Evaluation of the impact of the CAP on habitats, landscapes, biodiversity

Final Report

Alliance Environnement
November 2019

– ALLIANCE ENVIRONNEMENT –

EUROPEAN COMMISSION

Directorate-General for Agriculture and Rural Development
Directorate C — Strategy, Simplification and Policy Analysis
Unit C4 — Monitoring and Evaluation

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European Economic Interest Grouping

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European Economic Interest Grouping

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LIST OF ACRONYMS AND ABBREVIATIONS

AECM:	Agri-Environment-Climate Measure
AEI:	Agri-Environmental Indicator
AES:	Agri-Environment Schemes
AKIS:	Agricultural Knowledge and Information System
ANC:	Area under Natural Constraint
AIR:	Annual Implementation Reports
APO:	Association of producer organisations
Art.:	Article
AT:	Austria
AWU:	Annual Work Units
B&L:	Biodiversity and Landscape
BHD:	Birds and Habitats Directives
BPS:	Basic Payment Scheme
BE:	Belgium
BG:	Bulgaria
B-W:	Baden-Württemburg
CAP:	Common Agricultural Policy
CBD:	Convention on Biological Diversity
CD:	crop diversification
CLLD:	Community-Led Local Development
CMEF:	Common Monitoring and Evaluation Framework
CMO:	Common Market Organisation
CS:	Case Study
CVdL:	Centre-Val de Loire
CY:	Cyprus
CWR:	Crop Wild Relatives
CZ:	Czechia
DE:	Germany
DG:	Directorate-General
DG AGRI:	Directorate-General for Agriculture and Rural Development
DG ENV:	Directorate -General for the Environment
DK:	Denmark
EAFRD:	European Agricultural Fund for Rural Development
EAGF:	European Agricultural Guarantee Fund
EC:	European Commission
ECJ:	European Court of Justice
EE:	Estonia
EEA:	European Environment Agency
EFA:	Ecological Focus Area
EIA:	Environmental Impact Assessment
EIP-Agri:	European Innovation Partnership for Agriculture
EL:	Greece
ELD:	Environmental Liability Directive
ELS:	Entry Level Stewardship
ENRD:	European Network for Rural Development
ES:	Spain
ESF:	European Social Fund
ESIF:	European Structural and Investment Funds
ESPG:	Environmentally Sensitive Permanent Grassland
ESQ:	Evaluation Study Question
EU:	European Union
EUR:	Euro
FA:	Focus Area
FADN:	Farm Accountancy Data Network
FAO:	Food and Agriculture Organization
FAS:	Farm Advisory System

FI:	Finland
Fl.:	Flanders
FOWL:	Forest and other wooded land
FR:	France
F&V:	Fruit and vegetable
GAEC:	Good Agricultural and Environmental Conditions
GHG :	Greenhouse gas
GLAS:	Green, Low Carbon Agri-Environment Scheme
GVA:	Gross Value Added
Ha:	Hectare
HLS:	High Level Stewardship
HNV:	High Nature Value
HR:	Croatia
HU:	Hungary
IACS:	Integrated Administration and Control System
IAS:	Invasive Alien Species
IBA:	Important Bird Area
IE:	Ireland
IL:	Intervention Logic
IO:	Information Obligation
IT:	Italy
ITPGRFA:	International Treaty on Plant Genetic Resources for Food and Agriculture
LAG:	Local Action Group
LCA:	Landscape Conservation Association
LPIS:	Land Parcel Identification System
LT:	Lithuania
LU:	Luxembourg
LUCAS:	Land Use/Cover Area frame Survey
LSU:	Livestock Unit
LV:	Latvia
M:	Measure
MAES:	Mapping and Assessment of Ecosystem and their Services
MS:	Member State
MT:	Malta
N:	nitrogen
N/A:	Not applicable
NB:	Nota Bene
NBSAP:	National Biodiversity Strategies and their Action Plan
NECD:	National Emission Ceilings Directive
NFC:	Nitrogen Fixing Crops
NGO:	Non-Governmental Organisation
NH_3:	ammonia
NL:	Netherlands
P:	phosphorus
P1:	Pillar 1
P2:	Pillar 2
P4:	Priority 4
PAF:	Prioritised Action Framework
PBA:	Prime Butterfly Area
PC:	Permanent Crop
PDO:	Protected Denomination of Origin
PG:	Permanent Grassland
PGI:	Protected Geographical Indication
PL:	Poland
PO:	Producer organisation
POSEI:	Programme d'Options Spécifiques à l'Éloignement et l'Insularité
PT:	Portugal
RDP:	Rural Development Programme
RO:	Romania
SAC:	Special Area of Conservation

