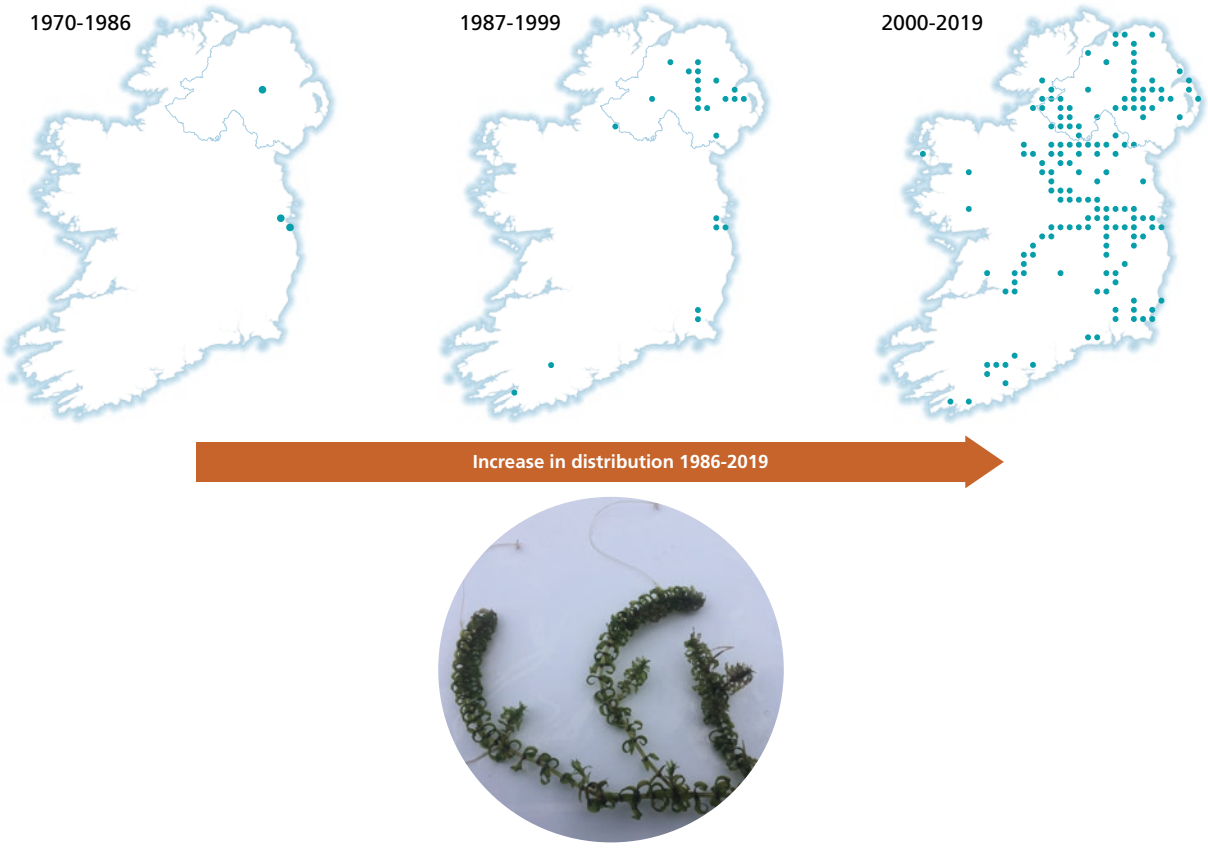
(D) The percentage of wading species considered red, amber or green across BoCCI assessments from 1999 to 2021. Each column is categorised as red, amber or green. All data displayed as percentages.

Botanical Society of Britain and Ireland Plant Atlas for Ireland

In 2023, the Botanical Society of Britain and Ireland (BSBI) published a new Plant Atlas for Ireland (Stroh *et al.*, 2023). Using data collected over 20 years (2000-2020), the atlas highlighted a significant loss of Irish flora, with more than half of Irish native plant species (56%) having declined in range or abundance or both. According to the BSBI, many of the habitats that Irish wild plants depend on have been removed or altered by farming and forestry since the 1950s. Grassland plants have been affected the most. Re-seeding, over-fertilising, nitrogen deposition, herbicides, drainage and changes in grazing pressure have all contributed to the decline of species (Stroh *et al.*, 2023). Mirroring the freshwater faunal declines highlighted by Kelly-Quinn *et al.* (2020), the BSBI report also highlighted how many Irish lakes and wetlands have seen significant declines in both species and populations of native aquatic flora, with many lakes now dominated by invasive non-native aquatic plants, such as Nuttall's pondweed, *Elodea nuttallii*[5] (Figure 7.8).

Other important habitats such as peatlands have been planted with conifers or converted to agriculture, thus excluding the native peatland plants, such as sphagnum moss, heathers and sundew. There is also evidence that climate change may have affected Irish flora by helping some southern species to spread northwards, altering the natural range of species expected in Ireland. Non-native plants such as Himalayan balsam and rhododendron have become invasive. These are having a negative impact on native flora across the country (Stroh *et al.*, 2023).

Figure 7.8 Increase in distribution of the invasive Nuttall's pondweed, *Elodea nuttallii*, 1986-2019. Dots on the maps represent records of the pondweed (at the scale of 10 km × 10 km squares) in each period



Source: Map data available at plantatlas2020.org/atlas/2cd4p9h.xmq

5 A perennial aquatic plant native to North America, Nuttall's pondweed, *Elodea nuttallii*, grows submersed in lakes, rivers and other shallow water bodies. In Ireland it is considered an invasive alien species that is outcompeting and replacing our native aquatic flora, such as charophytes. www.eea.europa.eu/themes/biodiversity/state-of-nature-in-the-eu/article-12-national-summary-dashboards-archived

International Union for Conservation of Nature Red List of threatened species in Ireland

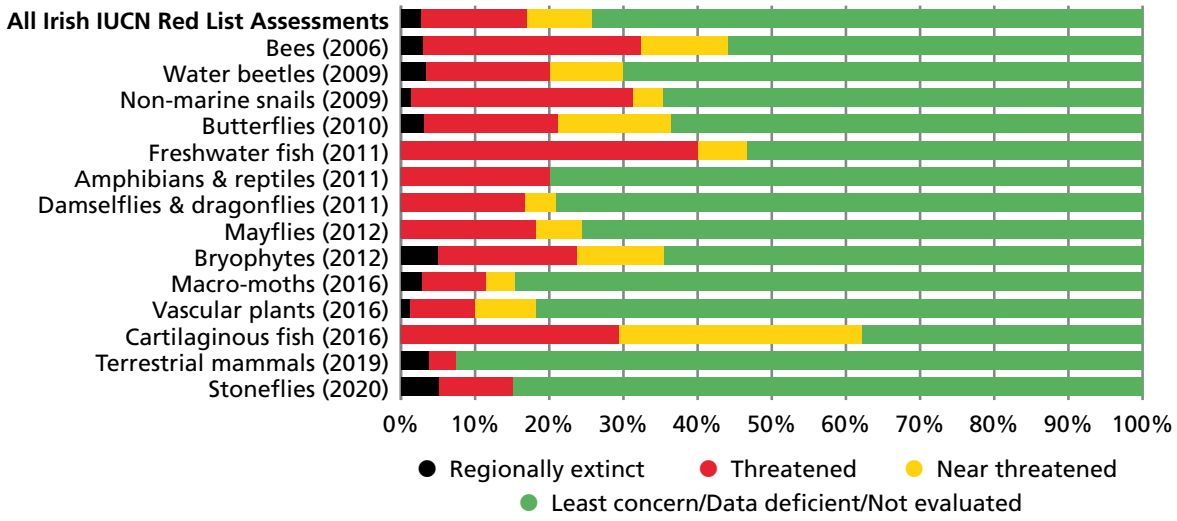
What is often missed in our current understanding of biodiversity in Ireland is the sheer number of species and groups that have not received any assessment to date (see Kelly-Quinn *et al.*, 2020). Most of our assessed species are listed in both the EU Habitats and Birds Directives and are therefore required to be assessed on a 6-year basis. However, these species represent just a small proportion of all the species found in Ireland. It is estimated that our island has at least 31,000 species: only about a tenth of these have had their conservation status assessed. This means that there is a fundamental gap in our knowledge about how biodiversity is changing in Ireland. Even within certain groups such as the insects, for example, data can often be over-reliant on particular groups such as moths and butterflies (Lepidoptera) and do not paint an accurate picture of the status of the wider diversity of insect groups (Duffus and Morimoto, 2022). Such an approach can mask declines or improvements in less well-studied groups.

The International Union for Conservation of Nature (IUCN) was established in 1964. Its Red List of Threatened Species has evolved to become the world's most comprehensive information source on the conservation status of animal, fungi and plant species. It is independent of other reporting mechanisms, such as the EU Habitats and Birds Directives. The IUCN Red List is a critical indicator of the health of the world's biodiversity (ICUN, 2012) and has been used to assess several groups in Ireland.

Unfortunately, of the Red List assessments completed up to 2020, 433 (14%) of 3145 Irish species assessed using the IUCN criteria are considered threatened with extinction, and 9% are near threatened.[6] Some notable examples include the angel shark (*Squatina squatina*), basking shark (*Cetorhinus maximus*), European eel (*Anguilla anguilla*), Arctic char (*Salvelinus alpinus*) and Atlantic salmon (*Salmo salar*). More worryingly, 82 (3%) species assessed have been categorised as extinct in Ireland (Figure 7.9), most notably the grey wolf (*Canis lupus*),[7] once widespread in Ireland but hunted to extinction.

