Teagasc Submission to the Citizens' Assembly on Biodiversity Loss

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Introduction

This submission responds to the consultation process issued by the Department of the Taoiseach in relation to a Citizens' Assembly on Biodiversity Loss. This submission is submitted on behalf of Teagasc (the Agriculture and Food Development Authority). Teagasc, established under the Agriculture (Research, Training and Advice) Act 1988, is the national public body providing integrated research, advisory, education and training services to the Irish agri-food sector. Teagasc programmes are fully aligned with and supportive of a number of relevant government and EU policies, in particular the following: *Programme for Government-Our Shared Future* (PFG), *Food Vision 2030, The European Green Deal*, *EU Farm to Fork Strategy for a Fair, Healthy and Environmentally-friendly Food System,* and the *EU Biodiversity Strategy for 2030*.

One of the Strategic Goals of Teagasc is "*to provide science-based evidence and technologies to enable Ireland meet commitments in regard to gaseous emissions, water quality and biodiversity"* (Teagasc, 2021).

This submission was prepared by the Teagasc Biodiversity Working Group. The Teagasc Biodiversity Working Group is a cross-programme, inter-disciplinary group of Teagasc research and knowledge transfer staff. The submission was prepared following consultation with colleagues across Teagasc using their collective knowledge and expertise in biodiversity.

Teagasc has and continues to pursue comprehensive research, education and knowledge transfer programmes to address knowledge gaps on the interaction between agriculture and the environment (including biodiversity). Research is conducted by Teagasc in collaboration with a range of Irish and international research institutes and universities, and supported by funders, including: the Department of Agriculture, Food and the Marine (DAFM), the Research Stimulus Fund (administered by DAFM), INTERREG, Science Foundation Ireland (SFI) and STRIVE (administered by the Environmental Protection Agency). With regard to Knowledge Transfer, Teagasc aims to support the sustainable development of the Agri-food industry through the delivery of high quality environment knowledge transfer programmes and services. More specifically, the Biodiversity & Landscape Sub-Programme specifically addresses biodiversity decline. Thus, Teagasc is strategically-placed to contribute significantly to discussions in relation to biodiversity loss.

Teagasc has responded to the guidance for submissions to focus on the issues of central concern to the Citizens' Assembly on Biodiversity Loss and in particular on a subset of the most relevant issues as set out in the *Terms of Reference*.

The submission focuses in particular on:

A. Overview of the current state of farmland biodiversity in Ireland
B. The main drivers of biodiversity loss, their impacts and the opportunities of addressing these drivers
C. Opportunities to improve the State's response to the challenge of biodiversity loss, how that response can best be resourced and implemented in a strategic and coordinated manner, and how progress can be measured
D. Opportunities to develop greater policy coherence and strategic synergies between biodiversity policy and other policy priorities

Section A – Addresses Bullet 1 within the Terms of Reference.
Section B – Addresses Bullets 2 and 3 within the Terms of Reference.
Section C – Addresses Bullet 7 within the Terms of Reference.
Section D – Addresses Bullet 5 within the Terms of Reference.

Background

The Irish landscape has been farmed for over 6,000 years, with approximately 65% of the country currently under agricultural management. Much of the appearance, character and biodiversity (i.e. diversity of wildlife, insects, plants etc) of the landscape that has formed, is as a result of, and dependent on, farming activities and the interactions between these activities and the environment. For example, approximately 50% of all European plant and animal species are dependent on agricultural practices (Kristensen, 2003; Stoate et al., 2009).

Whilst a synergistic relationship between biodiversity and agriculture is possible, in recent decades the intensification and expansion of agricultural practices have been identified as contributing significantly to the loss of biodiversity in Ireland and worldwide. The *State of the Environment Report* (EPA, 2020) synopsised various data and indicators to highlight that "nature was declining globally and nationally". In 2019, Ireland declared a "National Climate and Biodiversity Emergency". The NPWS (2019) highlighted that (with regard to designated habitats including Special Area of Conservation and Special Protection Areas) the main pressures included agriculture, forestry, urbanisation, recreation and invasive species.

Multiple agricultural and environmental policies now recognise the threat posed by biodiversity decline and have included halting and reversing the decline in biodiversity as a key objective. By 2030, 10% of farmland area is to be targeted for high diversity features (*EU Farm to Fork Strategy*); and 30% of designated habitats and species will reach favourable conservation status (*EU Biodiversity Strategy for 2030*). Additionally, national and international policies (e.g. *Climate Action Plan*, *Water Framework Directive*, *Nitrates Action Plan*, *Common Agricultural Policy Strategic Plans*) recognise the critical role of biodiversity in nature-based solutions, delivering multiple ecosystem services (including carbon storage/sequestration, water quality, flood mitigation etc.). These existing and emerging policies highlight the need for integrated land use strategies to address environmental and agronomic objectives.

The challenge of reversing biodiversity loss relies heavily on the capacity to retain, enhance and restore biodiversity on farmland, in a way that is fair to farmers and effective for nature. To achieve this, there is a need to learn from existing best practices in relation to conservation of farmland biodiversity. Practices include having clear objectives and targets, having locally developed aims, implementing results-based payments, engaging specialised advisory support etc. (further best practice https://www.cap4nature.com/).

Coupled with implementing best practices, significant knowledge gaps must be addressed, from the fundamental ecology (and functioning) of agricultural systems, to understanding how to design policy and schemes that will be both successful and sustainable.