SAPS:	Single Area Payment Scheme
SE:	Sweden
SEA:	Strategic Environmental Assessment
SEBI:	Streamlined European Biodiversity Indicators
SCM:	Standard Cost Model
SFM:	Sustainable Forest Management
SFS:	Small Farmers Scheme
SI:	Slovenia
SK:	Slovakia
SME:	Small and Medium Sized Enterprise
SMR:	Statutory Management Requirement
SPA:	Special Protection Area
SUPD:	Sustainable Use of Pesticides Directive
SWOT:	Strengths, Weaknesses, Opportunities, Threats
UAA:	Utilised Agricultural Area
UK:	United Kingdom
VCS:	Voluntary Coupled Support
Wall.:	Wallonia
WFD:	Water Framework Directive
WTO:	World Trade Organization
WWF:	World Wide Fund

1 INTRODUCTION

1.1 OBJECTIVES AND SCOPE OF THE EVALUATION STUDY

The objective of this evaluation study is to carry out 'an evaluation of the impact of the Common Agricultural Policy (CAP) on habitats, landscapes, and biodiversity'. It aims to evaluate the positive and negative, direct and indirect impacts of the 2014-2020 CAP on biodiversity and landscapes in areas under its direct influence, which include many protected habitats. It answers 15 evaluation study questions set by the Directorate-General for Agriculture and Rural Development, following public consultation. Not all CAP instruments or measures have relevant potential impacts. Those examined by this evaluation are described in section 3.

1.2 GEOGRAPHIC COVERAGE AND TIMEFRAME

The geographical scope of the evaluation is all 28 Member States of the EU. Case studies were undertaken in ten Member States listed in section 4.6.1. The timeframe is the current programming period (2014-2020) with 2007-2013 as a reference period.

1.3 DEFINITIONS OF KEY TERMS

In this study, in accordance with Article 2 of the Convention on Biological Diversity (CBD[1]) '**biodiversity**' is defined as '*the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems*'.

The study considers the impacts of CAP measures on all components of biodiversity, whether or not they are rare or threatened.

However, some parts of the study, e.g. in the Evaluation Study Question 5 (ESQ 5), focus on the species that are targeted by the Birds and Habitats Directives (hereafter also called the Nature Directives and BHD). These will include 'species and habitats of Community interest'. Strictly speaking, these comprise the habitats listed in Annex I of the Habitats Directive, and species listed in Annexes II and/or IV or V of the Habitats Directive, but do not include any bird species. However, in this study, it is assumed that birds should be considered, similarly to the species listed in Annex II of the Habitats Directive, as their conservation is an EU policy objective under the Birds Directive and due to their selection for particular conservation measures, including the designation of protected areas. Bird species listed in Annex I of the Birds Directive are therefore included in the analysis. For clarity and brevity, **BHD habitats and species** is the term used to refer to the group comprising: habitats listed in Annex I of the Habitats Directive, species listed in Annexes II and/or IV and V of the Habitats Directive, and species listed in Annex I of the Birds Directive.

This study also assesses the impacts of the CAP on **landscapes**. The focus is on the role that landscape attributes play in supporting biodiversity at the landscape scale. Particular attention is given to landscape diversity which is most relevant to the CAP's contribution to biodiversity and ecosystems. Landscape diversity includes aspects such as connectivity, corridor effects of landscape features, and homogeneity or heterogeneity of landscapes. It should be noted that connectivity does not necessarily refer to structural connectivity (i.e. links between patches of the same or similar habitat) but means instead functional connectivity, which takes into account a species' ability to move through/over the landscape.

[1] https://www.cbd.int/convention/text/default.shtml

2 DESCRIPTIVE CHAPTER

2.1 THE EU BIODIVERSITY TARGET AND POLICY FRAMEWORK

In order to evaluate the CAP's impact on habitats, landscapes and biodiversity it is necessary to understand the EU's objectives in that sphere and the policy framework which gives them effect. The CAP's impact on the extent to which those objectives are achieved may then be assessed.

The EU has adopted a Biodiversity Strategy to 2020 with a key headline target of '*Halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss.*[2]' In the following three sections the EU biodiversity target is briefly set out, and the key instruments that aim to contribute to meeting it are described. Section 2.2 then outlines the way agricultural and forestry systems and biodiversity interrelate, identifying the agricultural and forestry practices that most affect biodiversity and landscapes. Section 3 then provides a broad description of the CAP measures, their intervention logic and their potential to affect biodiversity outcomes either directly or indirectly.