Other extinct species may be less well known but include the orange-striped stonefly (*Perlodes mortoni*), the minutest diving beetle (*Bidessus minutissimus*), the grass-like wetland specialist Buxbaum's sedge (*Carex buxbaumii*) and the moss *Dicranum undulatum*, to name a few. The loss of *Dicranum undulatum*, a species once recorded in raised bogs in the midlands, is almost certainly due to drainage and damage to its habitat by industrial-scale peat extraction (Lockhart *et al.*, 2012).

Figure 7.9 A summary of all IUCN Red List assessments for Irish flora and fauna carried out between 2006 and 2020 highlighting regionally extinct (black), threatened (red) and near threatened (orange) species



Source: Data sourced from published reports at www.npws.ie/publications/red-lists

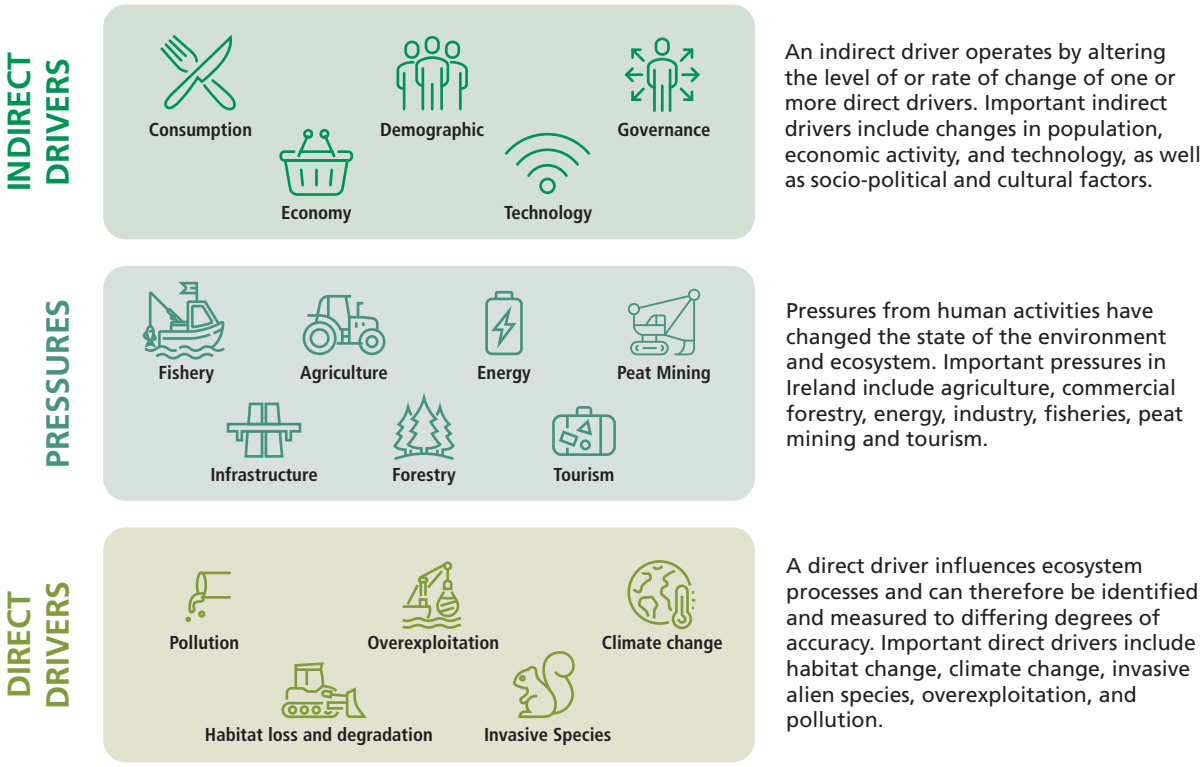
6 Full list of Red Lists reports for Ireland can be found here: www.npws.ie/publications/red-lists (accessed 1 April 2024).

7 The last grey wolf (*Canis lupus*) was reportedly shot in Co. Carlow in 1786 (Fairley, 1984; Hickey, 2016).

3. Threats to nature and biodiversity

How we live in and use our land has significant implications for human life, our economy and our society, and it also has consequences for nature and biodiversity. The most recent global assessment of biodiversity loss by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) lists changes in land and sea use, direct exploitation of organisms, climate change, pollution and invasion of alien species as the main threats to biodiversity (IPBES, 2019). In Ireland, the main reasons for biodiversity loss are wide ranging but generally reflect those highlighted by IPBES (2019). More specifically, and according to the most recent National Biodiversity Action Plan – for the period 2023-2030 (NPWS, 2024) – overgrazing, undergrazing, land abandonment, water and air pollution, alien and problematic species, recreation, development (particularly residential, agricultural and commercial), land drainage, river barriers and the modification of coastal areas, and climate change are all key issues affecting nature in Ireland. However, the ways in which human activities affect nature and biodiversity loss are nuanced and often reflect the policies and strategies adopted by society and government. This results in both direct and indirect drivers of change and demand that magnify pressures on the environment, nature and associated biodiversity (Figure 7.10).

Figure 7.10 Indirect and direct drivers and human pressures that cause biodiversity loss in Ireland



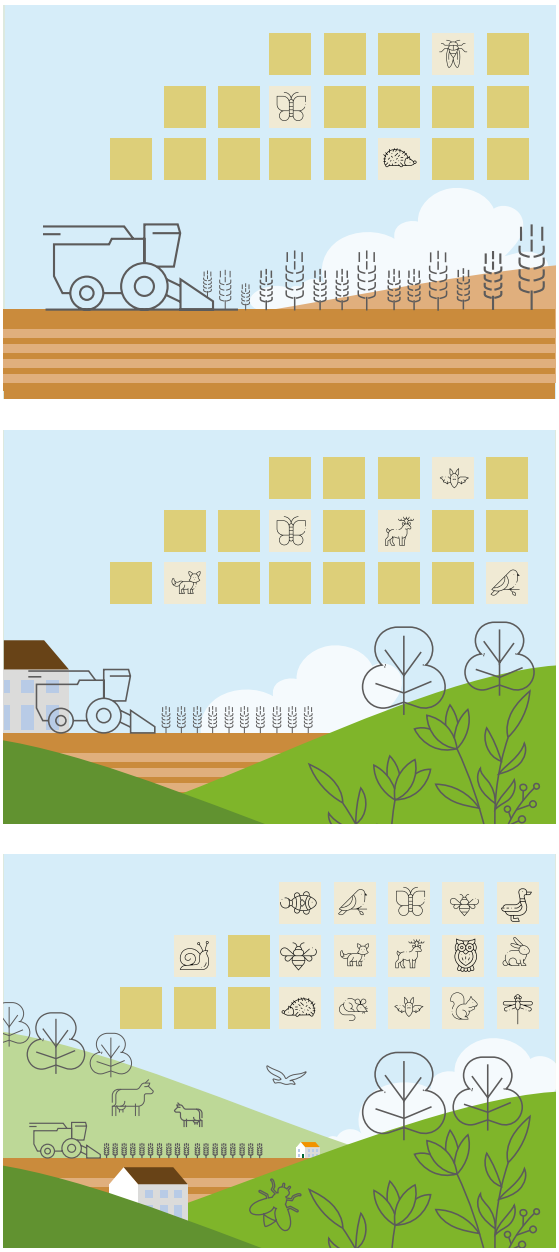
Source: Adapted from OPW, 2022

Land cover and land use

The challenges of managing the modified landscape we have created over generations cannot be overstated. Land cover in Ireland is dominated by grasslands. More than half of our land is used for agriculture-related activities. For more information about land cover and use, see Chapter 5.

This specialisation and intensification of land for agriculture has had a significant impact on biodiversity (Figure 7.11).

Figure 7.11 Value of landscape and land-use diversity for high biodiversity and healthy ecosystem functioning and resilience



Homogenous agricultural landscape

- Low biodiversity -> biological pest control missing, pollination deficit
- Heavy dependence on agrochemicals
- Susceptibility to erosion and nutrient leaching -> increased pollution of groundwater and water bodies
- Lower soil biodiversity -> poorer soil health
- Less carbon stored and sequestered
- Larger vulnerability to extreme weather events
- Unsustainable in long term