A. Overview of the current state of farmland biodiversity in Ireland

The *State of the Environment Report* (EPA, 2020) highlighted that nature was declining globally and nationally, and focused heavily on NPWS data relating to designated habitats (e.g. Natura2000 sites) and species. Whilst good information is available with which to assess the condition of Natura2000 sites and species (e.g. as part of Article 17 reporting requirements for the Habitats Directive), significant gaps in knowledge remain in relation to the status of biodiversity at a national scale. For the wider countryside there are some regional and pilot studies (e.g. the recent pilot Farm Environmental Survey), however, there is no baseline assessment (at a national scale) of the quantity and quality of farmland habitats. This remains a fundamental barrier to assessing the scale of biodiversity and addressing the drivers of biodiversity decline in an agricultural context.

Teagasc scientists (and collaborators) have worked towards addressing this gap with regard to assessing the quantity and quality of biodiversity on Irish farms (including beyond Natura2000 sites). Recent Teagasc studies on ***habitat quantity*** include:

- The IdealHNV project highlighted that one third of the agricultural area of Ireland was potentially High Nature Value Farmland[1] (Figure 1). As much as half of this HNV land lies outside of Natura2000 designation (Matin *et al.,* 2016; 2020).
- The Teagasc-led, FARM_ECOS project quantified and assessed the quality of semi-natural habitats across a gradient of farming intensities. Average quantity of habitats ranged from approximately 6-7% on more intensively-managed farms, to >30% on more extensively-managed farms (Rotchés-Ribalta *et al.,* 2021), and varied from region to region (Tsakiridis *et al.,* 2022).
- A further Teagasc study (Larkin *et al.,* 2021) focused specifically on more intensively-managed land, and highlighted that habitats made up approximately 6-7% of the farm area of intensive farms (dairy, beef and arable).

These are some of the few empirical assessments on the quantity of habitats on Irish farms, and highlight that wildlife habitats (e.g. hedgerows, field margins, ponds, streams, wetlands, peatlands and woodlands) commonly occur on farmland, and thus all farmers can help halt the decline in farmland biodiversity. The studies also help give an important insight into how geography, enterprise and agricultural policies and practices impact biodiversity. However, the limited number of studies also shine a light on the lack of empirical data on the quantity of habitats at a national scale, and in non-designated areas in particular.

[1] HNV farmland is characterised by low intensity agriculture, supporting a high degree of biodiversity and associated ecosystem services.