The main EU policy instruments that elaborate the EU target are the Birds and Habitats Directives (Nature Directives). Both Directives have a similar set of specific and operational objectives requiring the conservation not just of species but also their habitats, through a combination of site and species protection and management measures supported by monitoring and research.

2.1.1 THE BIRDS AND HABITATS DIRECTIVES

2.1.1.1 Summary of key provisions

The Birds Directive[3] and Habitats Directive[4] form the cornerstone of the EU's biodiversity policy framework. The Birds Directive aims to maintain the populations of all species of naturally occurring birds in their wild state in the EU at a level that corresponds to the ecological, scientific and cultural requirements while taking into account economic and recreational requirements. This aim is further developed and defined in the Habitats Directive whose primary objective is: the *'maintenance or restoration, at favourable conservation status, of the natural habitats and species of wild fauna and flora of Community Interest'.* In simple terms, favourable conservation status can be described as '*a situation where a habitat type or species is prospering (in both quality and extent/population) and with good prospects to do so in the future as well'* (European Commission, 2011). Member States must take measures to enhance, maintain, or restore the status of designated habitats and species to a favourable level with consideration of economic, social, and cultural requirements and regional and local characteristics. Favourable Conservation Status is assessed across the whole national territory or across biogeographical or marine regions within the national territory if there is more than one such region within the Member State.

Both Directives have two main approaches (pillars) by which they can achieve their objectives:

- The protection of sites of particular importance to specific listed habitats and species, through the establishment of the Natura 2000 network, which comprises Special Protection Areas (SPAs) designated under the Birds Directive (for birds listed in Annex I of the Directive and for migratory species) and Special Areas of Conservation (SACs) designated under the Habitats Directive (for habitats listed in Annex I and species listed in Annex II).
- Protection measures that apply to all birds (with some exceptions) and selected non-bird species (listed in Annexes IV or V of the Habitats Directive) wherever they occur.

Of particular relevance to this study are the requirements under Articles 6(1) and 6(2) of the Habitats Directive for Member States to provide appropriate conditions for habitats and species within Natura 2000 sites. For each SAC under the Habitats Directive, Member States must adopt conservation measures through appropriate statutory, administrative or contractual means. Member States have similar but more general obligations under Articles 3 and 4 of the Birds Directive to avoid the deterioration of SPAs, and to manage them to meet the needs of the species for which they were

[2] The target was endorsed by the European Council on 26 March 2010.
[3] Directive on the conservation of wild birds (2009/147/EC, which is a codified version of the original Directive 79/409/EEC)
[4] Directive on the conservation of natural habitats and of wild fauna and flora (92/43/EEC)

designated. While all Natura 2000 sites are subject to conservation measures, Member States have discretion over the most appropriate means to ensure site management. The Commission has encouraged the use of site management plans, but their use is not obligatory. The Commission has published guidance on the management of farmland within Natura 2000 sites (European Commission, 2014).

In the context of landscape protection, Article 10 of the Habitats Directive is particularly relevant to CAP measures that apply outside Natura 2000 sites. Under this Article, 'Member States shall endeavour, where they consider it necessary, in their land-use planning and development policies and, in particular, with a view to improving the ecological coherence of the Natura 2000 network, to encourage the management of features of the landscape which are of major importance for wild fauna and flora'. These features include hedgerows, stone walls and terraces and lines of trees and may be affected by agricultural activities and CAP measures. The Article 10 provisions are not mandatory and remain at the discretion of Member States. Nonetheless, there is an argument that such measures should be taken when Member States regard them as necessary to achieve the overall objectives of the Directives, especially for the maintenance or restoration of the species and habitats at Favourable Conservation Status (Kettunen et al, 2007).

2.1.1.2 Implementation and funding

38% of the area Member States have designated as SACs and SPAs is on farmland. The CAP therefore plays an important role in incentivising its appropriate management. The CAP's array of instruments and measures, supported by advice and knowledge exchange, seeks to do this, whilst avoiding damaging impacts which could arise indirectly, and providing adequate protection for habitats on agricultural and forest land.