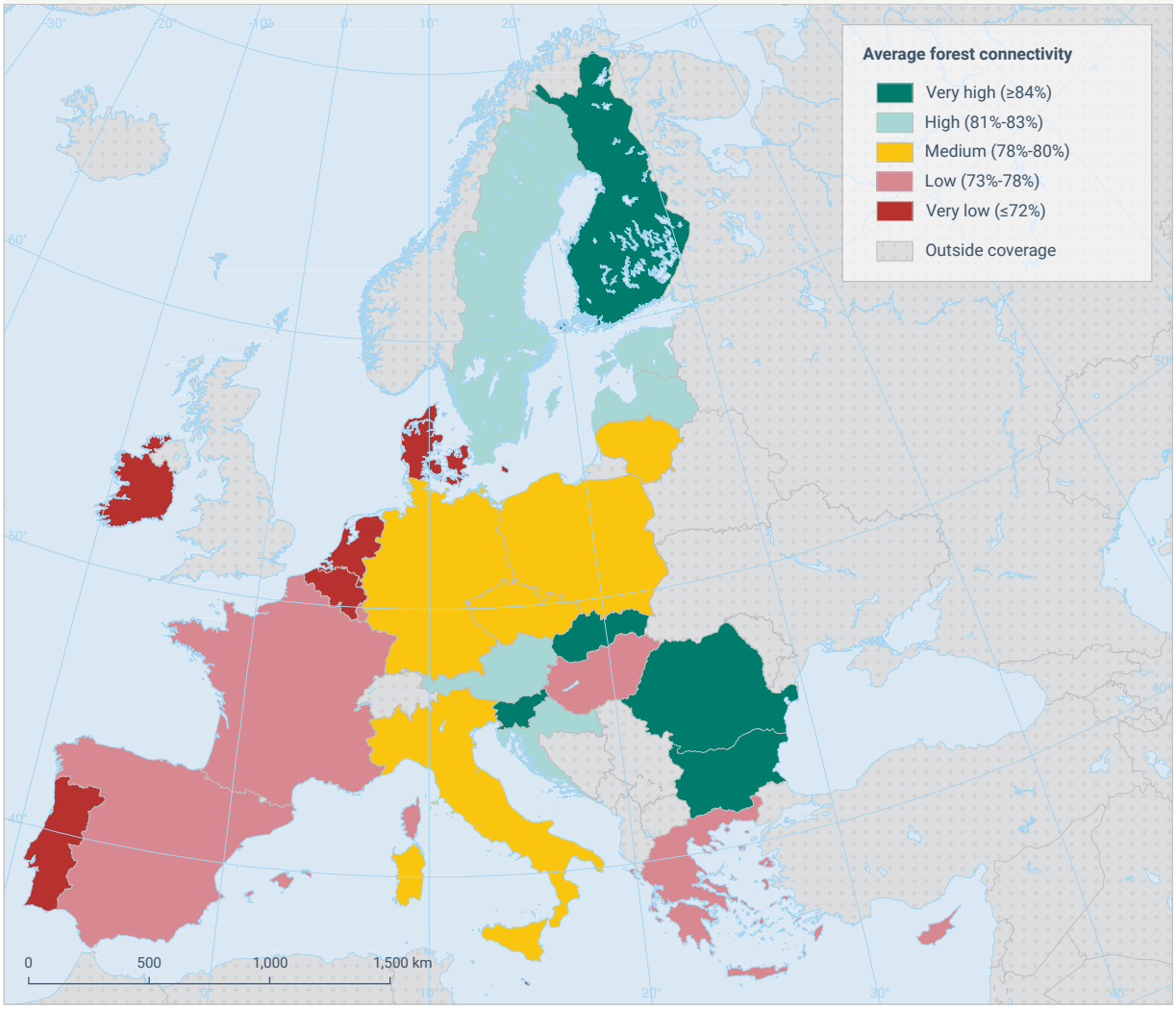
Agricultural landscape with diverse landscape elements

- Higher biodiversity -> possibility to count on biological pest control, improved pollination
- Decreased dependence on agrochemicals
- Resistance to erosion, decreased nutrient leaching
- Higher soil biodiversity -> improved soil health
- More carbon stored and sequestered
- Increased resistance to extreme weather events
- Sustainable also in long term

Source: Adapted from Aveliina Helm @aveliinahelm

The declines in populations and species diversity of bees, butterflies and other insects, birds and plants are largely the result of monoculture and the drive to achieve ever-increasing levels of productivity (DCHG, 2019). This drive for productivity has been characterised by the loss, removal or neglect of hedgerows, stone walls, rough grass areas, ponds, wetlands and scrub, while practices such as land drainage and fertiliser and pesticide application, although local in extent, reduce space for nature (DCHG, 2019). Similarly, the fragmentation and loss of habitats reduces the space and connectivity needed for viable and sustainable species populations (Guilfoyle *et al.* 2023) and therefore overall survival (e.g. fragmented forest and woodland habitat in Ireland; Figure 7.12).

Figure 7.12 Forest fragmentation in the EU Member States



Reference data: © EuroGeographics, © FAO (UN), © TurkStat Source: European Commission – Eurostat/GISCO

Source: EEA, 2023

Over-exploitation

Over-exploitation of our natural resources is a major driver of biodiversity loss. Peatlands have been mined for fuel for 400 years in Ireland (Malone and O'Connell, 2009). Ireland's Atlantic climate and diversity of peatland habitats has resulted in a unique biodiversity that is considerably different from that found elsewhere in Europe (excluding Scotland) and across the world.[8] Today, given the conversion of natural peatlands to agricultural pasture and forestry and practices such as drainage and turf cutting, the Irish Peatland Conservation Council[9] estimates that Ireland has witnessed a 77% loss in peatland habitat, the majority of which has occurred over the past 50 years owing to human activities. Similarly, the NPWS estimated that only 10% of the original raised bog resource and 28% of the original blanket peatland resource are considered natural peatlands and suitable for conservation (DAHG, 2015) (Figure 7.13). In a global study, Fluet-Chouinard *et al.* (2023) estimated that Ireland had lost up to 90% of its wetlands (peatlands included) since 1700, owing to human activities associated with land drainage and land use change, primarily for agricultural activities and urbanisation. This loss of peatlands and other wetlands (swamps, ponds, etc.) has been detrimental to our native biodiversity.

8 www.npws.ie/peatlands-and-turf-cutting (accessed 1 April 2024).

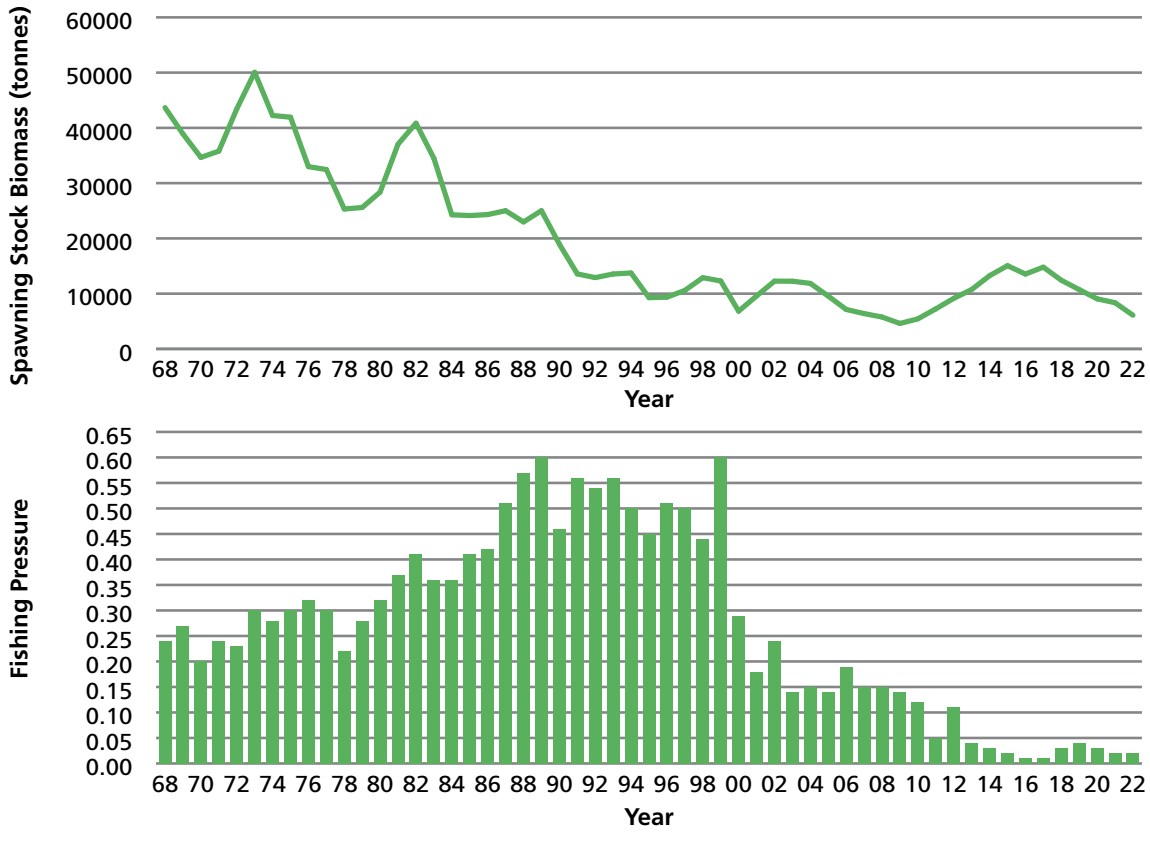
9 www.ipcc.ie (accessed 1 April 2024).

Nevertheless, Ireland still has one of the highest proportions of Europe's remaining intact peatlands and bogs, including a variety of raised and blanket bogs, fens and wet heath. These peatland habitats need to be protected (and where necessary restored) and have potentially immense value for protecting native Irish biodiversity and providing a range of other ecosystem services, such as carbon storage and flood mitigation (DAHG, 2015).

Figure 7.13 Exploited peatland

Over-exploitation of marine fish stocks remains a driver of biodiversity loss in Ireland (Vaughan *et al.*, 2023). Coupled with the effects of climate change, many commercial fish stocks will continue to come under pressure in the future. For example, both herring and cod (Figure 7.14), which are cold-water species and are at the southern limit of their range in Ireland, have seen declines in their spawning stock biomass in recent years, which is directly attributable to over-exploitation in the 1970s, 1980s and 1990s (Vaughan *et al.*, 2023). Over-exploitation can have long-term knock-on effects on both our economy and our livelihoods. Extinction threatens 48 species living in the Irish marine environment, including fish, crustaceans, shellfish and other invertebrates, with over-fishing, alongside accidental by-catch and near-shore pollution, driving many population declines (Fogarty, 2017).