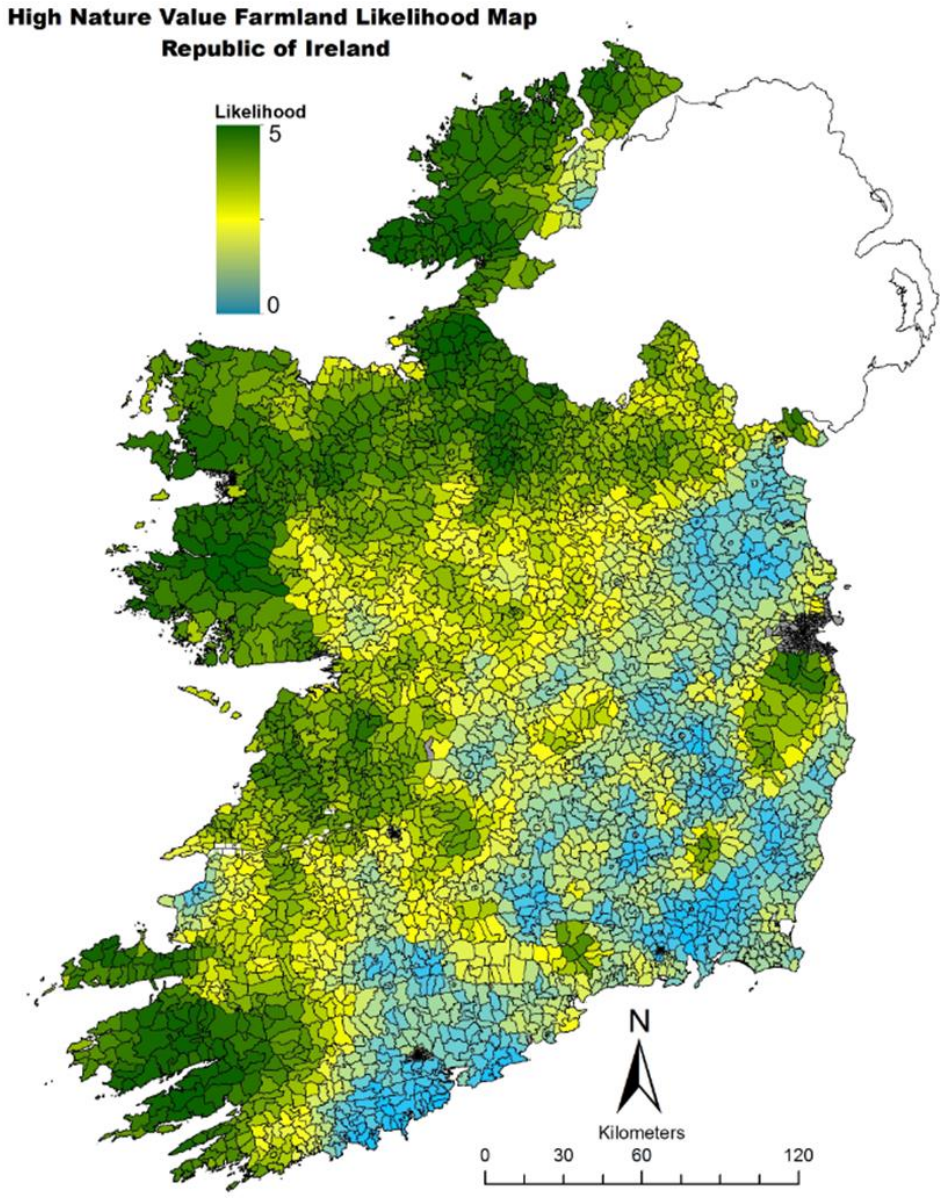

Figure 1: Modelled distribution of the nature value of farmland at the scale of electoral districts, and based on five indicators. Green = high likelihood of being high nature value, blue = high likelihood of being low nature value (Matin *et al.,* 2020).

In addition to habitat quantity, ***habitat quality*** is also extremely important for the protection of plants, insects, mammals and birds, especially rare species. Good quality farmland habitats support more wildlife, along with a better delivery of ecosystem services including improving water quality, supporting biological control of pests and diseases and enhancing carbon storage and sequestration. Figure 2 (hedgerow on left) shows a high quality flowering hedgerow, with feeding and nesting resources for a variety of species (e.g. floral resources for pollinators, diversity of nesting resources for birds). The hedgerow on the right (Figure 2) would be considered a low quality (over-managed) hedgerow, lacking many of feeding and nesting resources. Once again, there is a significant lack of information in relation to the quality of farmland habitats (beyond Natura2000 sites). Despite lack of nationally available data, recent studies by Teagasc highlight that:

- Habitat quantity is not necessarily associated with habitat quality (Rotchés-Ribalta *et al.,* 2021). Higher levels of habitat area do not correlate with higher levels of habitat quality. Retention of habitats alone may not ensure the quality of the habitats.
- Studies on more common farmland habitats such as hedgerows (Figure 2) and field margins found that although ubiquitously distributed in the Irish farmed landscape, the majority of sampled hedgerows and field margins were of low quality (frequently due to being over-managed) (Larkin, 2020; Larkin et al., *in press*).
- Habitat diversity (i.e. variety of different habitats), and connectivity (i.e. linking habitats to each other), are also important factors impacting biodiversity (Ruas *et al.,* 2022).

Importantly, these studies have helped clarify the role of habitat quantity, quality, diversity and connectivity in conserving biodiversity in the Irish farmed landscape. The studies have helped identify how negative impacts can be mitigated and what interventions are likely to have the greatest positive effects on biodiversity (and associated ecosystem services). However, significantly more work is needed such that the scale of impact required to address the current biodiversity emergency can be determined.

Figure 2: Hedgerow of high ecological quality (on the left), hedgerow of low ecological quality (on the right).

B. The main drivers of biodiversity loss, their impacts and the opportunities of addressing these drivers

B.1 Background: Agriculture and Biodiversity in Ireland

Much of the habitats and species throughout the Irish landscape have formed as a result of farming activities and the interactions between these activities and the environment. Changes in farming practices (e.g. intensification, specialisation, abandonment) can lead to a decrease in the quantity and quality of farmland habitats and a reduction in associated ecosystem services. The reduction in biodiversity at a national scale (EPA, 2020), mirrors global trends (UN, 2019), where there has been a continuous decline in biodiversity (including farmland biodiversity) over recent decades. The *UN Global Assessment Report on Biodiversity and Ecosystem Services* (2019) highlighted that threats to biodiversity and ecosystem services include: exploitation of species, climate change, pollution, alien invasive species and land-use change. However, land-use change has the largest relative negative impact on terrestrial and freshwater ecosystems, and agricultural expansion at a global scale (at the expense of forests, wetlands and grasslands) is the most widespread form of land-use change.

The widespread decline in global biodiversity, including farmland biodiversity represents a major global conservation challenge. This is worrying as, aside from the cultural and recreational values that are associated with wildlife, biodiversity has functional value in the provision of goods such as food, fuel and fibre. In addition, habitats and species provide important societal benefits, including nutrient cycling in soil, flood prevention, carbon sequestration, carbon storage, pollination (see Text Box 1), and regulation of pests and diseases (all commonly referred to as ecosystem services). A decline in biodiversity will result in a reduction in the delivery of these benefits and services.

Text Box 1: Case study example: Pollinators

Bees are important pollinating insects and are vital for sustaining delivery of ecosystem services, including crop production, in agricultural contexts. However, bees are facing an ecological crisis in Ireland, with one third of our 100 bee species under threat of extinction. The intensification and homogenisation of landscapes are principal drivers of these trends as they have led to a loss of food (flowers) and homes (nest sites) for bees. A loss in the quantity and quality of important foraging habitats such as hedgerows and extensively managed grasslands is a significant factor in the reduced availability of forage for bees. The use of herbicides, fungicides and insecticides also represents a major threat to bees and has been implicated in their decline both in Ireland and abroad. At a landscape scale, lack of connectivity can act as barriers to bees travelling between patches of beneficial habitat.

In order to halt the decline of bees on farmland, targeted management of the land, in relation to habitat quantity, quality, diversity and connectivity, is required.

