



Office for  
**Environmental  
Protection**

**Drivers and pressures affecting terrestrial  
and freshwater biodiversity in  
Northern Ireland: Summary of call for  
evidence responses**

**15 November 2024**

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## 1. Introduction

This report summarises the evidence on drivers and pressures affecting biodiversity submitted through the Office for Environmental Protection's (OEP) call for evidence (CFE).<sup>1</sup> This report does not represent the opinion of the OEP, rather it sets out the evidence we received and used to inform the work within our report: [Drivers and pressures affecting terrestrial and freshwater biodiversity in Northern Ireland](#). The methodology used and our assess responses is detailed within the report 'Drivers and Pressures Affecting Biodiversity in Northern Ireland' available on our website.

Evidence described within this report is organised on a spatial scale, and with reference to the questions included within the CFE (Box 1). The following sections describe the drivers and pressures identified at a global, United Kingdom (UK), and then a Northern Ireland (NI) scale. Within each section the drivers and pressures are presented in order of the frequency with which stakeholders cited them. Subjects that were most frequently discussed and evidenced appear first. This ordering is not intended to reflect the scale of impact. Evidence of the drivers and pressures presented within the following sections only includes that which has been submitted through our CFE, and as such is not exhaustive.

**Box 1: Questions included in the Call for Evidence (CFE) on the drivers and pressures affecting biodiversity in Northern Ireland.**

1. What are the key drivers and pressures affecting biodiversity in Northern Ireland? What evidence is available to demonstrate these affects?
  - a. Over what time period (short, medium, long term) and spatial area do these pressures and drivers have their affects?
2. What are the cumulative and synergistic relationships between drivers, pressures, and their affects?
3. How should drivers and pressures be prioritised? What evidence supports any such prioritisation?
4. What actions are needed to reverse the decline in biodiversity, for example land use and land use change? What are the trade-offs that need to be taken into consideration?
5. What are the barriers and opportunities to address pressures and drivers through governance and mitigation strategies? What evidence supports these?
6. What are the transboundary drivers and pressures impacting biodiversity in Northern Ireland?

## 2. Drivers and pressures affecting global biodiversity

Submissions to our CFE emphasised the need to understand biodiversity loss as a global crisis. Global scale drivers, pressures and impacts therefore provide the context in which the questions within our CFE should be understood. Responses further stated this context was necessary due to NI's international material footprint,<sup>i</sup> and commitment to international conventions including on biodiversity.<sup>3</sup> Reports including the Global Biodiversity Outlook 5,<sup>4</sup> and the Global Assessment Report on Biodiversity and Ecosystem Services<sup>5</sup> evidence the status and trends of biodiversity. These reports show that insufficient progress has been made in implementing global targets for biodiversity.<sup>4</sup> Multiple drivers and pressures are identified through these assessments of causing widespread decline in species and habitats, inhibiting ecosystem functioning, and undermining human wellbeing. Specific indicators of the global decline of biodiversity include:

- 75% of the global land surface has been significantly altered by human activities.<sup>5</sup>
- Over 85% of wetland area has been lost.<sup>5</sup>
- 32 million hectares of primary or recovering forest were lost between 2010 and 2015.<sup>5</sup>
- Species abundance in most major terrestrial biomes has fallen 20%, most of which has occurred since 1900.<sup>5</sup>
- Vertebrate and insect populations have declined over the last 50 years.<sup>5</sup>
- ~ 25% of species are threatened, suggesting that around 1 million species already face extinction, many within decades.<sup>5</sup>
- The current global rate of species extinction is at least tens to hundreds of times higher than natural levels.<sup>5</sup>

Trends of biodiversity decline have accelerated over the past 50 years (**Error! Reference source not found.**)<sup>5</sup> Global assessments demonstrate that since 1970 global agricultural production, fishing, and extraction of materials has increased, which has led to significant losses of biodiversity.<sup>5</sup> The rate of loss varies amongst regions and countries. For example, Latin America and the Caribbean, Africa, and Asia and the Pacific have experienced significant losses since 1970. Comparably the rate of loss in North America, and Europe and Central Asia was more significant pre-1970, driven largely by the industrial revolution.<sup>5</sup> Global assessments have concluded that these trends of biodiversity are caused by several drivers and pressures affecting biodiversity. These are summarised below.

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<sup>i</sup> Material footprint relates to the domestic and foreign extraction of raw materials to produce products. The reduction of material footprints – including reducing material production, consumption and waste per capita – is essential to achieve biodiversity targets.<sup>2</sup>

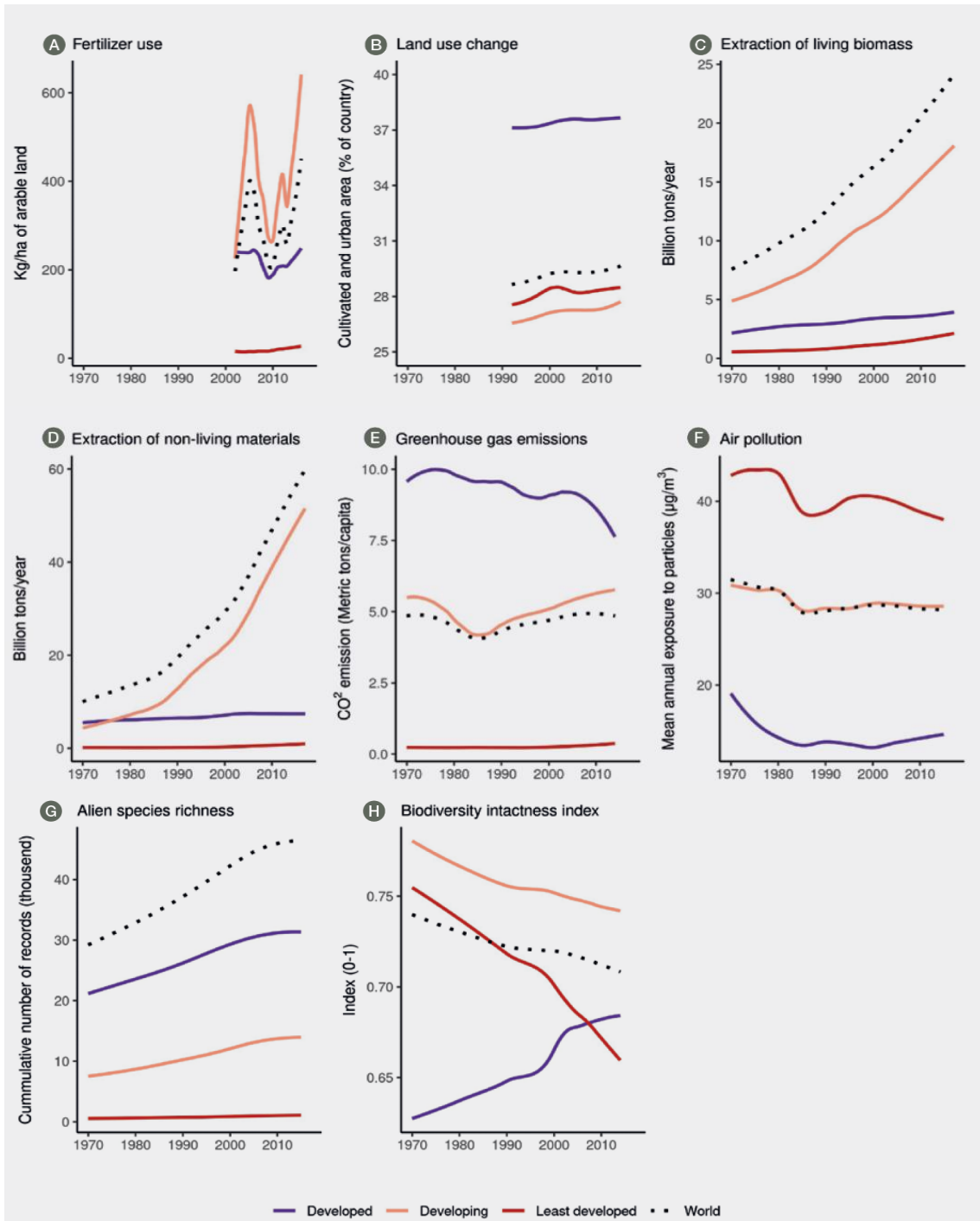


Figure 1 Temporal trends for selected indicators of actions and direct drivers (Source: IPBES, 2019, p91)

## 2.1. Global drivers

Submissions to our CFE identified two drives affecting biodiversity.

- **Global governance – conventions and agreements:** were identified as a positive driver that could benefit biodiversity. Agreements such as the recent Kunming-Montreal Global Biodiversity Framework (GBF) stemming from the Convention on Biological Diversity (CBD) sets targets and goals with the vision of a world living in harmony with nature by 2050.<sup>6</sup> Signatory countries to the CBD must translate these goals and targets into national implementation plans, a matter considered further in section 4. However assessments of progress demonstrate a collective failure of countries to achieve international targets.<sup>4</sup> Submissions to our call also highlighted that whilst international agreements should act as a positive driver, implementation by the UK<sup>7,8</sup> and NI<sup>9,10</sup> has largely been ineffective. This is considered further in sections 3 and 4.
- **Production and consumption patterns - material footprints:** the decoupling of production and consumption (where a product is produced in one country and consumed in another) is driving global biodiversity loss. This offshoring of resource demands disproportionately impacts biodiversity in developing nations. The UK is ranked 5<sup>th</sup> in the world in terms of exporting its biodiversity pressure footprint to other countries (Figure 2).<sup>5</sup> Responses highlighted the effect of unsustainable material consumption within NI as driving losses globally.