Figure 7.14 The relationship between spawning stock biomass (top) and fishing pressure (bottom) on cod, *Gadus morhua*, in the Irish Sea, 1968-2022. Fishing pressure based on the Vessel Monitoring System



Source: Vaughan *et al.*, 2023

Figure 7.15 Macroalgal bloom in Youghal Bay, Co. Cork, a negative response to high levels of nutrient pollution

Pollution

Clean air is essential for healthy ecosystems. While recent decades have seen significant improvements in air quality in Ireland, air pollution continues to cause damage to both our health and the environment (DECC, 2023). Air pollution in the form of nitrogen deposition continues to affect natural habitats and their plant communities (Aherne *et al.*, 2021), which, in turn, has consequences for associated sensitive species and biodiversity, namely our butterflies, bees, other insects and birds. Air pollution from sulphur deposition, while much reduced, may still contribute to the acidification of soils and water (Chapter 2).

Water pollution in our environment is unfortunately too common, mainly due to nutrient inputs from agriculture and poorly treated waste water (Figure 7.15). For further discussion on this topic, see Chapters 8 and 9. The loss of high-quality unpolluted rivers, lakes and estuaries nationally has consequences for many freshwater species, such as the freshwater pearl mussel, and also for aquatic plants, invertebrates, fish and birds (King *et al.*, 2011, Kelly-Quinn *et al.*, 2020, Stroh *et al.*, 2023). Nutrient pollution in our waters also favours opportunistic invasive species, such as Nuttall's pondweed, allowing them to outcompete and replace our native fauna (see Figure 7.8). Similarly, nutrient pollution, in combination with invasive species, such as the Ponto-Caspian zebra mussel now widespread across Ireland, can result in significant ecological and economic impacts.

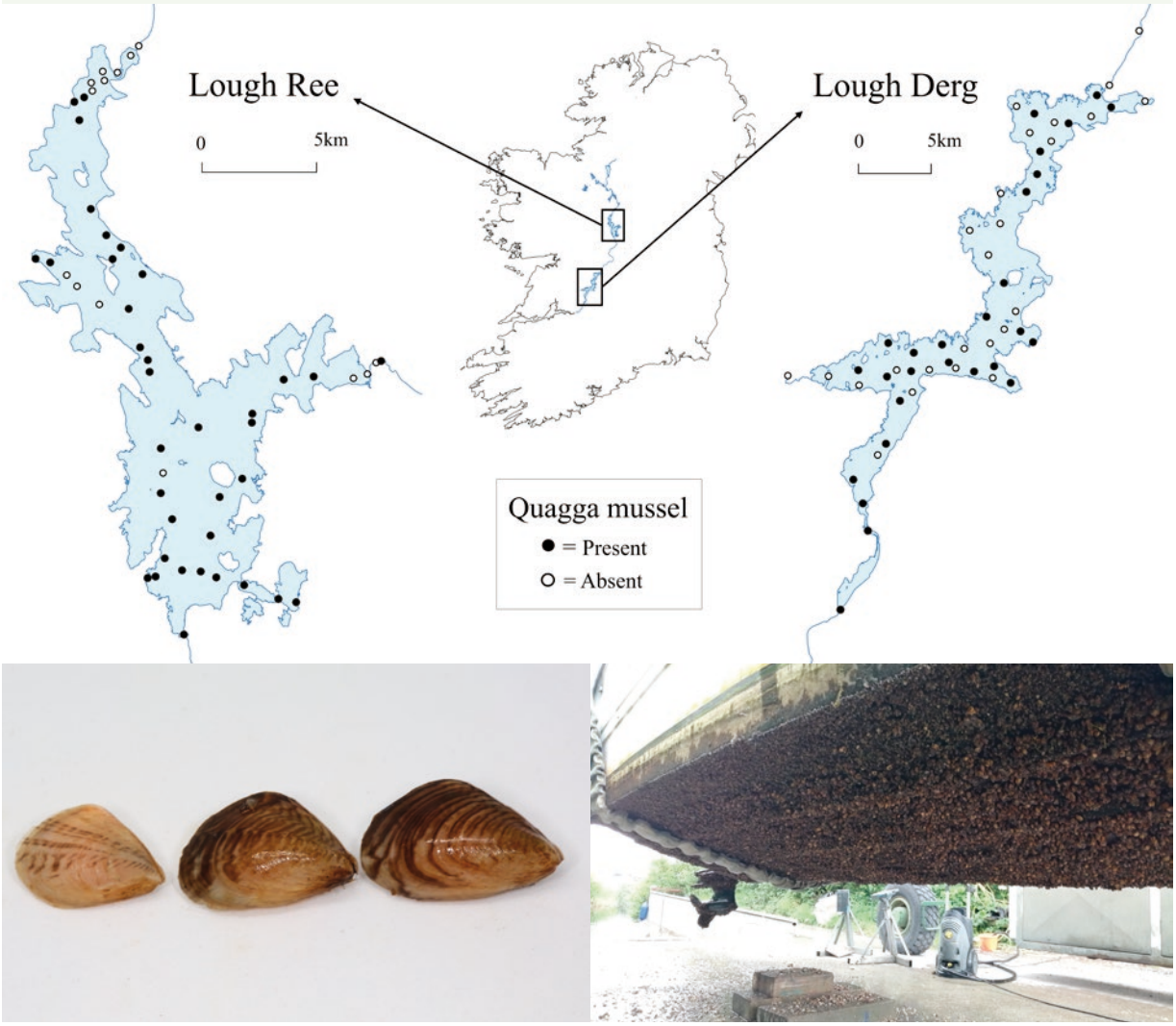
Invasive alien species

Invasive alien species are those that have become problematic after they have been introduced (deliberately or accidentally) to places where they do not occur naturally. Increased trade, human movement, changes in land use and climate change mean that the risk of invasive species arriving, spreading and becoming established in Ireland is high. Non-native species become invasive because they adapt to their new environment easily, outcompeting native species for resources such as food, light or space, and may have little or no predation (e.g. sika deer; Twining *et al.*, 2022).

These invasive species can have a negative impact on the economy, wildlife and habitats and are one of the top five causes of biodiversity loss across the globe (IPBES, 2019). For example, Stroh *et al.* (2023) recently highlighted non-native species as one of the main threats to native plant biodiversity in Ireland. Similarly, invasive species can cause environmental and economic damage – for example, both zebra and quagga mussels[10] can block public and private water abstraction in lakes, increasing operating costs. They attach readily to boats (Figure 7.16) and moorings, causing damage and increasing maintenance costs. Invasive species can also contribute to large ecological disasters; for example, in Lough Neagh in Northern Ireland, the combination of nutrient pollution (from agricultural run-off and sewage), the proliferation of invasive zebra mussel populations across the lake (which filter particles from the water, increasing light penetration) and climate change has resulted in extensive blooms of toxic blue-green algae (The Rivers Trust, 2024). Blue-green algae can release toxins harmful to humans, animals and birds.

10 These species are both originally from the Ponto-Caspian region and are known to cause widespread economic and ecological impacts on affected waters outside the native range.

Figure 7.16 (top) The Shannon River system with Lough Ree and Lough Derg enlarged. Dots show the presence (black) and absence (white) of the invasive quagga mussel (first discovered in Ireland in July 2021) during surveys in 2021 and 2022. The photographs (bottom left) show three quagga mussels and (bottom right) thousands of quagga mussels established on the hull of a boat on the Shannon system – a key dispersal mechanism of this species



Source: Map reproduced from Flynn *et al.*, 2023

Ireland has a long list of invasive non-native species (e.g. zebra mussel, quagga mussel, Asian clam, grey squirrel, Alpine newt, rhododendron, Chinese mitten crab (Figure 7.17) and Pacific oyster), which have all displaced, to varying degrees, naturally occurring species across Ireland, resulting in biodiversity loss and damaged ecosystems.

Figure 7.17 The invasive alien Chinese mitten crab (left) caught in the Barrow estuary. Native white-clawed crayfish (right) from the Slate river, Co. Kildare, a protected species now absent from much of the River Barrow Catchment and whose range in Ireland has declined in recent years because of a lethal contagious fungal-type disease (*Aphanomyces astaci*) originally from North America

Credit: Jan-Robert Baars (UCD)