B.2 Opportunities for addressing drivers of biodiversity loss

Wildlife habitats commonly occur on farmland. On some farms, these habitats are scarce, while on others the whole farm is an extensively-grazed wildlife habitat that supports both farming and nature. Whether it is protecting and managing existing habitats or creating new ones where needed, all farmers can help halt the decline in farmland biodiversity. There is also increased awareness about the value of biodiversity on farmland, and the role of nature-based solutions to address environmental challenges. This has culminated in a growing commitment among the farming community to implement farm-scale actions to protect and enhance nature and deliver ecosystem services. Nature conservation in Ireland is dependent on these farm-scale efforts.

Right measure: right place

Addressing biodiversity loss requires the appropriate spatial targeting of evidence-based and cost-effective conservation measures. Ideally, these would be supported by decision support systems to ensure the right measure is located in the right place. In order to do this, there is a need for national-scale data collection programmes, "*we need to continue to systematically survey habitats and species"* (EPA, 2020). Such datasets can help ensure that the right measures are designed and targeted to the right place.

One-size does not fit all

Widespread implementation of uniform and prescribed management tends to result in analogous landscapes, and reduced biodiversity. Different species have different habitat requirements. There is thus a need to retain and enhance a diversity of habitats (to support a diversity of species and deliver a range of ecosystem services). However, even within the one habitat, different species will have different requirements (D'Ahmed *et al.,* 2021). Habitat quality is thus a subjective metric and will vary from species to species. Habitat management recommendations should therefore avoid uniformity of habitat.

Targeted actions across many different land uses

Farming covers a broad range of land uses, and biodiversity is exceptionally context-dependent. Appropriate advice for biodiversity will range from maintenance of existing habitats with high levels of biodiversity (e.g. HNV farmland); enhancement of existing habitats from lower to higher quality; and creation and restoration of habitats in areas where they no longer occur.

Importance of landscape-scale implementation

A key reason cited for the lack of effect of biodiversity conservation measures (e.g. implemented under agri-environment schemes), is the mismatch between the scale of measure implementation (usually at field or farm scale) and the scale at which the ecological process take place (typically at larger spatial scales). A focus on landscape-context specific measures (as recommended in the ACRES Co-operation Project) would

be expected to improve their effectiveness at conserving biodiversity at a landscape scale. Enhancement of landscape diversity, maintenance and improvement of the quality of habitats and ensuring appropriate connectivity between habitat patches could help halt biodiversity loss and support the delivery of ecosystem services over the long term (Rotches-Ribalta *et al.,* 2019).

Collaboration between all stakeholders

The *State of the Environment report* (EPA, 2020) highlighted that we need to *"develop collaborative projects between scientists, farming sectors and the public*". Ireland is a leader in such collaborative approaches (see Moran *et al.,* 2021). The availability of farm advisory system (FAS) approved agricultural advisors throughout Ireland, engaging in knowledge exchange on biodiversity, is a valuable resource supporting such collaborative approaches. Teagasc research shows that the role and attitude of agricultural advisors is key to mainstreaming biodiversity issues amongst farmer stakeholders. Farmers sourced environmental information from their traditional source of agricultural information such as farm management and scheme assistance. In addition, advisors along with other farmers and family were key influencers on environmental decisions. The resource of FAS approved agricultural advisors (both Teagasc and private advisors) is now being utilised in mainstream agri-environment schemes to engage farmers in biodiversity, as has been done in locally-led projects such as the Burren Programme, the Pearl Mussel EIP Project and the Hen Harrier EIP Project. While specialist expertise can be used for upskilling and training on biodiversity, agricultural advisors can transfer clear simple directions on biodiversity management practices, engage farmers, exchange knowledge and ultimately influence attitudes and actions.

Motivating stakeholders

Whilst actions need to be targeted across many different land uses, knowledge of the different farming styles is also critical for more effective biodiversity conservation (O'Rourke et al., 2012). A better understanding of farmers' motivation is likely to result in wider adoption of conservation management (Stoate, 2002). Farmers are intrinsically motivated to practice conservation by factors such as their attachment to their land (Ryan et al., 2003) or cultural factors (Dunn et al., 2000) rather than exclusively by motivations such as receiving economic compensation.

B.3 Barriers to Opportunities

We cannot manage what we do not measure

There is a need for regular, systematic national-scale data collection programmes, especially for areas outside of Natura2000. Collecting, managing, sharing and analysing ecological and environmental data plays a key role in halting and reversing the decline in biodiversity. Gathering robust and representative baseline data in relation to the quantity

and quality of habitats can help policy-makers, researchers, advisors and farmers target appropriate advice, mitigation and supports (e.g. right measure: right place).

New technologies

To date, digital technologies have supported the protection of biodiversity at a national and global scale and have played an important role in mapping environmental data (e.g. national landcover map, LiDAR data, ortho-photography, Digital Elevation Models). However, new technologies are required to support habitat quality assessments, to support the spatial targeting of environmental mitigation measures, and to identify environmentally synergistic land-uses (and also trade-offs).

Stakeholder awareness

The value of stakeholder engagement was highlighted earlier; however, a barrier here is the lack of awareness amongst stakeholders (on occasion). This includes lack of awareness on the value of biodiversity and ecosystem services, for example not being aware that common 'weeds' are wildflowers which may (or may not) be growing in the wrong place, and should be retained rather that replaced with planted wildflower seed which may not be native or of local provenance. Elsewhere there is a lack of awareness in relation to the functioning of habitats (what/how habitats deliver for carbon sequestration, water quality, soil health) and the urgency/ imminence of the challenge of biodiversity loss.