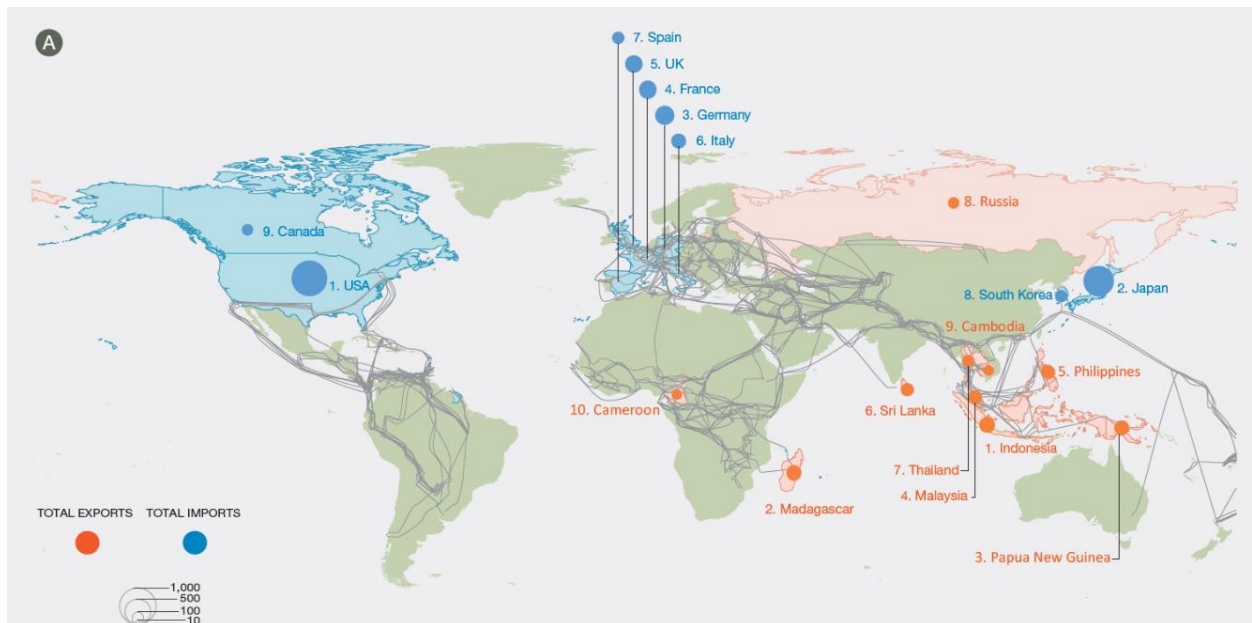


Figure 2 Biodiversity footprint showing top ten exporting countries associated with pressures on biodiversity in developing economies and top ten importing countries with respect to pressures on biodiversity (developed and emerging economies); thicker arrows indicate a larger number of threatened species associated with bilateral trade flow. (Source: IPBES 2019, p.89)

The IPBES global assessment<sup>5</sup> identifies other drivers of biodiversity loss including:

- **Societal values relating to nature:** this affects the policies, norms, and technologies that determine people's interactions with nature. These values can, and are, evolving rapidly across the globe, catalysed by issues (and pressures) including globalisation, climate change, and population migration.
- **Demographics:** the world's population has doubled, and aged over the last 50 years, with trends varying globally. Demographic changes such as migration, and human capital (i.e. education, health, skills), are linked to pressures including increasing economic growth, urbanisation, responses to conflict, and climate change.
- **Technological innovations:** includes the loss of traditional practices, sectoral transition (e.g. agricultural intensification, biomass energy), changes and trade-offs within urban areas and industry.
- **Economics:** structural shifts (i.e. from agriculture towards industry and services) and rates of material consumption, affect nature. Wider economic aspects including wealth concentration (within countries or companies), goods and material flows, financial flows, and tax havens also drive changes in



biodiversity. For example 30% of threatened species and 32% of the consumption of water in water scarce regions are linked to international trade.<sup>5</sup>

- **Governance – market interactions:** including certification schemes covering a wide range of products including timber, fish, palm oil, and tourism can drive positive affects by distinguishing illegally produced, and environmentally damaging goods. Inappropriate or ineffective schemes can negatively affect biodiversity or people's consumption.
- **Governance – local community coordination:** the ownership or responsibility for lands, such as by local communities through commons can create benefits for biodiversity (e.g. historic knowledge, rights of nature). Such systems are however, vulnerable to exploitation.
- **Governance – government:** including approaches to property rights and resource use rights, investment in transportation, fossil fuel subsidies, growth of conservation policies, payments for ecosystem services and other positive incentives, equity considerations (e.g. wealth, race), taxes and wider policy responses have variable impacts on biodiversity.

## 2.2. Global pressures

Submissions to our call drew attention to global scale. In order of impact, with the most impactful first, these include changes in land and sea use change; direct exploitation of organisms; climate change; pollution; and invasion of alien species.<sup>5</sup> In the context of our terrestrial and freshwater focus, these pressures are described by IPBES as:<sup>5</sup>

- **Land use change:**  
Since 1970 land use change has had the largest relative negative impact on nature. Whilst land use encompasses many aspects such as urbanisation through which urban areas have doubled in size since 1992, agricultural expansion is the most impactful for both terrestrial and freshwater ecosystems. One third of the global terrestrial land surface is being used for cropping or animal husbandry.<sup>5</sup>
- **Resource exploitation:**  
Mainly via harvesting, extraction, logging, hunting, fishing of species and ecosystems is the second most impactful pressure on both terrestrial and freshwater ecosystems.<sup>5</sup>
- **Climate change:**  
The global average temperature for 2023 was 1.46 °C above the pre-industrial baseline, driving increases in the frequency and intensity of extreme weather events and a rise in the global average sea level. These changes impact

biodiversity, including species distribution, phenology, population dynamics, community structure and ecosystem function. Climate change is a compounding pressure, exacerbating negative impacts on biodiversity when other pressures are considered.<sup>5</sup>

- **Pollution:**

Atmospheric, water, and land-based pollution are negatively impacting biodiversity. The source of such pollution includes urban and rural waste, industry, mining and agricultural activities, oil spills, and toxic dumping.

- **Invasive species:**

Since 1980, records of invasive species, including pathogens, have increased by 40%. Nearly one fifth of the Earth's surface is now at risk of plant and animal invasions, negatively affecting biodiversity including the extinction of species.<sup>5</sup> Invasive species can also negatively impact human health and the economy.<sup>5</sup> The movement and introduction of species beyond their natural range has been caused by travel, trade, tourism associated with globalisation, and human population growth.<sup>11</sup> The introduction and establishment of invasive species is exacerbated by climate change.<sup>5</sup>

### 2.3. Cumulative and synergistic global drivers and pressures

Drivers and pressures do not exist in isolation. Global assessments demonstrate the complex relationship between drivers and pressures.<sup>5</sup> For example, land use change, in combination with urbanisation – both through infrastructure development, and indirect spatial demands e.g. energy – have negatively impacted forests, wetlands, and grassland.<sup>5</sup> Similarly, in freshwater ecosystems, the combination of land use change (e.g. water extraction), pollution, climate change, and invasive species are causing harm across the globe.<sup>5</sup> Collectively these pressures are negatively affecting species and habitat abundance, and distribution, genetic diversity, and undermining ecosystem functioning.<sup>4,5</sup>

### 3. Drivers and pressures affecting the UK's biodiversity

Submissions to our call highlighted the loss and degraded state of biodiversity across the UK. Several assessments including the State of Nature<sup>12</sup>, State of UK Butterflies,<sup>13</sup> State of Britain's Larger Moths,<sup>14</sup> the Plant Atlas,<sup>15</sup> and Article 17 Habitat reports<sup>16</sup> evidence the widespread decline in the UK's biodiversity. Specific trends and indicators that demonstrate this include:

- The UK ranks 12<sup>th</sup> worst in the world for the amount of nature left.<sup>17,18</sup>
- 16% of species are threatened with extinction in Great Britain (GB).<sup>12</sup>
- The distribution of invertebrates have on average decreased by 13% across the UK since 1970.<sup>12</sup>
- The abundance of terrestrial and freshwater species have on average declined by 19% across the UK since 1970.<sup>12</sup>
- The population of moths decreased by 33% across GB in last 50 years.<sup>14</sup>
- The range of native plants has decreased by 53% across GB since the 1950s.<sup>15</sup>
- 80% of butterflies have declined across the UK since 1970.<sup>13</sup>
- Upland priority habitats such as blanket bog and wet heath are largely in unfavourable condition across the UK.<sup>16</sup>

#### 3.1. UK drivers

Just one UK-wide driver was identified through responses.