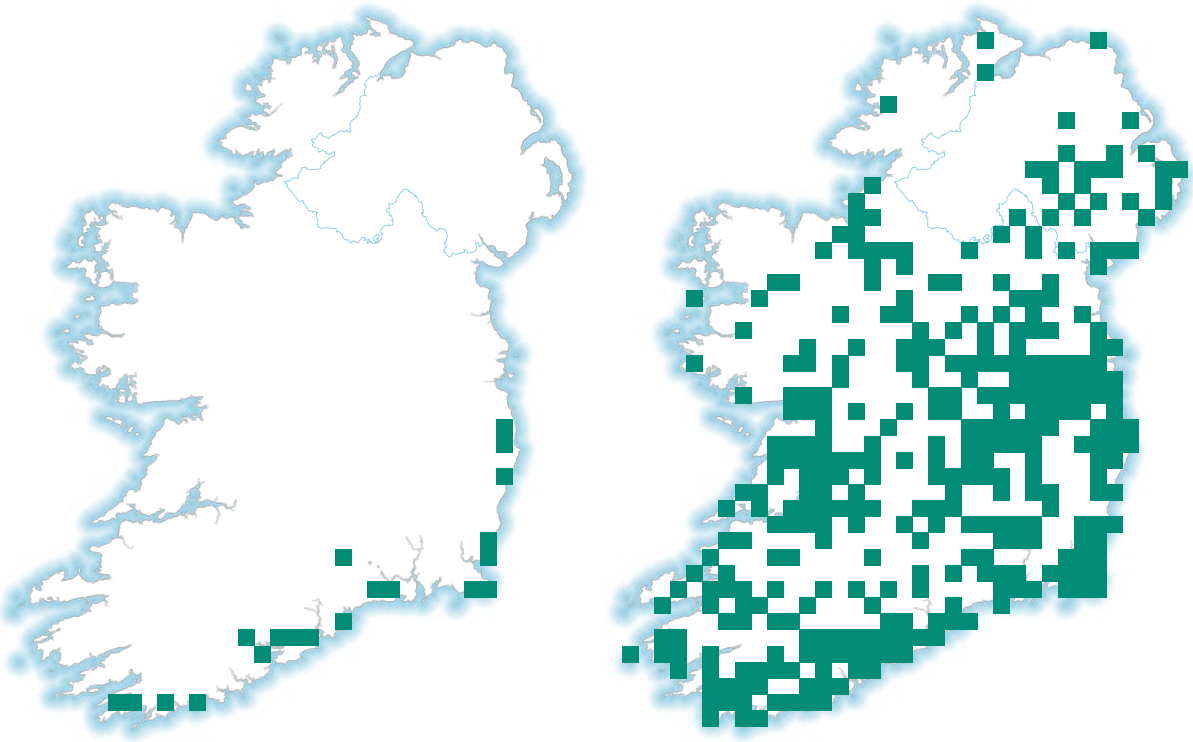
There are also significant economic costs. Kelly *et al.* (2013) estimated that the annual cost of invasive species to Ireland's economy was over €200 million, although this figure has most certainly increased since. IPBES (2023) estimated the annual global cost of invasive species in 2019 as €400 billion. The increased threats of other species becoming established (such as the Asian hornet, coypu and raccoon), and others spreading (like fireblight (*Erwinia amylovora*), a bacterial disease affecting hawthorn) have the potential to further damage Ireland's native species and habitats, resulting in increased economic costs. Despite the EU Regulation on the prevention and management of invasive alien species (Regulation (EU) No 1143/2014), ongoing failures relating to the continued introduction and spread of new invasive species in Ireland (Figure 7.17) highlight issues relating to the lack of enforcement initially and suitable management regimes (i.e. control and/or eradication) thereafter of non-native species and their introductions across the island.

Climate change

The climate and biodiversity emergencies are complicated and interconnected challenges. Biodiversity helps to regulate the climate and protect us from extreme weather and other effects of climate change. However, climate change is recognised as a major driver of change in nature and biodiversity globally (see IPBES, 2019). Changes in climatic conditions (e.g. rainfall patterns, average temperatures, prevalence of storms) in Ireland are likely to drive species change, both positively and negatively, with the geographical range of many of our native species likely to change. Climate change will also further aid the spread of invasive species and the associated negative consequences of native species' decline. It will also increase habitat degradation and fragmentation; increase the intensity, magnitude and frequency of fires, floods, storms and periods of drought; and increase pollution of air, water and soil.

Ireland has already had species (e.g. the winter stonefly, *Capnia atra*) categorised as vulnerable to extinction due to climate change (see Feeley *et al.*, 2020), while other species, such as the emperor dragonfly, have seen significant increases in their distribution across Ireland in recent years (Figure 7.18) as average temperatures rise. Similarly, several studies (see Woodward *et al.*, 2015) have highlighted the significant effect of heavy rainfall, flash flooding and related storm impacts on river biodiversity in Ireland, with the recovery of species often taking years to decades. Globally, the United Nations (UN) estimates that 8-41% of species are at risk of losing half their habitat owing to increasing temperatures, while live coral reefs have nearly halved in the past 150 years and further warming threatens to destroy almost all remaining reefs.[11]

Figure 7.18 The geographical spread of the emperor dragonfly, *Anax imperator*, in Ireland. This species was first recorded here along the south and south-east coast in the period 2000-2003 (left) and has gradually spread north and north-west over the past 20 years (right) due to climate change



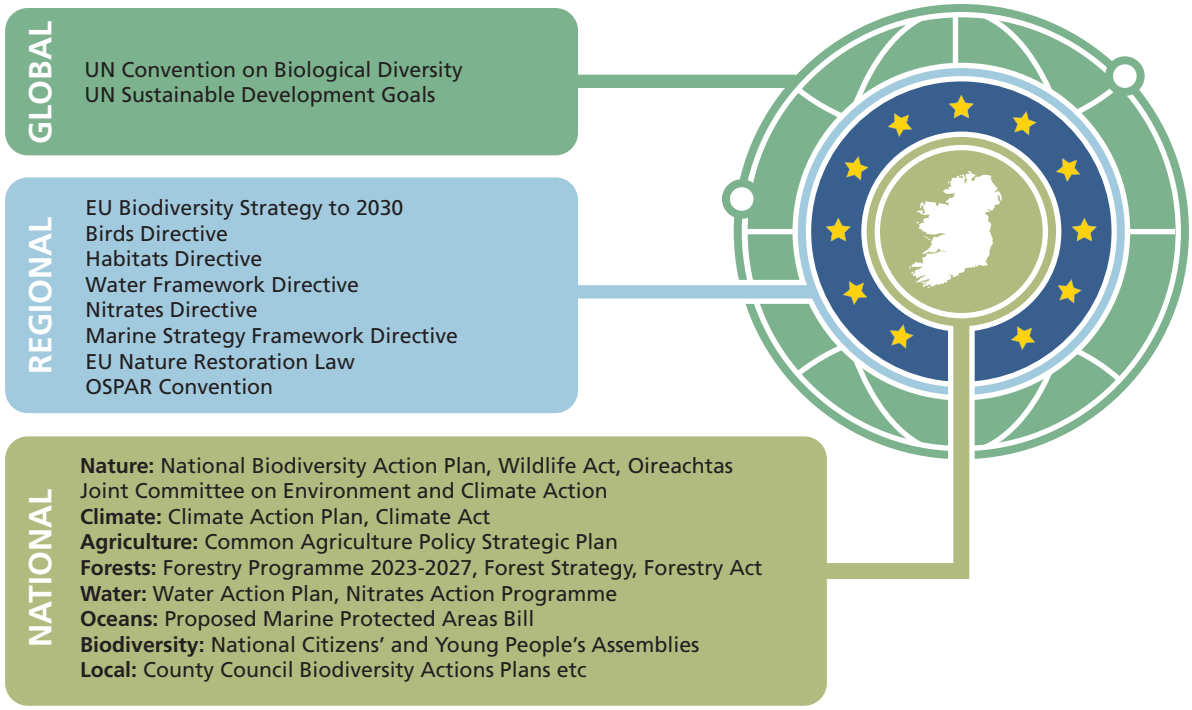
Source: NBDC, 2023; some CEDaR-generated data is included in the maps

11 www.un.org/en/climatechange/science/climate-issues/biodiversity (accessed 2 April 2024).

4. Global and European policies, plans and programmes for nature

Since the Dáil declared a biodiversity emergency in 2019 (Topic Box 7.2), the policy landscape has changed dramatically (Figure 7.19).

Figure 7.19 Environmental policies, plans and programmes that influence biodiversity



Source: Adapted from NPWS, 2024

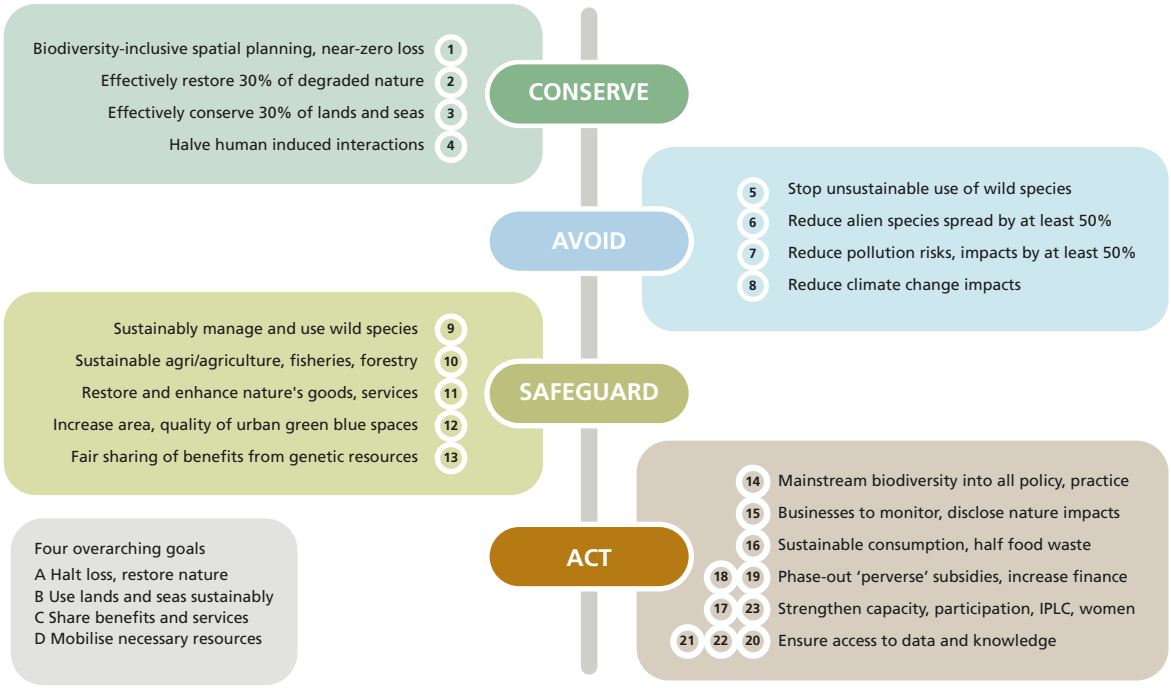
The UN Kunming-Montreal Global Biodiversity Framework

In 2022, the United Nations Biodiversity Conference of the Parties (COP15) to the UN Convention on Biological Diversity (CBD) adopted a landmark agreement to guide global action on nature through to 2030. Known as the Kunming-Montreal Global Biodiversity Framework (GBF), this agreement aims to address biodiversity loss, restore ecosystems and protect indigenous rights. The GBF includes concrete measures to halt and reverse nature loss, including protecting 30% of the planet and restoring 30% of degraded ecosystems by 2030. It also contains proposals to increase finance to developing countries. NPWS (2024) provides more detail on the alignment of government policy and the fourth iteration of the National Biodiversity Action Plan with the GBF targets. The framework contains global goals and targets (Figure 7.20) that aim to protect and restore nature for current and future generations, ensure its sustainable use and encourage investment in a green global economy. Together with the Paris Agreement[12] on climate change and the UN 2030 Agenda for Sustainable Development,[13] the agreement paves the way towards a climate-neutral, nature-positive, resilient world by 2050.