Most funding for the Natura 2000 network and other aspects of the implementation of the Nature Directives is through the integration of biodiversity goals into the key existing EU funds or instruments (i.e. the integrated approach)[5]. Of the EU funds other than LIFE, the European Agricultural Fund for Rural Development (EAFRD) – and in particular the agri-environment-climate measure (AECM) – is by far the largest source of EU funding for terrestrial Natura 2000 site management associated with agricultural or forestry activities. Decisions on funding priorities are taken at national and regional level.

To strengthen the coordination and integration of financing from different sources for Natura 2000 and biodiversity within the Member States, the European Commission, together with the Member States agreed that in 2014-2020 financing of the Natura 2000 network should be based on Prioritised Action Frameworks (PAFs) developed by the Member States. The purpose of these frameworks is to establish a national or regional strategy for protection and management of the Natura 2000 network including through use of the relevant EU financial instruments. PAFs aim to identify the required Natura 2000 conservation priorities and management measures as well as their costs and potential financing sources. Revised PAFs for the 2021-2027 programming period are being prepared by Member States for completion in 2019.

2.1.1.3 The Nature Directives Fitness Check and Action Plan for Nature, People and the Economy

The Fitness Check of the EU Nature Directives published in 2016[6], and its supporting evaluation study, found them to be fit for purpose although requiring substantially improved implementation to achieve their objectives. In particular the implementation of conservation measures within Natura 2000 sites required improvement. In addition, a survey of Member State EU funding allocations for the previous 2007-2013 financing period found that the amount budgeted for the Natura 2000 network (€550-€1,500 million per year) was only 9-19% of its estimated financing needs (Kettunen et al, 2011)[7].

Although it was not envisaged that the implementation of the Nature Directives would be solely dependent on EU funding, there is evidence that the primary cause of the funding gap is that the EU's integrated funding model has not been adequately realised, because the funding allocations for biodiversity have been insufficient and/or difficult to access (Kettunen et al, 2016). Based on a number

[5] COM(2004)431 and SEC(2011)1573.
[6] SWD(2016) 472 Final.
[7] More detail about the methodology used to estimate Natura 2000 financial needs is available in Kettunen et al (2011).

of prior studies (European Court of Auditors, 2011, 2013, 2014; Kettunen et al, 2011; Kettunen et al, 2014; Kettunen, McConville and van Vliet, 2012; Kettunen, Torkler and Rayment, 2014), the Fitness Check study concluded that, in addition to the overall gap in financing, a number of constraints have limited the use of EU funds for the implementation of the Nature Directives, including:

- Lack of integration of biodiversity requirements into EU sectoral funds at national, regional and local levels (e.g. through earmarking);
- Eligibility gaps, which limit the opportunities for EU funds to be used for nature conservation activities especially ongoing management requirements;
- Problems with uptake and absorption, such as resulting from capacity constraints within national and regional administrations and stakeholders; and
- Problems with coordination, which limit the ability to direct funds to priorities.

Following the Fitness Check the Commission developed an EU Action Plan for Nature, People and the Economy[8], to improve the implementation of the Directives, their coherence with socio-economic objectives and engagement with national, regional and local authorities, stakeholders and citizens. The Action Plan sets out 15 actions in four priority areas and over 100 individual measures to be implemented by 2019 by the Commission, the Member States, the Committee of the Regions and other stakeholders. In response to the perceived funding gap, one of the four priority areas of the Action Plan aims at 'Strengthening investment in Natura 2000 and improving synergies with EU funding instruments'. It proposes an increase in dedicated funding for nature and biodiversity which would allow for greater investment in Natura 2000 and calls for the development of more guidance and planning to help Member States. Action 8 calls on the Commission to help Member States to improve their multiannual financial planning for Natura 2000 as they update their PAFs**.** Action 9 aims to promote synergies with funding from the CAP.

2.1.2 THE EU BIODIVERSITY STRATEGY TO 2020

The EU Biodiversity Strategy comprises six main sub-targets and 20 supporting actions. Of particular relevance to this study (and the focus of ESQ 13) is Target 3, and supporting actions:

> *A) Agriculture: By 2020, maximise areas under agriculture across grasslands, arable land and permanent crops that are covered by biodiversity-related measures under the CAP so as to ensure the conservation of biodiversity and to bring about a measurable improvement in the conservation status of species and habitats that depend on or are affected by agriculture and in the provision of ecosystem services as compared to the EU2010 Baseline, thus contributing to enhance sustainable management.*
>
> *B) Forests: By 2020, Forest Management Plans or equivalent instruments, in line with Sustainable Forest Management (SFM)21, are in place for all forests that are publicly owned and for forest holdings above a certain size (to be defined by the Member States or regions and communicated in their Rural Development Programmes) that receive funding under the EU Rural Development Policy so as to bring about a measurable improvement in the conservation status of species and habitats that depend on or are affected by forestry and in the provision of related ecosystem services as compared to the EU 2010 Baseline*.