- **Governance – translating international commitments:**  
The UK is a signatory to several international frameworks and agreements for biodiversity including the CBD GBF. Submissions described the GBF as a positive driver of change, but noted that assessment of the UK's implementation of previous global targets suggests a collective failure.<sup>8</sup>

#### 3.2. UK pressures

Evidence identified through submissions explains various pressures at the UK-scale. The 2011 National Ecosystem Assessment<sup>19</sup> states that since the 1940s, pressures including habitat change, pollution and nutrient enrichment were the most significant, with overexploitation or resources, climatic change, and invasive species impacting but to a lesser extent. More recent assessments indicate that land use and land use change, specifically agricultural management of land, and climate change are the most significant pressures since 1970 (Figure 3).<sup>20</sup> Pollution, invasive species, and resource exploitation are also affecting the UK's biodiversity but less significantly.<sup>12-15</sup> The relationship between these pressures is again complex, whilst they are summarised individually below they rarely act individually. For example, the various aspects of climate change interact and exacerbate the impacts of other pressures.<sup>20</sup>

- **Land use change:** the intensive management of agricultural land including through the damage, loss, and conversion of seminatural habitats, is the foremost driver of biodiversity decline in the UK since 1970.<sup>20</sup> These changes have led to a loss of plant species across several habitats (e.g. grassland and heathland), and food sources associated with arable crops (e.g. winter stubble). Other land use pressures include urbanisation, hydrological change (e.g. land drainage), and forest management (e.g. afforestation, deforestation).
- **Climate change:** through changing climatic conditions (e.g. change in rainfall, extreme weather events) and sea level change are causing species range shifts, population changes, and food web disruption.<sup>12-15</sup> The impact of climate change is mixed, it can be both deleterious and positive. The determination of impact is made more complicated by interactions with other pressures.<sup>12</sup>
- **Pollution:** including air, water, and waste negatively affects biodiversity.<sup>12</sup> Whilst levels of some air pollution have declined substantially since 1970, ammonia, pesticides, herbicides, and fertilisers impact species, habitats, and ecosystem functioning across the UK.<sup>12,20</sup> The condition of freshwater ecosystems remains poor, and levels of plastic pollution harm biodiversity.<sup>12</sup> Noise and light pollution have also been demonstrated as harming species, including through behavioural changes.<sup>13,14</sup>
- **Invasive species:** introductions, exacerbated by climate change have increased in the last decade and been increasing since 1970.<sup>12,15</sup> Invasive species are disrupting ecosystem functioning and outcompeting native species.<sup>12,15</sup>
- **Resource exploitation:** evidence suggests that overexploitation is more significant in the marine environment when compared to terrestrial and freshwater environments across the UK.<sup>12</sup> On land, the impact of resource exploitation is variable. For example, whilst increasing recreation can lead to disturbance or destruction of biodiversity,<sup>12,15</sup> increasing plantation forest area can create positive impacts.<sup>20</sup>

UK assessments have also identified emerging drivers and pressures.<sup>12</sup> These include transitioning to renewable energy through spatial demand, wildlife disease including bird flu (avian influenza), and funding for conservation which has faced declines in absolute terms and as a percentage of gross domestic product. Submissions to our call, therefore, demonstrate the need to consider the predicted impact of future pressures.

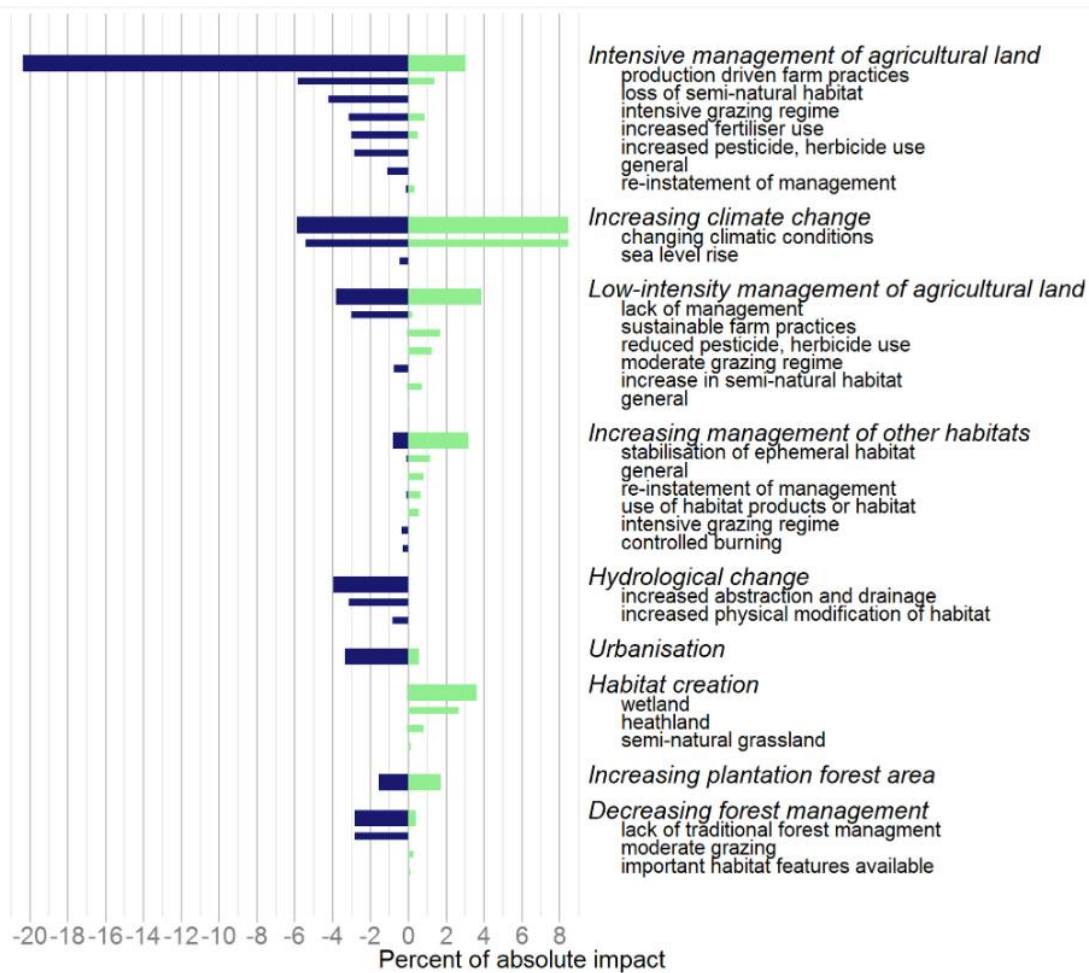


Figure 3 The most important broad drivers of species’ population changes, 1970–2012, showing constituent specific drivers. (Source: Burns et al., 2016)

Positive (green) and negative (blue) impact for each broad driver of change accounting for three percent or more of the total in absolute terms, ordered by absolute impact. Specific drivers (narrow bars) are listed under their associated broad driver (broad bars, italicised text); the impact of specific drivers sum to the total for the broad driver in each case. Results are presented using all strengths of evidence available and weighting species in the three major taxonomic groups equally (insects, plants and vertebrates).<sup>20</sup>

#### 4. Drivers and pressures affecting Northern Ireland's biodiversity

Biodiversity across NI is declining in both extent and abundance.<sup>21</sup> Evidence, submitted via our CFE, demonstrates both historic and current decline. Headline facts from official reports, peer-reviewed literature, and wider research submitted through the CFE include:

- No rivers, lakes or coastal transitional waters achieved good or high status when last assessed. 68% of groundwaters achieved good status.<sup>22</sup>
- 10% of the UK's peatland resource is found in NI, but only 15% of this is in good condition.<sup>23</sup> Only 5% of protected bog sites and only 14% of protected heath sites are favourable condition.<sup>23</sup>
- Out of the UK countries, NI has the greatest percentage, of nitrogen sensitive habitats exceeding critical ammonia levels for both lower and higher plants.<sup>24</sup> This includes but it not limited to the protected area network, in which all Special Areas of Conservation (SACs) and Special Protection Areas (SPA) along with 99.7% of Areas of Special Scientific Interest (ASSI) having ammonia concentrations greater than the critical level for damage.<sup>25</sup>
- Just 55% of features in marine and terrestrial protected sites are in favourable condition, and 36% were unfavourable.<sup>23</sup>
- NI has lost 50% of its nature, and now ranks 12<sup>th</sup> worst in the world for the amount left.<sup>17</sup>
- 12% of species in NI are at risk or threatened with extinction from the island of Ireland.<sup>21</sup>
- Since 1999 the number of bird species at risk of extinction has tripled from 18 to 54, representing 25.6% of regularly occurring birds.<sup>26</sup>
- Multi-species indicators for NI's butterflies show decreases of 17% in abundance (2006-2019) and 10% in distribution (1993-2019).<sup>13</sup>
- Farmland bird abundance has fallen by 43%.<sup>21</sup>
- 30% decline in wintering waterbird abundance.<sup>21</sup>
- An average decline of 54% in bryophyte species distributions.<sup>21</sup>
- Distribution of flowering plants have reduced by 14%.<sup>21</sup>
- Invertebrate species have, on average, increased in distribution by 24%.<sup>21</sup>

Such reports also point to indicators of the socio-economic value of biodiversity to NI. For example, pollination related to apple production in NI alone is worth £7 million a year<sup>27</sup> and population declines of pollinators threatens food production.<sup>28</sup>

##### 4.1. Northern Ireland drivers

- **Agriculture policy – past, present, future:**

Agriculture policy was cited in the CFE as a driver of the decline in biodiversity across NI. Reference was made to the historic policy such as the cross-

Departmental 2012 Gowing for Growth strategy.<sup>29</sup> The Strategy had the explicit purpose of 'accelerating the growth of farming, fishing and food and drink processing in NI to 2020 and beyond.'<sup>29</sup> It was widely agreed amongst respondents this was a fundamental policy that had driven the agricultural sector towards exceeding the carrying capacity of the environment. Evidence of this impact is also discussed in section 4.2.