12 unfccc.int/process-and-meetings/the-paris-agreement (accessed 4 April 2024).

13 sdgs.un.org/goals (accessed 4 April 2024).

Figure 7.20 Some of the key global targets of the Kunming-Montreal Global Biodiversity Framework



Source: Adapted from NPWS, 2024

The EU Biodiversity Strategy

The European Green Deal, which aims to make the EU climate neutral by 2050, is supported by policies such as the EU Biodiversity Strategy for 2030 (EC, 2021), the new Common Agricultural Policy Strategic Plan (see Chapter 10) and nationally by the Climate Action Plan, among others (see Chapter 4). The EU Biodiversity Strategy sets out a comprehensive package of commitments and actions to put Europe's biodiversity on the path to recovery by 2030. It addresses the five main drivers of biodiversity loss – changes in land and sea use, over-exploitation, climate change, pollution and invasive alien species – and aims to put in place an enhanced governance framework. As well as taking action to restore and protect biodiversity in Europe it commits to taking EU action to raise the level of ambition for biodiversity worldwide and reduce the impact of trade. In addition, a third river basin management plan cycle and new legislation for marine protected areas (MPAs) are currently in train. These developments are reflected throughout the new (fourth) National Biodiversity Action Plan (NPWS, 2024).

EU Nature Restoration Law

The EU Nature Restoration Law (Regulation (EU) 2024/1991) sets legally binding targets to restore degraded ecosystems, in particular those with the most potential to capture and store carbon, and to prevent and reduce the impact of natural disasters. The law will require all Member States to produce a national restoration plan. This work will be led by the NPWS and will include a public participation process, informed by robust ecological and socio-economic impact assessments (NPWS, 2024).

The proposal contains the following specific targets:

- based on existing legislation (for wetlands, forests, grasslands, rivers and lakes, heath and scrub, rocky habitats and dunes) – improving and re-establishing biodiverse habitats on a large scale and bringing back species populations by improving and enlarging their habitats

- pollinating insects – reversing the decline of pollinator populations by 2030, achieving an increasing trend in pollinator populations, and developing a methodology for regular monitoring of pollinators
- forest ecosystems – achieving increasing trends in the amounts of standing and lying deadwood, the proportion of uneven aged forests, forest connectivity, the abundance of common forest birds and stocks of organic carbon
- urban ecosystems – achieving no net loss of green urban space by 2030 and an increase in the total area covered by green urban space by 2040 and again by 2050
- agricultural ecosystems – increasing populations of grassland butterflies and farmland birds, increasing the stock of organic carbon in cropland mineral soils and the share of agricultural land with high-diversity landscape features, and restoring drained peatlands under agricultural use
- marine ecosystems – restoring marine habitats such as seagrass beds or sediment bottoms that deliver significant benefits, including for climate change mitigation, and restoring the habitats of iconic marine species such as dolphins, porpoises, sharks and seabirds
- river connectivity – identifying and removing barriers that prevent the connectivity of surface waters, so that at least 25,000 km of rivers are restored to a free-flowing state by 2030.

As part of the EU Nature Restoration law, Member States are required to submit National Restoration Plans to the Commission within two years. Ireland's 4th National Biodiversity Action Plan 2024-2030 (NPWS, 2024) commits to the preparation of a National Restoration Plan by 2026 to contribute toward the ambitious EU restoration targets.

Ireland's National Biodiversity Action Plan

Ireland's 4th National Biodiversity Action Plan 2024-2030 was published in January 2024 (NPWS, 2024). The plan is an all-of-government document and sets out the national agenda for protecting and restoring biodiversity for the period 2024-2030. It aims to deliver the transformative changes required in how we value and protect nature with a view to proactively tackling the biodiversity emergency. Key objectives in the plan include:

- adopt a whole-of-government, whole-of-society approach to biodiversity
- meet urgent conservation and restoration needs
- secure nature's contribution to people
- enhance the evidence base for action on biodiversity
- strengthen Ireland's contribution to international biodiversity initiatives.

The objectives are underpinned by 194 actions supported by indicators (NPWS, 2024). The plan also takes account of EU and international biodiversity strategies and policies and relevant national policies. The plan recognises the critical importance of the compilation of a national restoration plan, which will support the ambition of the EU Biodiversity Strategy for 2030 and the restoration targets of the Global Biodiversity Framework. The fourth iteration of the National Biodiversity Action Plan also includes other actions (see NPWS, 2024) to address the recommendations arising from the Citizens' Assembly on Biodiversity Loss (Topic Box 7.2), including increased resources, support for local action, engagement with business and putting the action plan on a statutory footing. NPWS will also explore ways in which the rights of nature could be formally recognised, including the potential for constitutional change (NPWS, 2024).

5. Current action on nature

Clearly, the production of biodiversity actions plans, whether by businesses or on a local, regional, national or international governance level, is a positive step for nature restoration and promotes biodiversity protection. However, action plans must have clear targets and tangible ways of measuring success to evaluate the current state, and change in state, of verifiable data that relate to biodiversity (NBDC, 2021a). In other words, it is important that we start and continue to measure and assess the state of biodiversity. This process should involve the measurement of indicators for appropriate data relating to biodiversity. This includes direct metrics, such as the number of endangered species and habitats, and indirect metrics, such as the number of biodiversity-related policies implemented (NBDC, 2021a), and will provide evidence-based results for reporting on biodiversity change and conservation action and informing conservation policy at national and European levels. Evidence of tangible action and associated outcomes in relation to biodiversity is slowly becoming more evident in Ireland.

A review of the third iteration of the National Biodiversity Action Plan for the period 2017-2021 (BWG, 2023) highlighted progress in implementing actions, aiding a shift in public opinion towards a greater appreciation of biodiversity. For example, efforts to mainstream biodiversity into decision-making and improve expert knowledge of biodiversity across government were deemed successful, and several programmes are ongoing. Large sectoral achievements included the restoration or rehabilitation of 25,000 ha of peatland habitat by Bord na Móna (BWG, 2023) and the publication of Ireland's river basin management plans for 2018-2021 and 2022-2027 (DHLGH, 2024).

The establishment and reporting of the Citizens' Assembly on Biodiversity Loss set an international benchmark for embedding biodiversity into the public consciousness and for society-led recommendations. Several additional positive actions are highlighted below.

Expansion of Ireland's national parks

In addition to the Natura 2000 network and network of NHAs (see Introduction) Ireland has eight national parks:[14] the Burren, Co. Clare; Glenveagh, Co. Donegal; Killarney, Co. Kerry; Wicklow Mountains; Connemara, Co. Galway; Wild Nephin, Co. Mayo, the Boyne Valley (Brú na Bóinne[15]), Co. Meath and Páirc Náisiúnta na Mara, Ciarraí[16] (Kerry Seas National Park). Ireland also has 77 registered nature reserves, most of which are owned by the state, except for a few owned by organisations or private landowners.

All-Ireland Pollinator Plans 2015-2020 and 2021-2025

The All-Ireland Pollinator Plan 2015-2020, managed by the National Biodiversity Data Centre (NBDC), was the first action plan to address the decline of pollinating insects such as bees (see Fitzpatrick *et al.*, 2007). It set out to ensure the sustainability of our food production, avoid additional economic impact on the agricultural sector and protect the health of the environment (NDBC, 2020). Its overarching goals were to collectively take steps to reverse the loss of pollinators by restoring populations to healthy levels. The results of the first All-Ireland Pollinator Plan were extremely positive. It changed the perception of biodiversity conservation from being negative to being seen as an endeavour that can be achieved with positive solutions-based approaches. The pollinator plan engaged communities, businesses and local authorities in proactively managing land for pollinators and, by association, other biodiversity.

A new All-Ireland Pollinator Plan for 2021-2025 (NBDC, 2021b) builds on the success of the first plan. It provides a 5-year road map to help bee and other pollinator populations and our wider biodiversity. It engages with more partners to deliver more actions and focuses on encouraging a better way of managing our whole landscape to permanently support our struggling biodiversity.

14 www.nationalparks.ie/ (accessed 4 April 2024).

15 www.discoverboynevalley.ie/new-national-park-boyne-valley (accessed 4 April 2024).

16 www.nationalparks.ie/kerry-seas/ (accessed 24 April 2024).