Resources (including human resources)

Actions to address biodiversity loss, including for example: collection of baseline data, monitoring programmes, long-term funding of collaborative projects and programmes, all require investment of resources to ensure their success (see Section C.3). Additionally, these approaches are dependent on the availability of a broad cohort of skilled staff (e.g. data collection, in delivering specialised farm advice etc.). Training and development of such staff requires integration of ecological, environmental and agronomic modules in higher education programmes.

C. Opportunities to improve the State's response to the challenge of biodiversity loss, how that response can best be resourced and implemented in a strategic and coordinated manner, and how progress can be measured

C.1 Background: The States response to biodiversity loss

Multiple agricultural and environmental policies now include conservation of biodiversity as a key objective, and thus have the potential to play a critical role in addressing the challenge of biodiversity loss. For example, within Cross Compliance (*Common Agricultural Policy*), the recognition of landscape features (i.e. hedgerows), and their eligibility under Basic Payment Scheme has contributed to the retention of landscape features, resulting in them being ubiquitous throughout the Irish landscape. Lessons can be learned from previous policy successes; however, there are also lessons to be learned from the shortcomings of past policies. Recent publications by the European Court of Auditors (2017, 2020a,b, 2021) have been critical of previous CAPs, highlighting that (at a European scale) "most CAP funding has little positive impact on biodiversity". There are thus opportunities to learn from historic policies, and recommendations made by the European Court of Auditors, and others, to improve policy response to biodiversity loss.

C.2 Opportunities to improve the State's response to the challenge of (farmland) biodiversity loss include the following:

Morrison and Bullock (2018) highlighted that "the main sector delivering biodiversity-related expenditure is agriculture, which is linked to 75% of the total expenditure between 2010-2015". CAP 2023-27 has higher green ambitions than previous CAP (in line with environmental and climate legislation). Within this, 40% of the CAP budget will be climate and biodiversity relevant, with 25% of the budget for direct payments being allocated to eco-schemes. Achievement of biodiversity goals on farmland is thus intimately linked to the effectiveness of the programme of objectives, design, implementation and incentives that are delivered by the CAP in Ireland. Opportunities to support effectiveness include:

- Improved clarification of targets and indicators for different farmland habitats and species, and improved translation of conservation goals into long-term programmes that support evidence-based actions at farm- and landscape-scale.
- Improved planning for adaptation of biodiversity conservation to climate change.
- Improved recognition of the important role of farming in delivering farmland biodiversity, and how practical actions will vary depending on the current habitat quantity and quality e.g. maintenance of current high levels of farmland biodiversity where they occur, improvement from medium to higher levels farmland biodiversity and restoration in areas with low or no farmland habitats.

- There is also opportunity for improved instruments to better engage the private sector and attract investment in biodiversity and related ecosystem services. One example may be public-private partnerships that add value to the State's investment in biodiversity conservation (e.g. agri-environment schemes) by complementing that with market-based incentives for additional biodiversity benefits.

C.3 How can the response be best resourced and implemented in a strategic and coordinated manner?

Given that 40% of the CAP budget will be climate and biodiversity relevant, it is important to maximise the biodiversity benefits attained from this expenditure. Opportunities include:

- Aligning incentives across and within government policies so that disincentives for biodiversity conservation are removed, and positive incentives are clearly signalled.
- Improved quantification of the opportunity costs for farmers that act to conserve biodiversity so that biodiversity conservation is adequately incentivised and rewarded.
- Locally-led and results-based approaches have been shown to work in multiple cases (e.g. O'Rourke and Finn, 2020) and several other case studies are underway. A challenge is to scale up the lessons and successes from these short-term, geographically-limited projects/programmes. With scaling up comes several opportunities for additional biodiversity benefits, but also additional challenges (e.g. administrative costs, overheads, human resources). There is a need for detailed consideration of how best to scale up, and maximise benefits while overcoming challenges.
- Improved support for dedicated specialised advisory support for farmers in high nature value farming systems.
- Identification of policy-focused strategic budgets for research and implementation projects that facilitate strategic development of biodiversity action programmes that maximise effectiveness, and support the trialling of novel and innovative approaches.

C.4 How can progress be measured?

- Given that the revised CAP is now the largest available budget to achieve biodiversity objectives, it is imperative that CAP biodiversity objectives are SMART. Environmental monitoring and reporting (for biodiversity in particular) within previous CAP was considered to be insufficient (see Geijzendorffer *et al.,* 2016; ECA, 2019). There are opportunities for enhanced and timely monitoring and reporting of biodiversity actions. Enhanced, timely monitoring can speed up confirmation of the effectiveness of a policy or, where needed, can hasten understanding of deficiencies in the achievement of biodiversity objectives, and allowing deficiencies to be rectified (Pe'er

et al., 2022). Experience across Europe suggest that assessment of effectiveness is best achieved by funding scientists to conduct monitoring and evaluation of specific measures/programmes.

C.5 Barriers to improving the State's response

Outside of Natura 2000 areas, there is currently a clear paucity of biodiversity monitoring (with very limited exceptions, such as the Countryside Bird Survey). The majority of efforts are not regular, not systematic nor nationally representative. Instead they are typically represented by postgraduate research projects that are limited in geographical coverage and duration. Measurement of progress will require improved monitoring of biodiversity in the wider countryside that is regular, systematic and nationally representative.