This economic focus of agricultural policy was demonstrated to have an impact on biodiversity due to a lack political will, and financial investment in developing and implementing agri-environment schemes. Whilst submissions identified positive options available within the current Environmental Farming Scheme (EFS) (e.g. group for breeding waders, retention of winter stubbles), criticism was focused on the low payment rates, the capping of agreements by DAERA, and to not proceed with a further tranche of wider-level EFS agreements in 2023.

Responses also highlighted the Common Agriculture Policy (CAP) as a negative driver of policy and practice in NI. Specific criticisms were laid at the economic drivers (e.g. market volatility), and bluntness of the CAP causing species decline. This included for example the ineligibility of habitats (e.g. mature heather and scrub) on which farmers were then required to undertake actions that were detrimental to maintain eligibility for farm payments. Furthermore, the fines imposed for non-productive or non-compliant land was also suggested as driving species decline. The recent development of agricultural policy was therefore described as a positive opportunity. However, no quantitative evidence was provided through our call to demonstrate the effect of policy.

Despite the opportunity offered by recent policy development, delays and deficiencies in current agri-environment scheme attracted significant criticism through submissions. Submissions emphasise that delays, the content, and financial support for the new Farming with Nature scheme are causing significant uncertainty. This delay is in turn said to be creating significant concern for farmers who are currently involved in EFS.

Submissions pointed to the transition from previous agri-environment schemes to EFS in 2015 as being indicative of the impact that uncertainty can create. Evidence was provided of a substantial reduction of the area of land under agri-environment schemes, which has not been achieved since (Figure 4). Responses suggested that low uptake was caused by uncertainty surrounding the new scheme and that payment levels were insufficient. The short-term nature of the scheme with 5 year agreements was also suggested to be a disincentive for farmers. No evidence was submitted to conclusively determine the reason for fewer agri-environment schemes from 2016. This suggests that there is a need to better understand the motivations of farmers in the context of agri-environment schemes.

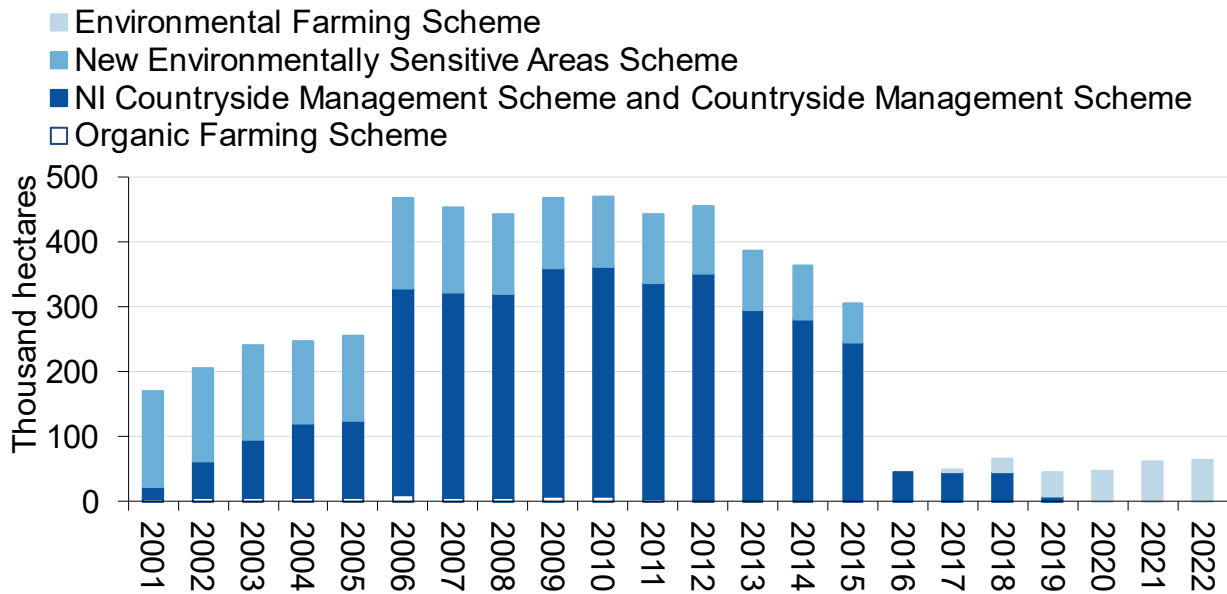


Figure 4 Northern Ireland agri-environment schemes, areas under agreements 2001 - 2022 (Source: DAERA, 2023)

The lack of detail on new agri-environment schemes, and specifically the uncertainty around the level of funding committed to Farming with Nature were also highlighted in submissions.

- **Governance – political instability and a lack of political will:**

The second most frequently cited driver affecting biodiversity was political instability. At the time of our CFE, NI had been without an Executive and Assembly for two years. This lack of political leadership was frequently cited as causing delays to meeting environmental obligations (e.g. the delayed publication of the Environmental Improvement Plan). Political instability was cited as a reason for the low level of agri-environment scheme uptake (see above), and lack of management plans for protected sites, which collectively contribute to environmental improvement.

A related driver of decline is the lack of political will or ambition in relation to the environment. Respondents referred to a culture where economics is prioritised, with the environment being less important, notably within DAERA but also across other departments and public authorities. The lack of leadership and vision is driving fragmented approaches to biodiversity, and wide-spread non-compliance with regulation (see later in this section).



- **Governance – enforcement and independence:**

Low levels of enforcement, coupled with wide-spread disregard and non-compliance with environmental legislation has significant economic, social and environmental costs.<sup>30</sup> Responses pointed to systemically inadequate enforcement of damage to biodiversity such as in the case of tree protection breaches. Evidence shows that of 369 tree protection breaches reported between 2019 to 2022, just one resulted in enforcement action being taken and none led to prosecution.<sup>31</sup> Similarly, in the context of agricultural cross-compliance penalties, data provided by DAERA to a respondent demonstrated that between 2017-2021, an average of 1,166 penalties were applied each year. Of these, 44% were warning letters and 56% had a financial penalty attached. Where there was a financial penalty, less than 1% related to habitats and birds. Compared to 53% of penalties relating to farming rules, and 35% on water quality.

Responses suggested that low levels of enforcement were caused by difficulties demonstrating the causal link between breaches and their impact on biodiversity (see section 4.1). Furthermore, a lack of resources (see later in this section), and an apparent culture within DAERA and NI Environment Agency (NIEA) that enforcement is inappropriate was also suggested as a cause of low enforcement. No quantitative evidence was provided to support these assertions.

Responses further suggested that NIEA's lack of independence from DAERA was a driver of the decline of biodiversity. Remarking on NIEA as an agency within DAERA, respondents widely criticised funding cuts, conflicts of interest, and an inability to challenge policy direction as undermining their effectiveness. Several responses pointed to the illegal dump at Mobuoy as 'stark illustration' of the failures in monitoring, regulation, and enforcement across NIEA.

Evidence submitted to our CFE criticised the regulation and enforcement of quarrying activities. The age of licences, the lack of conservation conditions attached to permissions, has created a situation within which enforcement action was not taken in instances where priority and Annex 1 habitats were destroyed. Submissions suggested that the failure to enact the Review of Old Minerals Permissions provisions was evidence of this driver.

- **Governance – poor coherence within and between departments:**

A lack of holistic or joined-up decision making at various scales of government are said to be driving biodiversity loss. This was, for several responses best exemplified in the contrasting purposes of the Going for Growth strategy<sup>29</sup> which encouraged intensification and accelerated growth in agriculture. At the very same time DAERA was setting out and asking departments, and wider society to deliver the Biodiversity Strategy 2015-2020. Evidence for the consequence of this imbalance is provided under the pressure of land use – agriculture below (see section 4.2).

- **Governance – translating international commitments:**

Whilst the UK is a signatory to international frameworks and agreements, delivery is devolved and carried out via Biodiversity Action Plans. In NI, previous global targets were translated through the Biodiversity Strategy for 2015-2020.<sup>32</sup> Responses evidenced that many of the targets within the Biodiversity Strategy were not met.<sup>9,10</sup> Furthermore delays in developing a new Biodiversity Strategy, also referred to as a Nature Recovery Strategy, were criticised as reflecting the lack of prioritisation within DAERA of actions to protect and restore biodiversity.