Box 1: Biodiversity Strategy actions supporting Target 3

- Action 8: Enhance CAP direct payments to reward environmental public goods such as crop rotation and permanent pastures; improve cross-compliance standards for GAEC (Good Agricultural and Environmental Conditions) and consider including the Water Framework in these standards
- Action 9: Better target Rural Development to biodiversity needs and develop tools to help farmers and foresters work together towards biodiversity conservation
- Action 10: Conserve and support genetic diversity in Europe's agriculture
- Action 11: Encourage forest holders to protect and enhance forest biodiversity

[8] COM(2017) 198 final.

- Action 12: Integrate biodiversity measures such as fire prevention and the preservation of wilderness areas in forest management plans

In 2015 the European Commission published its mid-term review of the Biodiversity Strategy[9]. As regards Target 3a, it recognised that the CAP has a range of instruments that can contribute to supporting biodiversity, and that examples have shown that, if appropriately implemented, they can have substantial beneficial impacts. However, the measures have not been successfully applied to biodiversity at sufficient scale, and therefore the Commission concluded that no significant progress towards the target has been made. Similarly, the Commission also concluded that no significant progress has been made towards Target 3b; noting that the potential for forest management plans and equivalent instruments to contribute to the target has been largely unused.

2.1.3 THE CONSERVATION OF GENETIC RESOURCES

The conservation of agricultural and forest genetic resources is important for intrinsic reasons, as well as contributing to wider biodiversity conservation, such as through improving ecosystem resilience. Some traditional hardy breeds of livestock are also better suited to low intensity farming systems that are of high nature value (HNV). Maintaining genetic diversity also contributes to agricultural resilience, adaptability (for example to climate change and disease) and profitability. For example, improved strains of cattle can reduce the GHG intensiveness of meat production through reduced mortality and higher growth rates.

The EU is committed to the conservation of agricultural and forest genetic resources through the Biodiversity Strategy 2020 and through its global commitments under the CBD, the Nagoya Protocol on Access and Benefit Sharing, and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). Member States also report individually to the FAO on their agricultural genetic resources conservation actions and to the FAO and Forest Europe on forestry genetic resources conservation. The EU Biodiversity Strategy commits the Commission and Member States to encourage the uptake of agri-environment-climate measures to support genetic diversity in agriculture and to explore the scope for a strategy for the conservation of genetic diversity in the EU. The Commission expected Member States to recognise the benefits of funding actions for agricultural genetic resources when planning their 2014-2020 Rural Development Programmes, as well as their research programmes in the European Innovation Partnership on Agricultural Productivity and Sustainability, but there is no obligation to allocate funds under the CAP[10].

2.2 THE RELATIONSHIP BETWEEN AGRICULTURE, FORESTRY AND BIODIVERSITY, LANDSCAPES AND HABITATS

2.2.1 AGRICULTURAL SYSTEMS AND THEIR BIODIVERSITY

In order to understand the CAP's impact, it is necessary first to understand how agriculture and forestry affect biodiversity, landscapes and habitats, before going on to examine agricultural and forest management.

2.2.1.1 The main types of farming systems in the EU

The terrestrial ecosystems that now exist in Europe are primarily a result of thousands of years of human interactions with natural ecosystems. Consequently, most of the EU is now dominated by agricultural and managed forest ecosystems, especially in lowland areas. Their interactions with the varying climates, topography and soils of Europe has contributed to a rich diversity of landscapes and habitats. As agriculture spread, new and diverse semi-natural habitats[11] with novel species communities were created (such as wood pastures, hay meadows and heathlands). This process is thought to have initially increased species richness across much of Europe (Ellenberg, 1988; Kornas, 1983; Poschlod,

[9] SWD (2015) 187 final.
[10] European Commission (2013) Report from the Commission to the European Parliament, the Council and the Economic and Social Committee Agricultural Genetic Resources – from conservation to sustainable use. COM (2013) 838 final.
[11] Sometimes referred to as 'cultural habitats'.

Baumann and Karlik, 2009; Stoate, 2011). Over the last hundred years and particularly since the 1950s, drivers of agricultural development have led to widespread agricultural improvements of natural and semi-natural habitats and the intensification of management (Stoate et al, 2009), which has created a range of agricultural habitats. According to Poláková et al (2011), the following eight types of agricultural habitat, and a further three organic types, can be distinguished according to their predominant types of vegetation and the intensity of their management, as set out in Table 1.