D. Opportunities to develop greater policy coherence and strategic synergies between biodiversity policy and other policy priorities

D.1 Background*:* Policy coherence and sustainability

For ecosystems such as agricultural systems to be sustainable, the three pillars of sustainability (economic, societal and environmental sustainability) all need to be considered. A disconnect between any of the sustainability pillars will impact the overall sustainability of the system. For example, Figure 2a (below) highlights the distribution of HNV farming systems. HNV systems perform well in relation to environmental sustainability[2]. Despite this, HNV systems historically received a proportionally low amount of attention from agricultural[3] and environmental policy. HNV systems have performed poorly in relation to economic sustainability (as evidenced by the Farming Income Figure 2b). Ultimately, as these systems become less economically sustainable, HNV farmland land is susceptible to abandonment, intensification or alternative (more profitable) land use, all of which in turn impact environmental sustainability.

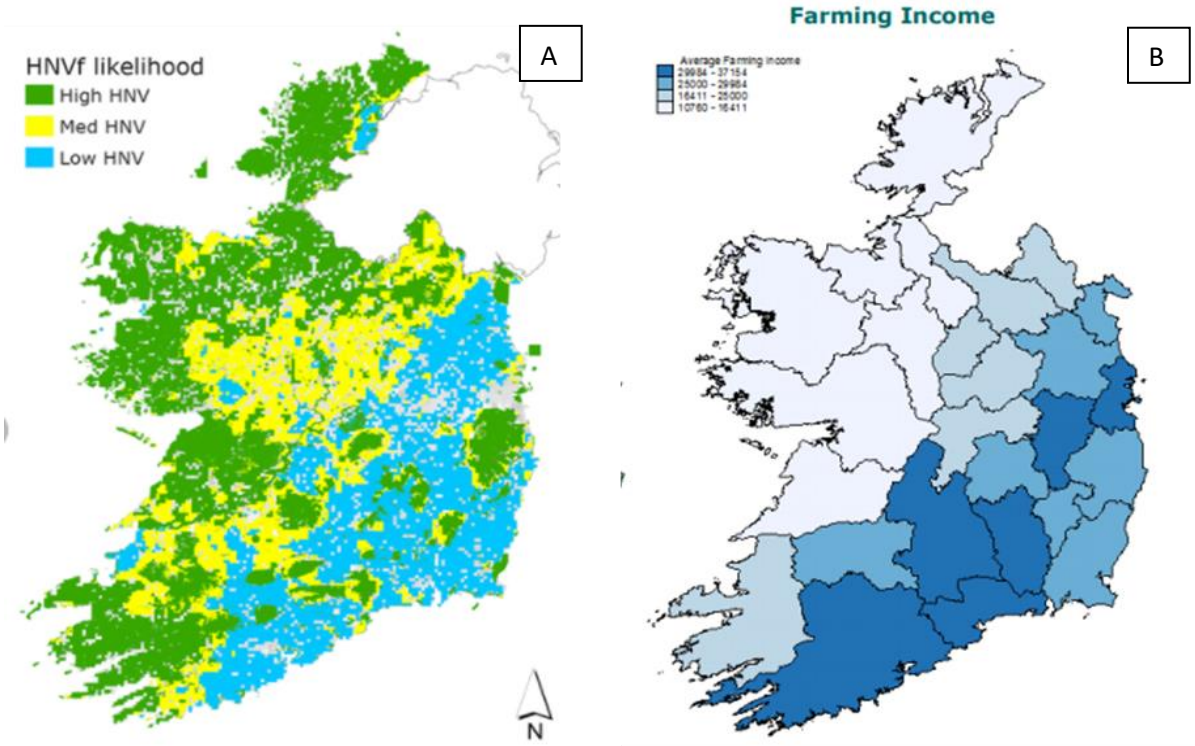

Figure 2: A) Modelled distribution of the nature value of farmland Green = high likelihood of being high nature value, blue = high likelihood of being low nature value (Matin et al. 2020). B) Distribution of average Farming from low (Light blue = €10,760-€16,411) to high (Dark blue = €29,984-€37,154) (Revenue, 2015)

[2] HNV systems support biodiversity and deliver a range of ecosystem services and benefits for society, contributing to multiple *UN Sustainable Development Goals*

[3] Recent iterations of CAP Strategic Plan has seen convergence of BPS entitlements, and prioritisation for HNV regions within the ACRES Co-operation Project.

D.2 Opportunities to develop coherence and synergies between policies

The *UN Global Assessment Report on Biodiversity and Ecosystem Services* highlighted that managing landscapes sustainably can be better achieved through multifunctional, multi-use, multi-stakeholder and community-based approaches. Sustainable practices can be enhanced through well-structured regulations, incentives and subsidies, removal of distorting subsidies, and integrated landscape planning.

Policy coherence between sustainability pillars

The *EU Farm to Fork Strategy* and the *EU Biodiversity Strategy for 2030* were launched on the same day and there was significant integration between the two strategies. However, whilst this approach demonstrated an ambition for greater coherence between sustainability pillars, disconnects can still exist. For example, some habitats (e.g. scrub, ponds) that contribute significantly to biodiversity and delivery of ecosystem services (e.g. water quality, carbon sequestration) may not be fully eligible for policy supports (Larkin *et al.,* 2019). These 'undervalued' habitats are thus threatened with land use change, i.e. conversion to an eligible habitat (Rotchés-Ribalta *et al.,* 2020). Whilst policy in this area is beginning to address this disconnect, there are further opportunities to recognise the contribution that agricultural land can make in relation to the delivery of the CAP objectives, including those on environment and climate.