- **Financing and resourcing:**

Evidence submitted demonstrates a gap between the resources and finances currently allocated, and what is needed to meet nature and climate objectives. Assessments suggest that public spending on biodiversity priorities in NI is approximately £1.4 million per 1,000km<sup>2</sup> compared to UK average of £2.3 million. Current annual spending on biodiversity (£31 million) is approx. a quarter of estimated needs (approx. £114 million). Estimates suggest a finance gap of £80 million for actions for species and habitats.<sup>33</sup> When wider needs including measures for water, flood risk, resource efficiency, climate and nature engagement are considered the finance gap is at £400 million per year.<sup>33,34</sup>

This included for example an estimated need of £28 million per year for peatland restoration and woodland creation for at least 10 years (Figure 5).<sup>33,34</sup> Increasing investment in nature and climate was rationalised on the basis of both need (i.e. biodiversity crisis, legislative commitments) and the potential wider benefits (e.g. economic, and physical and mental well-being).<sup>35</sup>

Inadequate levels of financial support is, for respondents, worsened by the lack of resources (e.g. staff time) committed to actions for biodiversity. For example, evidence suggests that under-resourcing, including a real-time decline, within NIEA is negatively impacting their ability to administer agri-environment schemes, and carry out monitoring of NI's protected sites.

|   | Capital costs (£m) | Annual costs (£m) | Total cost over 10 years (£m) | Annual average cost (£m) |
|---|--------------------|-------------------|-------------------------------|--------------------------|
| <b>Nature for climate investments</b>                             |                    |                   |                               |                          |
| Woodland creation and management                                  | £122.0             | £6.0              | £128.0                        | £12.8                    |
| Peatland restoration and maintenance                              | £121.0             | £33.0             | £154.0                        | £15.4                    |
| <b>Subtotal</b>   | <b>£243.0</b>      | <b>£39.0</b>      | <b>£282.0</b>                 | <b>£28.2</b>             |
| <b>Other natural environment related measures</b>                 |                    |                   |                               |                          |
| ASSI Restoration and Management                                   | £153.0             | £54.4             | £207.4                        | £20.7                    |
| Priority Habitats (creation, restoration, maintenance)            | £103.5             | £45.5             | £149.0                        | £14.9                    |
| Agri-environment for widespread species                           | -                  | £260.0            | £260.0                        | £26.0                    |
| Species recovery  | £49.0              | £10.0             | £59.0                         | £5.9                     |
| Restoration and maintenance of landscape and historic environment | £41.0              | £17.0             | £58.0                         | £5.8                     |
| Resource protection measures in agriculture                       | -                  | £480.0            | £480.0                        | £48.0                    |
| <b>Subtotal</b>   | <b>£346.5</b>      | <b>£866.9</b>     | <b>£1,213.4</b>               | <b>£121.3</b>            |
| <b>Total</b>  | <b>£589.5</b>      | <b>£905.9</b>     | <b>£1,495.4</b>               | <b>£149.5</b>            |

Figure 5 Nature for climate investments (Source: Green Finance Institute, 2021. Based on Rayment, 2019)

- **Legislative framework:**

Legislation is driving changes in biodiversity. For example, in the context of the Climate Change (Northern Ireland) Act 2022,<sup>36</sup> submissions suggested that nature based solutions should drive coordinated action on climate and nature. However, submissions cautioned that a ‘dash for carbon’ in which climate mitigation is prioritised risked negatively impacting biodiversity (e.g. forest edge effect on breeding waders, afforestation of peat).

Responses reflected on laws specifically concerned with the natural environment such as the Wildlife and Natural Environment (Northern Ireland) Act 2011,<sup>37</sup> and the environmental assessments regime (e.g. Strategic Environmental Assessment, and Habitats Regulation Assessment). There was widespread agreement across responses the legislative framework is insufficient and inadequately implemented, evidenced by the continued decline in protected species and habitats.<sup>23</sup>

The Wildlife and Natural Environment (Northern Ireland) Act 2011<sup>37</sup> was criticised as not being sufficiently robust and effective. Responses suggested that the biodiversity duty has not driven the necessary conservation of biodiversity through

public authority working. Submissions noted this duty had not been tested through judicial processes. However, evidence was submitted of suspected damage to a protected site caused by a public authority, and responses spoke broadly of a lack of knowledge of legal obligations within public authorities.

Other regulation including the Fisheries Act 1966<sup>38</sup> was described as not fit for purpose. Specifically, the protection provided to non-native fish species such as roach and carp is leading to harm caused to native species and waters. Notably these species are not included in the Wildlife and Natural Environment (Northern Ireland) Act 2011,<sup>37</sup> and were only included in the Fisheries Act 1966 due to their EU status.

Concerns were also raised as to the potentially negative impact of legislative drivers for climate action (see section 4.2 and 4.3), and potential regressive divergence (see section **Error! Reference source not found.**). Notwithstanding these negative legislative drivers, responses evidenced the positive role that wider legislative framework including environmental assessments can play in protecting biodiversity.

- **Peoples disconnect with nature:**

Recognised as a driver at multiple scales,<sup>5,12</sup> the disconnect, including lack of education and awareness negatively impacts biodiversity. Research submitted demonstrates that 'nature connectedness' is a key factor in the actions taken by people in addressing climate change actions that support biodiversity.<sup>39</sup> Further research, focused on children shows their connectedness to nature is reflective of the amount of time spent in nature. In turn this affects their actions, with greater connectedness related to pro-environmental behaviours and pro-nature behaviours.<sup>40</sup> Whilst no quantitative evidence is provided to support a determination of the level of connectedness in NI, equivalent work carried out in Scotland demonstrated that when 'people do not feel connected to nature, and therefore don't care for nature and see its importance, they are more likely to over-exploit and not take seriously the impacts of climate change, pollution and invasive non-native species.'<sup>41</sup>

#### 4.2. Northern Ireland pressures

Pressures identified and evidenced within submissions included:

- **Land use – agriculture:**

77% of land in NI is used for agriculture,<sup>42</sup> consequently all responses cited it as the dominant pressure on terrestrial and freshwater biodiversity. Responses highlighted various drivers of agriculture's impact, including a policy imperative for growth promoting intensification (see section 4.1), inadequate and uncertain agri-environment schemes, economic viability including external (global) market forces, lack of environmental education, and a lack of enforcement (see section 4.1).

Notwithstanding these, evidence provided demonstrates a range of interconnected pressures on biodiversity caused by agricultural intensification across NI, including:

- Livestock units: livestock numbers have increased since 2019, and NI has generally higher numbers of pig (six times) and laying-hens (three times) than the UK.<sup>42</sup> The consequence of this are large amounts of excess manure, and high-levels of atmospheric emissions (e.g. ammonia) (see later in this section).
- Grazing regime: over and under grazing has led to unfavourable condition of habitats (e.g. upland heaths<sup>43</sup>), and impact river ecosystems (e.g. poaching, siltation).
- Habitat management: including inappropriate hedgerow cutting, cessation of coppicing and abandonment are negatively impacting species including birds (e.g. yellowhammer) and butterflies, through habitat loss, fragmentation, and encroachment or succession.
- Land conversion: for example, loss of native woodland habitat, or riparian zones creating direct habitats loss,<sup>13,14</sup> and additional pressures such as siltation. Responses also pointed to statistics relating to the movement from mixed farming towards improved grassland, with arable farming now making up only 3% of the land area. Across the 60% of agricultural land that is grassland, 70% is classified as improved.<sup>44</sup>
- Nutrient use: fertiliser use is negatively impacting species and habitats and are a consequence of intensification. Excessive levels of nitrogen and phosphorus is causing nutrient enrichment in rivers and lakes.

- **Land use – planning and development:**

The second most frequently cited pressure of ‘planning and development’, encompassed a wide scale and typology of infrastructure and impacts. These include single dwellings, to wastewater system, renewable energy, urbanisation or urban sprawl, infrastructure, and demolition of buildings.

The impact of such development was equally diverse, including direct loss of habitat, siltation through run-off during construction, nutrient enrichment from septic tanks, and domestic use of pesticides. Responses stated the negative impact of such activities was driven by, amongst other things, underinvestment in infrastructure (e.g. wastewater), legislation, and policy implementation.<sup>45</sup> For example, planning policy in NI provides no guidance, advice or protection to wildlife in relation to light pollution (see later in this section). This lack of guidance from central government is being replicated at the local authority level where Local Development Plans published provide little to no attention to the impact of light-pollution (Figure 3, Table 1). The same is true of the impact of sound.

| <b>Retained PPS</b>  | <b>Light</b>                    | <b>Sound</b>                  |
|--|---------------------------------|-------------------------------|
| PPS 2 (Natural Heritage)   | Nil                             | Nil                           |
| PPS 4 (Planning & Economic Development)                                    | Nil                             | Nil                           |
| PPS 6 (Planning, Archaeology & the Built Heritage)                         | Nil                             | Nil                           |
| PPS 7 & Addendums (Quality Residential Developments)                       | Avoiding impact on neighbours   | Avoiding impact on neighbours |
| PPS 8 (Open Space, Sport and Outdoor Recreation)                           | Nil                             | Nil                           |
| PPS 11 (Planning & Waste Management)                                       | Nil                             | Avoiding impact on neighbours |
| PPS 16 (Tourism)   | Nil                             | Impact on 'tourism asset'     |
| PPS 17 (Control of Outdoor Advertisements)                                 | 'potential for light pollution' | Nil                           |
| PPS 21 (Sustainable Development in the Countryside)                        | Nil                             | Avoiding impact on neighbours |
| PPS 23 ('Enabling Development for the Conservation of Significant Places') | Nil                             | Nil                           |

Table 1 Summary assessment of Northern Ireland planning policy for consideration of light and sound. (Source: submission to call for evidence)

Equally biodiversity checklists that are meant to provide protection from harm were widely criticised as being subject to desk-based assumptions by people who may not have sufficient ecological expertise. Combined with a lack of post-consent monitoring, significant concern was raised as to the true impact of planning and development.