EU LIFE projects

The EU LIFE programme 2021-2027 funds environmental, climate and energy objectives. The programme seeks to develop, demonstrate and promote innovative techniques, methods and approaches to reach EU environmental and climate goals. Integrated projects support authorities in EU Member States in implementing environmental and climate plans, programmes and strategies developed at a regional, multi-regional or national level. One of four main themes in the LIFE programme is 'Nature and Biodiversity'.

Some of the Irish nature and biodiversity LIFE projects include Waters of LIFE,[17] the Corncrake LIFE project (below), LIFE on Machair[18], the Wild Atlantic Nature LIFE project and the Kerry Life Freshwater Pearl Mussel project (Topic Box 7.4).

Corncrake LIFE project and Curlew Conservation Programme

Ireland's population of endangered corncrakes has risen by more than one-third in recent years, according to the latest figures provided by the NPWS (2024). These show that the number of breeding territories in 2023 surpassed 200 for the first time in a decade. The increase has been brought about following the introduction of a multi-million-euro conservation investment in 2019, funded by the EU LIFE programme.[19]

Similarly, the Curlew Conservation Programme has reported the largest number of young curlew (Figure 7.21) fledged in the wild since the programme began in 2017 (Harrison *et al.*, 2023). The project is supported by the NPWS and the Department of Agriculture, Food and the Marine (DAFM). It reported that 42 chicks reached fledgling stage in 2023, up from 19 in 2022, representing more than double the number of chicks reaching the stage of being able to fly (Harrison *et al.*, 2023).

Figure 7.21 A curlew chick

Credit: Barry O'Donoghue, NPWS

17 www.watersoflife.ie/ (accessed 4 April 2024).

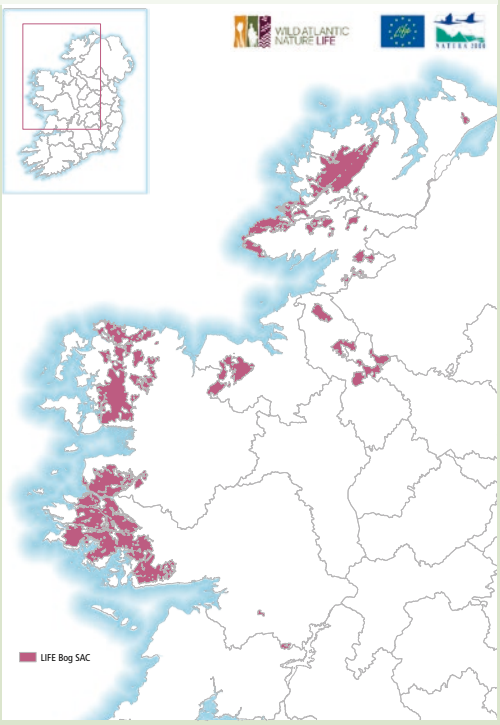
18 www.lifeonmachair.ie/ (accessed 18 April 2024).

19 www.corncrakelife.ie (accessed 4 April 2024).

Topic Box 7.4 Wild Atlantic Nature and Kerry LIFE Freshwater Pearl Mussel projects

The Wild Atlantic Nature LIFE Integrated Project[20] aims to deliver and support the management of high-quality habitats, and to improve the conservation status in the Special Areas of Conservation network of blanket bog, a priority habitat under the Habitats Directive. The primary focus is on 35 Natura 2000 sites in the north-west of Ireland, covering a total area of 262,632 ha (Figure 7.22). Running from 2021 to 2030 and led by the Department of Housing, Local Government and Heritage (DHLGH) with nine other associated beneficiaries, this multidimensional project works with farmers, landowners, local communities, state agencies and others across a broad range of actions spanning sectors including agriculture, forestry, tourism, community development and science.

Figure 7.22 Wild Atlantic Nature LIFE-IP Blanket Bog Special Areas of Conservation within the Northern and Western Regional Assembly



Map adapted from NPWS[21]

The Kerry LIFE Freshwater Pearl Mussel Project[22] team worked closely with farmers and forest owners in the County Kerry river catchments of the Caragh and Blackwater. The project, which ran between 2014 and 2020, initially targeted an area comprising 2500 ha of farmland and 515 ha of forestry (in both public and private ownership) for inclusion. This target was exceeded and covered 5038 ha of farmland and 542 ha of forest. By the project's end, 25 key deliverables and outputs had been achieved. These included an improved river habitat for the protected and endangered freshwater pearl mussel; 5.9 km of river buffer zones created; 76 km of drains re-vegetated; 122 drains blocked; 2.6 km of hedgerow planted; sediment losses reduced; livestock management facilities and livestock drinking facilities enhanced; nutrient inputs on farms across 501 ha reduced; 27 ha of native woodland established; 14.1 ha of existing woodland conserved; and 50.2 ha of conifer plantation converted to long-term native woodland.

20 www.wildatlanticnature.ie (accessed 4 April 2024).

21 LIFE IP Wild Atlantic Nature – Wild Atlantic Nature (accessed 24 April 2024).

22 www.npws.ie/research-projects/kerrylife (accessed 4 April 2024).

European Innovation Partnerships

European Innovation Partnerships bring together relevant parties at the EU, national and regional levels to streamline, simplify and better coordinate existing financial instruments and initiatives. Managed by the DAFM in Ireland, European Innovation Partnerships focus on challenges that can benefit society and modernise sectors and markets. They allow farmers, scientists and other experts to collaborate to develop new practices that are environmentally friendly and economically sustainable. Projects focusing on protecting wildlife and biodiversity include:

- BRIDE – Biodiversity Regeneration in a Dairying Environment[23]
- a locally led scheme for the conservation of the hen harrier[24]
- Protecting Farmland Pollinators[25]
- a project on the conservation of breeding curlew in Ireland[26]
- Pearl Mussel Project.[27]

Local authority biodiversity officer programme

Local authority biodiversity officers work at city and county levels collecting data on biodiversity, carrying out conservation projects, developing policies, providing advice and information, and raising awareness. Their role is diverse and is defined by individual local authority preferences, but with a core focus on strategic planning and collaboration on biodiversity and nature. For example, Fingal Council County published 100 actions[28] associated with five broad objectives (Figure 7.23). The programme is being delivered by the Heritage Council and the County and City Management Association, with support from the DHLGH and the NPWS.

Figure 7.23 Objectives of Fingal Biodiversity Action Plan

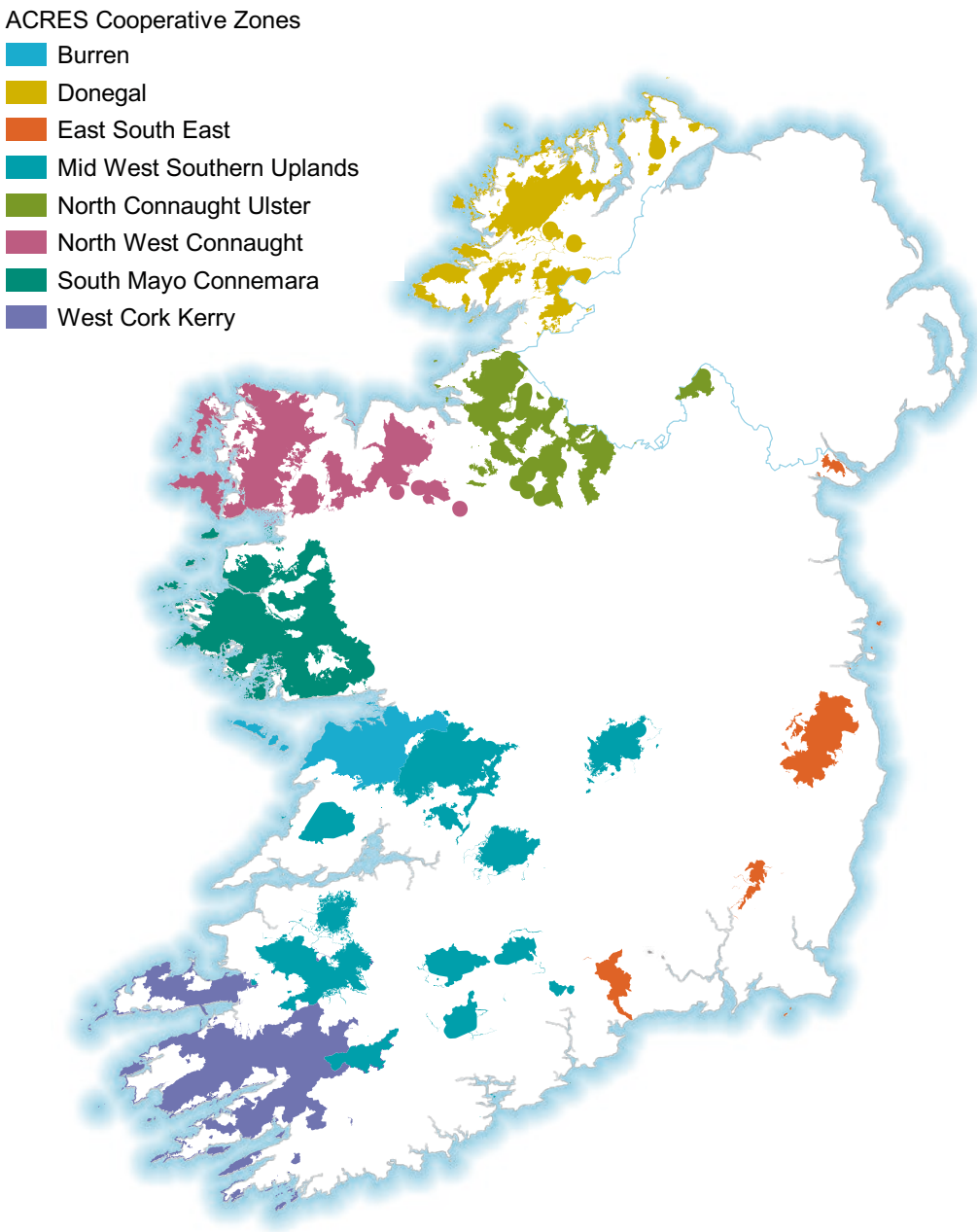
Source: Fingal County Council, 2023

23 www.thebrideproject.ie (accessed 4 April 2024).
24 www.henharrierproject.ie (accessed 4 April 2024).
25 biodiversityireland.ie/projects/protecting-farmland-pollinators (accessed 4 April 2024).
26 birdwatchireland.ie/our-work/species-habitat-conservation/countryside-wetlands/curlew-eip (accessed 4 April 2024).
27 www.pearlmusselproject.ie (accessed 4 April 2024).
28 www.fingal.ie/sites/default/files/2023-12/Fingal%20Biodiversity%20Action%20Plan%202023-2030.pdf (accessed 9 September 2024).