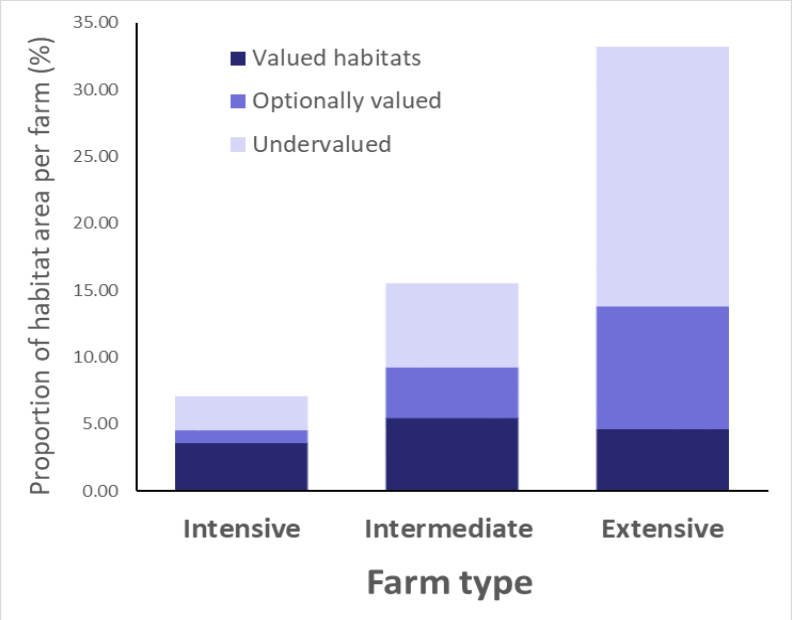

Figure 3: A comparison of habitat quantity across farm intensity types. Farm type was determined by Nature Value (NV) scores (incorporating variables relating to stocking rate, improved grassland, field-size). Intensive – NV score <3.5; Intermediate – NV score 3.5-5.0; Extensive – NV score >5.0.
Valued habitats are those habitats currently valued by agricultural policy (i.e. protected and eligible for policy supports); *Optionally valued* are habitats that are valued as habitats under optional agri-environment schemes; *Undervalued* are habitats not valued by policy (e.g. ineligible for policy supports) (derived from Rotchés-Ribalta *et al.,* 2020). -

Policy coherence <u>within</u> sustainability pillars

Natural synergies frequently exist between measures to protect the environment, e.g. land-based climate change and mitigation activities can be effective and support ecological conservation goals. However, the *UN Global Assessment Report on Biodiversity and Ecosystem* Services report highlighted that inappropriate implementation of specific practices (e.g. afforestation of non-forest ecosystems) can have negative side effects on biodiversity and ecosystem functions. Thus, strategies should recognise the potential multi-functional impact (positive or negative) of implementation measures, rather than from the perspective of a single ecosystem service such as water quality**.** An example of aligned policy and the recognition of the multi-functional benefits of measures include protection of landscape features. This has contributed to the retention of these *eligible* habitats within the landscape (Rotchés-Ribalta *et al.,* 2020), supporting the delivery of multiple ecosystem services. e.g. targeted and managed landscape features such as hedgerows support biodiversity, store carbon and can play an important role in water quality, for example in relation to sediment interception and retention (Sherriff *et al.,* 2019).

Coherence between policy and market strategies

Food companies are placing increased emphasis on nature-friendly production practices; and sustainability accreditation is also going to increase its requirements for inclusion of biodiversity in benchmarking of environmental sustainability. Many sustainability schemes place a strong focus on environmental themes that typically include nutrient management, reduction of greenhouse gas emissions, water quality, and soil management. However, sustainability will not be measured by these attributes alone; biodiversity is an important attribute to include to maintain the credibility of sustainability assessments. As highlighted earlier, there are thus opportunities for public-private partnerships, complementing policy drivers with market-based incentives for additional biodiversity benefits.

D.3 Barriers to success

Conflicting/changing policies;

Change in the direction of environmental and agricultural policy can be a barrier to policy coherence, and result in confusion amongst stakeholders. For example, CAP 2014-2020 asked Member States to develop a HNV farming indicator at EU level. However, in CAP 2023-2027 no HNV farmland/farming indicator was included (at EU level) in the legal proposal.

Note: Ireland has retained indicators relating to HNV farming in the latest CAP Strategic Plan.

Lack of long-term strategies.

There is a need for long-term land-use objectives. Frequently, there is an ecological lag-time response to conservation efforts. Longer-term strategies could be extended, beyond the time frames of traditional CAP instruments. Long-term measures and reliable payments can incentivise commitment by multiple stakeholders to maintain and improve ecosystems (https://www.cap4nature.com/).

Data availability,

As highlighted earlier, there are gaps in knowledge in relation to habitat functioning, for both above-ground and below-ground habitats. A lack of knowledge on the functioning of habitats is a barrier to identifying potential synergies (i.e. the ability of a habitat/management to deliver multiple ecosystem services) and trade-offs (e.g. where the delivery of one ecosystem service comes at the cost of another ecosystem service).

Note:

Teagasc are available to meet to discuss the topics highlighted in this submission or to provide further clarification on any of the comments made. We also note that further consultations with Irish stakeholder may be held in the future on this topic, and we would look forward to the opportunity to contribute further when these occur.