- **Land use – hydromorphological change:**

Hydromorphological changes include, but are not limited to dams, weirs, and arterial drainage. The pressures created by such activities range from localised impacts to a river, to catchment scale impacts. The cause of such changes range from flood management practices, intentional (e.g. straightening) or unintentional (e.g. poaching) damage, and drainage of land. Sources of evidence provided for this pressure are largely held individually by organisations, or not publicly available (e.g. inventory of structures and installations in rivers). Therefore, whilst responses

stated that, for example, large scale arterial drainage schemes occurred in NI between 1960 – 1990, evidence was not provided to substantiate this.

- **Land use – burning and wildfire:**

Wildfires caused either intentionally (e.g. management, or arson) or unintentionally are a pressure on a range of habitats. Wildfires have been found to cause significant and lasting harm to upland habitats and species.<sup>46</sup> NI's upland habitats are home to red listed species including golden plover and curlew, and are home to many other conservation priorities including wet heath, blanket bog, marsh fritillary butterfly, Irish hare, marsh saxifrage and argent and sable moth. Responses pointed to the recent burning of 720 acres of montane heath in 2021. In addition to destroying this priority habitat the subsequent ecological assessment proved it also caused the loss of priority plants and animal species such as skylark and common lizard.

Additionally, uplands perform a range of ecosystem services such as storing carbon, improving water quality and reducing the risk of flooding. Such is the importance of the uplands, that the Committee on Climate Change specifically called for an end to rotational burning in the uplands.<sup>47</sup> Furthermore, the IUCN UK Peatland Programme state that healthy peatlands do not need burning for their maintenance and the most effective solution for addressing wildfire risk is to restore the sites to fully functioning bog habitats.<sup>48</sup>

- **Land use – forestry:**

Responses highlighted that post-war forestry policy drove a proliferation of single species conifer plantations, largely on marginal land such as peatlands. This afforestation is associated with the drainage and degradation of priority habitats including blanket bog, acidification of watercourses and the fragmentation of open landscapes that are important for breeding waders (e.g. curlew) and raptors (e.g. hen harrier). As a pressure, forestry is cited in a significant proportion of protected area conservation objectives. Responses acknowledged that more recent forestry policies are 'increasingly progressive and reversing past damage', prioritising peatland restoration and broadleaf planting on non-peat soils being prioritised. However, the pace of restorative action is insufficient, prolonging the impact of the pressure of afforestation.

- **Pollution - atmospheric:**

NI produces 12% of the UK's ammonia emissions while only representing 6% of the land area.<sup>25</sup> Ammonia impacts habitats and plant species through either the dry or wet deposition of nitrogen compounds.<sup>49</sup> 97% of ammonia emissions in NI

originate from the agriculture sector.<sup>ii</sup> Ammonia concentrations exceed the critical level for lichens and bryophytes across almost all of NI, and is above the critical level for vascular plants across a third of the land area.<sup>24</sup> Woodland fungi are also sensitive to nitrogen deposition, with growing concern about impacts on ectomycorrhizal species associated with tree roots, and the impacts on tree health and associated invertebrates.<sup>21,50</sup> The loss of these woodland fungi also results in soil carbon release to the atmosphere, with climate change implications. Nitrogen deposition can also impact butterflies and moths through changes in plant communities.<sup>13,14</sup>

Evidence also highlighted the impact of ammonia on human-health, with the estimated cost of ammonia emissions on human health being on average £7,923 per tonne.<sup>51</sup> When calculated for NI, this would be a cost of £234 million.

- **Pollution - water:**

When broken down into categories of by source, substantiated water pollution incidents in 2022 were caused by farming (29%), followed by other (21%), domestic (18%), industry (18%), Northern Ireland Water Ltd (14%) and transport (1%).<sup>23</sup> Evidence within responses focused on agriculture and wastewater sources as described below. All submissions suggested the blue-green algal blooms in Lough Neagh in summer 2023 were indicative of the long-term pressures these sources of pollution were having. No evidence of other sources of water pollution were submitted.

- Agriculture: run-off of excess nitrogen, phosphorous, other chemicals such as pesticides and herbicides,<sup>13</sup> and the unsustainable use and management of soil leading to run-off and siltation<sup>52</sup> are some of the sources of agricultural pollution. Farming is the sector responsible for the largest number of substantiated water pollution incidents in 2022 ((29%), 2021 (29%), 2020 (33%), 2019 (36.5%), 2018 (30.5%), 2017 (30%), 2016 (32%), 2015 (33%), 2014 (35.8%), 2013 (26.9%), 2012 (32.3%), 2011 (33.8%).<sup>53</sup>
- Wastewater: including commercial (e.g. NI Water) and domestic sources, including for example combined sewage overflows, wastewater treatment works, are significant sources of phosphorous to freshwater ecosystems.<sup>54</sup> Submissions stated that such systems are responsible for over seven million tonnes of raw sewage discharge.<sup>55</sup>

- **Pollution – pesticides and herbicides:**

The use of pesticides is a cause of declines in farmland wildlife,<sup>56</sup> however no evidence was provided to quantify the impact within NI. Notwithstanding this,

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<sup>ii</sup> This is further broken down to: 66.3% from cattle, with the dairy sector producing 37.3% and beef 29% of agri ammonia emissions. The poultry sector was responsible for 12.3% while pigs accounted for 7.8% of total agri ammonia emissions. Sheep produced 2.6% of agri ammonia, 7% of emissions were from fertiliser and digestate to land accounted for 4% of emissions. (Source: DAERA, [Draft Ammonia Strategy Consultation](#), 2023)



comparable evidence across the UK shows that pesticide use is causing declines.<sup>56</sup> The specific example of neonicotinoid pesticides was given, wherein there is growing evidence that they harm bee populations and other pollinators; the decline of widespread butterflies has been correlated with neonicotinoid use.<sup>13</sup>

- **Pollution - light:**

Evidence was provided demonstrating that butterflies and moths are negatively impacted by light.<sup>13,14</sup> For example, outdoor light (pollution) can kill moths directly by contact with hot glass or bulbs or affect them indirectly by altering their behaviour, life cycles or predation rates.<sup>13,14</sup>

- **Pollution - waste:**

Littering and the unlawful disposal of waste was described as having multiple negative impacts on biodiversity. This was, for several responses exemplified by evidence on the Mobuoy Dump in NI. No evidence was provided to quantify the wider impact of waste in NI.

- **Natural resource exploitation – recreation:**

Recreation in the form of boating, outdoor sport and physical recreation such as on rivers, in forests, uplands, caves, beaches and urban parks can negatively impact biodiversity across NI. However, evidence of this impact was localised (e.g. to the Mourne Mountains) and appears dependent on organisations such as an environmental non-governmental organisation reporting it.

Evidence submitted demonstrates that recreation is an increasing pressure. In the period 2011-2017 the number of outdoor recreation operators increased by 48%, (in 2017, 563 operators).<sup>57</sup> It was also recognised that the Covid pandemic has created significant growth in outdoor recreation such as on Slieve Donard, or Culicagh mountain causing damage due to high visitor.<sup>58</sup> Wider evidence was not provided to quantify this change across NI.

Coastal habitats were described by respondents as being under high and increasing levels of pressure due to recreation. Through loss of habitat to development, or wider damage and pollution (e.g. littering) species such as Grayling and Wall are finding their last refuges reducing in size and quality.<sup>13</sup> Similarly, in addition to trampling habitats when off-lead, disturbance by dogs was evidenced as the cause of 50% of the disturbance of coastal birds.<sup>59</sup> Evidence in England demonstrated that when on-lead dogs caused just 5% of disturbance compared to 40% when off-lead.<sup>60</sup> This was noted as being particularly during the breeding season should birds be forced to leave the nest as it can lead to chilling of eggs, and vulnerability to predation of eggs and nestlings.