Agri-Climate Rural Environment Scheme

The €1.5 billion Agri-Climate Rural Environment Scheme (ACRES) programme[29] came into effect in January 2023 and is now the flagship agri-environmental scheme in use across Ireland, available to farmers in eight cooperation zones (Figure 7.24).

Figure 7.24 The eight ACRES cooperation zones



Adapted from DAFM[30]

29 www.gov.ie/dafm (accessed 4 April 2024).

30 gov – Agri-Climate Rural Environment Scheme (ACRES) (www.gov.ie) (accessed 24 April 2024).

These zones are targeted specifically at high-nature-value farmland dominated by semi-natural vegetation, Natura 2000 sites and priority water catchments with high water quality. ACRES incorporates landscape and catchment considerations into a results-based agri-environmental approach for these zones. The cooperation project teams are fully funded by the DAFM, ensuring no cost to the farmer and delivering income support for up to 50,000 farm families. The scheme uses results-based incentives through measurable on-farm actions (e.g. planting trees and hedgerows, establishing winter food crops for birds, and creating and enhancing riparian buffer strips along streams and rivers) to address biodiversity decline while also supporting farm families.

Peatlands Climate Action Scheme

The Peatlands Climate Action Scheme[31] (also known as the Enhanced Decommissioning Restoration and Rehabilitation Scheme, or EDRSS) encompasses the restoration and rehabilitation of approximately 33,000 ha of Bord na Móna peatlands that were previously harvested to generate electricity. Through the project, and the associated Peatlands and People LIFE Project[32], Bord na Móna is reassigning employees from harvesting operations into rehabilitation to support the natural environment and biodiversity of the peatlands. To date, approximately 17,000 ha have been rehabilitated across 54 bogs. The scheme is funded by €108 million from the EU National Recovery and Resilience Plan, administered by the Department of the Environment, Climate and Communications, regulated by the NPWS and operated by Bord na Móna.

Business for Biodiversity Ireland

Launched in 2022, the Business for Biodiversity Ireland platform[33] is a not-for-profit organisation established to guide and educate Irish businesses about their impacts on the natural world and enable them to assess their impacts and dependencies on nature by developing meaningful biodiversity strategies. Some of the services offered by the platform include increasing understanding of biodiversity through educational webinars, facilitating networking and collaboration among participating companies, educating member companies about national policy on biodiversity and identifying nature-based solutions to address climate change and biodiversity loss.

National Biodiversity Data Centre

In December 2022, the NBDC[34] was established as a company limited by guarantee by the government, placing it on a more secure footing. The NBDC, first established in 2007, has been at the forefront of many positive initiatives in relation to biodiversity in Ireland for 17 years. The centre has a wide remit, primarily collating and making data publicly available, but also producing informative and educational resources. This enables the NBDC to support national initiatives to maintain and enhance biodiversity, including recording species associated with Ireland's terrestrial, freshwater, marine, river and wetland environments. The NBDC currently manages nearly 6.5 million records of nearly 18,000 different species across 177 different data sets.[35] Citizen science and conservation initiatives coordinated by the NBDC include structured monitoring schemes such as the National Pollinator Monitoring Scheme, the Butterfly and Bumblebee Monitoring Schemes, Dragonfly Ireland 2019-2024, Explore Your Shore! and Rare Plant Monitoring Scheme.

Forestry Programme

Ireland's Shared National Vision for Trees, Woods and Forests until 2050 calls for the right trees in the right places for the right reasons with the right management. Ireland's Forest Strategy to 2030 describes how the 2050 vision will be made a reality, and the Forestry Programme 2023-2027 is the first step in implementing the vision. The Forestry Programme has been designed to make a significant contribution to Ireland's biodiversity objectives. The programme will facilitate the creation of new forest habitats at scale, with generous incentives for farmers and public bodies to plant mixed native woodlands on suitable land, and also 20-year payments for farmers to retain and promote emergent woodland on their land. For existing forest owners, measures under the Forestry Programme such as the Native Woodland Conservation Scheme, the Woodland Improvement Scheme and other sustainable forest management practices will be invaluable in protecting and enhancing biodiversity across our landscape.[36]

31 www.bnmpcas.ie (accessed 4 April 2024).
32 peatlandsandpeople.ie (accessed 17 September 2024).
33 businessforbiodiversity.ie (accessed 4 April 2024).
34 biodiversityireland.ie (accessed 4 April 2024).
35 maps.biodiversityireland.ie/ (accessed 10 April 2024).
36 www.gov.ie/dafm (accessed 4 April 2024).

6. Conclusions

The challenges of protecting the wide diversity of Ireland's habitats and species are now more serious than ever. The quality of natural habitats and the species they support are declining, both globally and nationally. These challenges are serious and, while they are not new, they are unprecedented. Valuing and protecting our natural environment were identified as key challenges in the 2012, 2016 and 2020 State of the Environment reports. Clearly, continuing with a 'business-as-usual approach' will mean that nature and our wild places will continue to fragment, and biodiversity will continue to decline.

The global assessment of biodiversity and ecosystem services undertaken by IPBES (2019) found that human actions are threatening more species with global extinction now than ever before. The report asserted that transformative global changes in human society are needed. Despite the numerous positive initiatives outlined above, trends in nature and biodiversity loss in Ireland are, for the most part, going in the wrong direction. To change the current unsustainable path will require greater consideration of biodiversity at every step of development and in sectoral plans and policies – a whole-of-government, whole-of-society approach to managing and protecting biodiversity. It will require detailed consideration of the national governance structures in place to protect biodiversity. It will also entail assessing the level of government funding required to stop and reverse the loss of biodiversity and habitats and to enhance, protect (via enforcement, where necessary) and adequately manage our natural environment.

Implementing the actions, plans and recommendations outlined in the fourth iteration of the National Biodiversity Action Plan (NPWS, 2024), reports from the Citizens' Assembly on Biodiversity Loss (Citizens' Assembly, 2023), the Joint Committee on Environment and Climate Action (JCECA, 2023), and the EU Nature Restoration Law will be very positive steps. The successful implementation of these actions, plans and recommendations will be critical in reversing the trends in biodiversity loss across Ireland and in driving nature restoration. Implementation will also result in additional positive effects, providing improvements in water quality (see Chapter 8) and the marine environment (see Chapter 9) and in mitigating the impacts of climate change (see Chapter 4). Although some of the actions have come a long way, particularly relating to agricultural policy, business engagement and the expansion of NPWS, previous iterations of the National Biodiversity Action Plan used similar language to the current (fourth) version and set many of the same, or similar, high-level targets. To see tangible and measurable improvements in nature across Ireland, the actions and plans outlined in the action plan must be resourced and implemented and their performance monitored and reported on. Much of the responsibility for the actions set out in the fourth National Biodiversity Action Plan (NPWS, 2024) primarily fall under the remit of the DHLGH, while DAFM has a considerable number of actions; nevertheless, it is essential that the alignment of policy, action and results across government are coordinated or they may be more difficult to achieve. Ultimately, embedding biodiversity and nature at the heart of policies that are aligned across sectors, such as agriculture, water, planning and so forth, will ensure that nature is considered at all levels across society. Significant positive results can be achieved where investment, science and local communities are used to drive positive action on the ground. The success of the Corncrake LIFE project, for example, indicates that nature can recover when aided by appropriate action and conservation measures.

Key chapter messages

1. The Irish landscape is heavily modified by humans. Many of the few remaining natural and semi-natural habitats are in a poor or bad state. Research in Ireland highlights that 85% of our protected habitats and almost one-third of our protected species of flora and fauna are in unfavourable status, over half our native plant species are in decline and more than 50 bird species are of high conservation concern. The leading causes of these declines are changes in agricultural practices, including intensification; pollution; the increasing spread of invasive species; and our changing climate.

2. Our natural habitats and biodiversity have been squeezed to the margins of our landscape and policies, while food production and economic development have been prioritised. However, nature underpins our food production, food security and economic development. We risk our future if we continue to marginalise nature, and its protection, and fail to deliver adequate, achievable, impactful, evidence-based and coordinated action to protect and restore it.

3. Biodiversity loss affects everyone. It is essential that nature protection, enforcement, management and restoration are mainstreamed across government, social and economic sectors and are fully considered at all levels of national, regional and local decision-making.

4. Nature can recover if given the opportunity. For example, Ireland's corncrake population has risen by more than 35% in recent years, reflecting the outcome of a multi-million euro conservation investment that began in 2019. Positive actions to halt declines and to restore the key elements of our natural world must be implemented.

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