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Appendix 1

How Teagasc is addressing the biodiversity emergency?

Teagasc activities to address the biodiversity emergency are integrated across Research, Knowledge Transfer and Education, specifically:

Research:

Teagasc Research on biodiversity* includes the following objectives:

1. Enhance biodiversity in agricultural systems across a gradient of intensities and enterprises
2. Development of effective indicators and implementation of farm-scale assessments of sustainability that include farmland wildlife.
3. Improving the environmental effectiveness and economic efficiency of management plans for High Nature Value farming and forestry systems.
4. Improving the understanding of the relationship between diversity and ecosystem function within agricultural systems.

*See Appendix 2 for a subset of relevant research projects.

Knowledge Transfer:

Significant advisor capacity building on biodiversity has been achieved in recent years through the Teagasc Environment KT Programme and advisor involvement in REAP, Agri-environment Training Scheme, Hen Harrier Project, Pearl Mussel, Project, Wild Atlantic Nature LIFE Project, NPWS Farm Plan Scheme Burren Programme and other biodiversity initiatives. The use of the Teagasc Biodiversity Management Practices Self-Assessment Tool: Linear Habitats enables effective biodiversity Knowledge Transfer by agricultural advisors. There is ongoing media engagement including a high profile Teagasc Hedgerow Week.

Farmers play a key role in influencing other farmers' decisions, thus Knowledge Exchange Groups are powerful tools of practice change. Teagasc KT plays an important role here, supporting the integration of biodiversity management policy into Knowledge Transfer groups through: European Innovation Programme (EIP) projects (e.g. Comeragh Upland Communities), LIFE projects and other Knowledge Exchange groups.

The Teagasc Signpost Programme is a multi-annual campaign to lead climate action by all Irish farmers. The programmes aims to achieve early progress in reducing gaseous emissions from Irish agriculture, improve water quality and biodiversity. It operates through a network of over 120 farms throughout the country, which will demonstrate best practice in environmental standards.

Teagasc leads engagement with stakeholders in the agri-environment industry. A weekly Signpost webinar has a regular audience of 300 – 400 people since 2020, delivering up –to-date information and inspiration on biodiversity, water quality and climate change. A National Hedgerow Week, initiated and led by Teagasc has put a focus on hedges for farmers, contractors and the general public.

Education:

Teagasc plays a critical role in the delivery educational material and training on biodiversity within Teagasc college courses and by incorporating modules on Agricultural Sustainability (incorporating ecological sustainability) within 3rd level Agriculture Programmes. Additionally, Biodiversity Plans have been initiated on all Teagasc agriculture college farms, with farm-based demonstrations of best practice to inform and effect practice change among future generations of farmers.

Appendix 2: Subset of recent, current and forthcoming research projects related to the Teagasc Biodiversity and Agri-Ecology sub-programme.

Project title	Teagasc role	Status
• FARM_ECOS: Farming and Natural Resources: Measures for Ecological Sustainability	Lead	Ongoing
• FarmCARBON: Hedgerows and other non-forest woodland carbon	Lead	Ongoing
• Designing Effective Agri-Environment Measures for Solitary Bees in Ireland	Lead	Ongoing
• LegacyNET: Investigating the benefits of multispecies grassland leys	Lead	Ongoing
• Agronomy of multi-species mixtures	Lead	Ongoing
• Microbial communities in multi-species mixtures	Lead	Ongoing
• GHGs from multi-species mixtures	Lead	Ongoing
• Assessment of Ecological Focus Areas	Lead	Ongoing
• SMarterBufferZ: Specific Management and Robust Targeting of Riparian Buffer Zones	Lead	Ongoing
• Farm habitat recording within the Teagasc National Farm Survey	Lead	Ongoing
• HNVFarmForBio: High Nature Value Farmland and Forestry	Collaborator	Ongoing
• Waters of LIFE	Collaborator	Ongoing
• BRIDE EIP: Biodiversity Regeneration In the Dairying Environment	Collaborator	Ongoing
• Caomhnú Árainn EIP	Collaborator	Ongoing
• Curlew EIP	Collaborator	Ongoing
• Great Yellow Bumblebee EIP	Collaborator	Ongoing
• COSAINT: Cattle exclusion from watercourses: Environmental and socio-economic implications	Lead	Completed
• LEAP: Livestock Environmental Assessment and Performance (LEAP) Partnership	Lead	Completed
• Enhancing and maintaining biodiversity on intensively-managed farming systems	Lead	Completed
• EU SmartAgriHubs	Collaborator	Completed
• IdealHNV: Identifying the Distribution and Extent of Agricultural Land of High Nature Value	Collaborator	Completed
• KerryLIFE: Conservation of the Freshwater Pearl Mussel	Collaborator	Completed
• AranLIFE: The sustainable management of terrestrial habitats of the Aran Islands.	Collaborator	Completed
• BurrenLIFE: Delivering for farming and wildlife.	Collaborator	Completed
• FLINT: Farm Level Indicators for New Policy Topics (FLINT)	Collaborator	Completed
• AE Footprint: Assessment of agri-environment schemes: the Agri-Environmental Footprint Index	Collaborator	Completed
• Animal Change: Testing the benefits of grassland mixtures under experimental drought	Collaborator	Completed
• E-ruminant: Sustainability indicators for farmland wildlife	Collaborator	Completed