In the case of Lough Neagh for example, evidence submitted demonstrates the rising trend in boat numbers both in term of commercial tourism and individual waterskiing, rowing, sailing, power boating, canoeing and recreational fishing. These spatial demands placed on the lough are subsequently likely creating damage to the protected features, as well as the broader ecosystem. No evidence was provided to quantify this environmental impact, however in 2009 it was suggested that the carrying capacity for the lough in terms of boat use had not yet been met.<sup>61</sup>

Responses suggested that the collection of species for recreational purposes may be negatively impacting populations.<sup>13</sup> The practice of collecting has reduced since the Victorian heyday. Therefore, this was described as a cumulative pressure that is likely less significant but combines with other pressures (e.g. habitat loss) to negatively impact populations. No evidence was provided to quantify this impact in NI.

The demand to create new or extend current countryside access is a future pressure. Recognising that many of the untouched or undisturbed areas are home to priority species, calls were made to better manage or regulate this. Sliabh Beagh, an SAC and home to hen harriers and red grouse which are both susceptible to disturbance, exemplified this risk wherein it is being assessed for new eco-trails. However, this was caveated by the recognition that development can be done harmoniously with nature, such as in the Cuilcagh mountain 'Stairway to Heaven' boardwalk.

- **Natural resource exploitation – aggregate extraction:**

Aggregate extraction including sand dredging in Lough Neagh, and wider quarrying activities are causing habitat loss, fragmentation, and pollution. Evidence was provided of the destruction of priority and Annex 1 habitats.<sup>62</sup> This included purple moor grass and rush pasture, and molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) at Craigall Rocks. Submissions suggested that whilst this damage was driven by a failure of regulation and enforcement (see section 4.1), quarrying activities are negatively affecting biodiversity. The lack of monitoring and data transparency issues, however mean there is a lack of data quantifying the impact of quarrying across NI.

- **Natural resource exploitation – commercial and leisure fishing:**

Within freshwater lakes and rivers, commercial fishing was identified as a pressure, but no quantitative evidence was provided to substantiate the scale of impact. For example, in Lough Neagh, while there are now 80 commercial fishing boats operating, a reduction from 200 in the past. It is unclear how impactful these activities are. Therefore, while there has been a decline in numbers of commercial vessels, this does not show a cause of decline in pressure or impact.

Aquaculture was also identified as a pressure on freshwater ecosystems and native species. Examples such as the salmon farm at Glenarm Co. Antrim were used to demonstrate the impact of disease, nutrients, and escapees on the wild populations. Furthermore, responses highlighted the collapse of sea trout and damage caused to wild salmon runs by aquaculture, as well as the industrial harvesting of other fish species as damaging who ecosystems including birds and fish (both adult and juvenile). No evidence was provided to quantify the impact of this pressure.

- **Natural resource exploitation – peat extraction:**

Peat extraction is known to be a pressure leading to the degradation of peatland.<sup>43</sup> However, no evidence was provided to quantify, or spatially mark the exact role of this extraction.

- **Pollution – chemicals including pesticides, herbicides:**

Several submissions suggested that the use, both domestic and commercial (e.g. agriculture), chemical pesticides and herbicides is affecting biodiversity in NI. The impact of chemicals on terrestrial and freshwater ecosystems is complex, leading to species mortality, changes to and bioaccumulation in food chains, negative impact on non-target species, and behavioural change. Chemical pollution, including pesticides and herbicides, is an emerging and increasing issue. No evidence was provided to quantify the impact of pesticides and herbicides on terrestrial and freshwater biodiversity in NI.

- **Invasive species:**

Responses highlighted the impact of globalisation in creating multiple pathways and vectors through which species move across distances not attainable through natural migration in comparable timescales.<sup>63–65</sup> Invasive species of interest in NI include New Zealand flatworms, zebra mussels, grey squirrels, rats, ferrets, roach, carp, Himalayan balsam, giant hogweed, rhododendron, and Japanese knotweed, each of which are affecting multiple ecosystems and species.<sup>12,66</sup>

Within protected sites, for example, only 1% of ASSI woodland in NI is in favourable condition, with 61% in unfavourable condition. According to the Woodland Trust, the main reason for these adverse conditions is alien and problematic species such as rhododendron which was identified at 23% of all sites.<sup>66</sup> Equally, the protected seabirds of Rathin, particularly those that burrow (e.g. puffin), have been negatively impacted by rats and ferrets.<sup>67</sup> In the case of Lough Neagh, the Zebra mussels were widely acknowledged as a likely contributing factor to the harmful algal blooms of 2023, due to their role in altering nutrient cycles, filtering out phytoplankton, increase plant growth, and influencing invertebrate and fish

populations.<sup>68</sup> Furthermore, they result in the extinction of native swan and duck mussels.<sup>69</sup>

In the context of a warming world, responses stressed that the potential impact of future invasive species establishment was increasing due to human-induced climate change.<sup>12,14,66</sup> No evidence was provided to quantify the predicted impact in NI.

There was general agreement across responses that the inadequate and slow response in legislation, policy and management, is further driving the spread and impact of invasive species. There is a need for stronger biosecurity policy and legislation, including for example the ban on import of certain plant or soils, because once an invasive species has become established it is almost impossible to eradicate. The gaps and inadequacies of the current legislative framework are exemplified by the fact that species such as Japanese knotweed are not listed under the Wildlife and Natural Environment (Northern Ireland) Act 2011.<sup>37</sup>

Beyond the direct impact on biodiversity, responses also highlighted the economic implication of invasive species. Including, for example the estimated total economic cost of ash dieback in Britain to be £14.8 billion, which is one third greater than the estimated cost of the 2001 UK foot and-mouth disease outbreak (adjusted for inflation).<sup>70</sup> No evidence was provided of the economic cost of invasive species in NI.

- **Climate change:**

Greenhouse gas emissions (GHGs) have continued to decline, with the most recent reductions since 2019 coming from transport and residential use. Agriculture is responsible for 27% of NI's GHGs and is the only sector from which there has been an increase from the 1990 baseline.<sup>71</sup>

Changes on a global<sup>5</sup> and local scale<sup>12,21</sup> are creating a variety of impacts on biodiversity in NI. For example, changes in weather conditions at wintering grounds for birds are creating shifts in their range,<sup>12,21</sup> or low survival rates of juvenile species in the marine environment.<sup>72</sup> Similarly, climate change known to create upward altitudinal and northwards latitudinal shifts in butterfly and moth distributions.<sup>13,14</sup> Whilst this is leading to the decrease in abundance and extent of some species, in other instances, various species of butterfly and moths have been shown to increase their range within the UK, likely due to climate change. These northwards shift however creates pressure on species in the areas which they are colonising.<sup>13,14</sup>

Changing weather patterns leading to longer growing seasons are creating changes to the habitats and ecosystems that species rely on. For example, a warmer and wetter climate has been shown to increased grass in bracken habitats or more rapid scrub and coppice regrowth.<sup>13,14</sup>

The drive to mitigate climate change, particularly through development of renewable energy is a further pressure on biodiversity. Whilst acknowledging the

need to expand NIs renewable energy capacity concerns were raised around the rush to decarbonise without due consideration given to the need to protect biodiversity.

- **Other – pathogens:**

A range of pathogens are already affecting native species and habitats in NI. These include for example squirrelpox,<sup>73</sup> highly pathogenic avian influenza (HPAI),<sup>21</sup> and ash dieback.<sup>66</sup> The causes, or vectors of these pathogens are not always clear, but they include invasive species (e.g. grey squirrel) and trade (e.g. ash saplings). Submissions highlighted the need to consider the knock-on effects of these pathogens. However, no evidence was provided to demonstrate the impact of pathogens at an ecosystem scale.

The potential for future pathogens was identified through submissions. Due to the increasing implications of climate change (e.g. species range shifts), and invasive species, there is a risk that more pathogens will reach and establish within NI. However, no evidence was provided that a risk-assessment of the impact of future pathogens impacting NI has been undertaken.

- **Other – wildlife persecution:**

Raptor persecution is one of seven UK wildlife crime priorities affecting birds of prey.<sup>74</sup> Evidence suggests that, for the most part, raptor populations are recovering in NI.<sup>26</sup> All species however remain vulnerable to the impacts of persecution and poisoning. Assessments covering 2019 – 2020 evidence 44 investigated persecution incidents in the form of shooting, poisoning (e.g. bendiocarb and alphachloralose poisons) and secondary poisoning (e.g. rodenticide), nest destruction, and collision. Between 2016 – 2020 there have been 32 confirmed incidents of persecution on species including common buzzard, peregrine falcon, red kite, hen harrier. Other assessments further detail the ongoing investigation of the poisoning of white-tailed eagles in County Antrim by the insecticide bendiocarb.<sup>75</sup> No evidence was provided to quantify the outcome of investigations (e.g. conviction rates).

#### 4.3. Cumulative and synergistic drivers and pressures affecting Northern Ireland

Submissions to the CFE suggested the drivers and pressures affecting terrestrial and freshwater biodiversity do not act individually. Instead, they affect biodiversity cumulatively, synergistically (total impact is stronger when together), or antagonistically (total impact is weaker when combined). Together these pressures create a range of ecological responses including negative feedback loops caused by the decline of biodiversity. Submissions stated that there is, therefore, a need to

respond to multiple pressures affecting biodiversity rather than individually. This requires cross-departmental working. However, the evidence base for quantifying the individual versus combined effect of drivers and pressures in NI is poor. Two specific groups of pressures were considered though responses including:

- **Climate change as a compounding pressure:**

Climate change was the most frequently cited multiple pressure. The impacts of climate change including altered hydrology and extreme weather events not only add to the pressures affecting species and habitats, but it also intensifies these pressures.<sup>5,12</sup> For example changes in precipitation and temperature caused by climate change can lead to changes in habitat structure, which in turn can facilitate the expansion of invasive species that may negatively impact ecosystem functioning, or affect food webs.<sup>5</sup> Climate change is understood to be synergistically impacting moths and butterflies in combination with nitrogen deposition which is altering plant communities.<sup>13,14</sup> No evidence was provided to quantify or distinguish the impact of climate change in combination with other pressures.

- **Nutrient enrichment and habitat loss:**

Nutrient enrichment in combination with habitat loss is suggested as a cause of the decline of biodiversity in NI. Submissions described these two pressures as resulting largely from the intensification of agricultural practices. Increasing nutrient levels, and loss of habitat whether through conversion of land or removal of habitat (e.g. hedgerows) is cumulatively affecting biodiversity. The decline of the marsh fritillary butterfly was a frequently cited example of the effects of these multiple pressures. Evidence from Denmark demonstrates that the decline of devils-bit scabious due to nitrogen deposition, along with loss of habitat through management practices creates loss of host-species for marsh fritillary.<sup>76</sup> Evidence of this causal relationship within NI was not provided.

In freshwater ecosystems, nutrient enrichment, combined with loss of riparian habitat can lead to siltation of watercourses. No evidence was provided to quantify the combined effect of these pressures in NI.

- **Case study – Lough Neagh:**

Lough Neagh was cited in most submissions as an example of multiple cumulative and synergistic pressures. The Lough is already impacted by invasive species (including zebra mussels and roach),<sup>69</sup> nutrient enrichment (including from agriculture, wastewater).<sup>23</sup> Other pressures suggested, but not evidenced included land use change (e.g. altering the water level), recreation (including fishing), and inappropriate planning decisions across the water catchment. The consequence of the historic and ongoing impact of these multiple pressures is demonstrated by the toxic blue-green algal bloom and loss of the Lough Neagh fly in 2023.<sup>77</sup>

## 5. Cross border drivers and pressures

Our call included a specific question on cross border pressures concerning the island of Ireland as a single biogeographic unit.

### 5.1. Cross border drivers

Submissions identified two governance related drivers affecting terrestrial and freshwater biodiversity on the island of Ireland:

- **Governance – conventions, agreements, and legislation:**

Reflecting on NI's commitment to international conventions including CBD, responses identified several positive governance drivers. NI is required as a signatory (as part of the UK) to the GBF to transpose global goals and targets into NI policy. There was widespread disappointment at the ongoing delays to the development of a new Nature Recovery Strategy, replacing the Biodiversity Strategy concluding in 2020.<sup>78</sup> This was, for the majority of responses, indicative of wider environmental governance failures (see also section 4.1)

A further positive driver – as described by responses – is the 1998 Good Friday (Belfast) Agreement.<sup>79</sup> Included within this agreement is a commitment to cooperation on agriculture and the environment on the island of Ireland. No evidence was provided as to the effectiveness or impact of this agreement. However, the implications of geo-politics were evidenced as negatively impacting the achievement of protected site objectives. Carlingford Lough was, for several responses, indicative of this negative drive. Disagreements relating to the border are preventing the re-classification and extension of the SPA.

Multiple legislative drivers were identified as driving positive impact. This included legislation derived from the EU including the Birds and Habitats Directives.<sup>62,80</sup> Similarly, the establishment of the island of Ireland as an 'ecoregion' for the purpose of the Water Framework Directive (2000/60/EC66),<sup>81</sup> was evidenced as recognition of the drive for coordinated action.

When considering the legislative framework, responses pointed to the risks created by gaps or grey areas. This was exemplified by the impact of farm waste, and the potential for improper cross-border transport. Responses argued such loopholes create unnecessary risk for both biodiversity and human-health.

Marine Protected Areas in Lough Foyle and Carlingford Lough were also identified as indicative of the negative driver of the lack of legislative precision in relation to regulation/licensing for certain activities due to the lack of clarity in relation to the border between NI and RoI.

Conversely the All-Ireland Pollinator Plan<sup>27</sup> was highlighted by several responses as a good example of biogeographic cooperation. However, no evidence was provided to support these statements, such as to demonstrate the impact.

- **Governance – divergence in legislation, policy, and implementation:**

Reflecting on recent and ongoing changes to the legislative and policy frameworks within NI, the UK, and the EU, the potential for divergence was cited as a potential driver of negative change.<sup>82,83</sup> This related to both regressive changes to standards in NI such as water quality, and divergence in the implementation of standards (e.g. pesticide use) across the island of Ireland. The potential for divergence was, also exemplified through the Levelling Up & Regeneration Act,<sup>84</sup> the Energy Bill,<sup>85</sup> and the Retained EU Law Act.<sup>86</sup> At the time of the CFE the lack of a Stormont Executive and Assembly created further uncertainty with responses citing the unknown implications of these statutes in NI.

Responses pointed to the need to consider the implications of wider legislative and policy frameworks beyond those that are explicitly for biodiversity. For example, whilst noting the potential negative impact of changing water quality standards, responses highlighted the implication of changes in environmental assessments regimes. There is, therefore, a need to consider the impact of any divergence – positive or negative- to biodiversity across the island of Ireland.

Furthermore, too much divergence in governance (i.e. legislation, and policy) and management practices was evidenced as compromising the operational effectiveness protected sites,<sup>87</sup> such as Slieve Beagh in Tyrone.<sup>88</sup> Here, variation in stocking rates, farm payments and agri-environment rules, and the enforcement of domestic and commercial peat extraction across a hydrologically connected peatland is inhibiting the appropriate management of the ASSI and SAC features within NI.

It was recommended by a respondent that, to better prepare for divergence in standards, regulations, and implementation that the OEP should review how responsibilities are organised across NI departments, and whether this facilitates cross border strategy and cooperation.

## 5.2. Cross border pressures

Specific transboundary pressures identified through responses included:

- **Natural resource extraction –peat extraction:**

Exemplified by Slieve Beagh, natural resource use and exploitation including different stocking rates, and extraction of peat (either commercial or domestic) is negatively impacting priority species (e.g. hen harrier) and habitats (e.g. blanket bog), and landscape scale restoration within NI. Where such pressures exist, responses identified the use of physical infrastructure (e.g. fencing) as an



undesirable solution. Whilst creating protections for sites, such fencing is not ideal for biodiversity, and in the context of being on an international border.

- **Land use hydromorphological changes:**

Dams, such as the hydroelectric power station on the river Erne were highlighted as creating physical impairment to fish passage. Furthermore, a lack of effective management (e.g. closing of smolt gates) and monitoring wherein fish counters for salmon have not been in operation throughout 2023, are creating serious problems for fish including Atlantic salmon. This impact is evidenced by the Agri-Food and BioSciences Institute's acoustic tracking that demonstrates that no smolts are reaching the sea. Responses stated the river Erne system previously hosted runs of hundreds of thousands, now reduced to an average of 1000 to 2000 fish. Survival of the extant population is reliant on hatchery stocking.

- **Pollution – atmospheric deposition of ammonia:**

Whilst recognising the critical levels of ammonia pollution caused by sources from within NI (see section 4.2), atmospheric deposition from the Republic of Ireland were also highlighted. For example, one response demonstrated that Culciagh Mountain is showing levels of wet ammonia deposition that are significant and could be causing damage. Due to prevailing winds, the respondent suggested that it is likely to come from sources to the southwest in the Republic of Ireland.

- **Land use and natural resource extraction – persecution:**

The persecution of raptors, including through secondary poisoning is a transboundary pressure requiring an all-Ireland approach.<sup>74</sup> No evidence was provided as to the rate or scale of impact of transboundary persecution.

### 5.3. Actions, barriers and opportunities

- **Gaps in data and definitions:**

Expanding on issues of data gaps within NI responses identified the limitations caused by a lack of contiguous data. This was best exemplified through the lack of transboundary mapping of peatland, a habitat that requires landscape scale and catchment scale management and interventions. Linked to this, responses highlighted the current lack of standardised classification and terminology for habitat and monitoring. In addition to impacting daily management and monitoring, it also creates challenges to the collation and comparison of data, a fundamental component of transboundary working.

## 6. Glossary of terms and acronyms

|       |  |
|-------|--|
| ASSI  | Areas of Special Scientific Interest                     |
| CAP   | Common agricultural policy                               |
| CBD   | Convention on Biological Diversity                       |
| CFE   | Call for evidence  |
| DAERA | Department of Agriculture, Environment and Rural Affairs |
| EFS   | Environmental farming scheme                             |
| GBF   | Kunming-Montreal Global Biodiversity Framework           |
| GHG   | Greenhouse gas emissions                                 |
| NIEA  | Northern Ireland Environment Agency                      |
| RoI   | Republic of Ireland                                      |
| SAC   | Special Areas of Conservation                            |
| SPA   | Special Protection Area                                  |

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