Table 1: Main types of agricultural habitats

Permanent grasslands[12] and other grazed habitats					Crops					
Natural habitats	Semi-natural habitats		Improved grassland		Cultivated			Permanent		
	Pastures	Meadows	Organic	Conven-tional	Extensive	Organic	Intensive	Extensive	Organic	Intensive

Source: own compilation

These include:

- Natural habitats: permanent grassland habitats that are extensively grazed, but are not dependent on grazing for maintenance and have not been significantly changed by livestock grazing or other human activities.
- Semi-natural habitats: vegetation and associated species that have not been planted and are dominated by native species, but are the result of human activities, for example woodland clearance, grazing and burning. These include:
  - Pastures which are dependent on livestock grazing for their maintenance; and
  - Meadows which are dependent on mowing (usually for hay) for their maintenance, although they may also be grazed at some times of year.
- Improved permanent grasslands which have been agriculturally improved through some form of physical works such as drainage, fertilisation or reseeding.
- Cultivated croplands, including temporary grasslands which are often converted from permanent grasslands. Most cultivated and permanent croplands in Europe are currently intensively managed, but some extensive cereals (for example on poor soils, dry, saline or waterlogged areas, or in remote locations) and old traditionally managed orchards are richer in biodiversity. Thus, there are strong grounds from a biodiversity perspective for distinguishing extensively cultivated crops and extensive permanent crops from intensive systems.

The organic farming systems are identified as a specific type of habitat (in three cases) because they differ significantly and consistently from conventional improved grasslands and especially intensively cultivated arable and permanent crops. Organic farming has been shown to enhance the species richness and abundance of many common taxa (plants, arthropods, soil biota, birds, and mammals) (Bengtsson, Ahnström and Weibull, 2005; Hole et al, 2005; Smith et al, 2011; Tuck et al, 2014; Tuomisto et al, 2012), although its effects are often species specific and trait or context dependent (Winqvist, Ahnström and Bengtsson, 2012).

The ecological processes and species associated with agricultural habitats described above are also affected by three important landscape-related factors:

- The spatial scale of the fields and farming system (e.g. from very small-scale strip farming, to enclosed fields or extensive unenclosed landscapes).
- The presence and ecological quality of field boundary habitats (e.g. hedges and ditches, uncropped strips) and other non-farmed habitat features (e.g. trees and ponds).
- Landscape diversity, in terms of:
  - Composition (i.e. habitat and boundary types);
  - Structure (i.e. scale of fields and other elements); and,
  - Interactions with other habitat types other than farmland (e.g. forests, wetlands, and urban areas).

[12] As defined ecologically as old grasslands or infrequently ploughed grasslands (typically at least five years old).

This typology is broadly compatible with the High Nature Value (HNV) farmland definition and typology which is widely recognised across Europe, by conservationists and policy makers (Box 2).

Box 2: High Nature Value farming and forestry

High Nature Value farmland comprises those areas in Europe where agriculture is a major (usually dominant) land use and where agriculture supports or is associated with either a high species and habitat diversity, or the presence of species of European, and/or national, and/or regional conservation concern or both (Beaufoy and Cooper, 2008; Cooper et al, 2007; Oppermann, Beaufoy and Jones, 2012). Within this definition three types of HNV farmland are identified:

- Type 1: Farmland with a high proportion of semi-natural vegetation.
- Type 2: Farmland with a mosaic of low intensity agriculture and natural and structural elements, such as field margins, hedgerows, stone walls, patches of woodland or scrub, small rivers etc.
- Type 3: Farmland supporting rare species or a high proportion of European or world populations.

The High Nature Value (HNV) farmland concept has been widely adopted across Europe in agricultural policy, primarily as a mapping/targeting and indicator tool. There is a considerable overlap between HNV farmland areas and farmland in Natura 2000, as the HNV type 3 has been identified using information from the Natura 2000 network, as well as from Important Bird Areas (IBAs), Prime Butterfly Areas (PBAs) and other suitable national biodiversity datasets (Paracchini et al, 2008).

High Nature Value forests are all natural forests and those semi-natural forests in Europe where the management (historical or present) supports a high diversity of native species and habitats, and/or those forests which support the presence of species of European, and/or national, and/or regional conservation concern (Cooper et al, 2007; European Commission, 2009). The combination of structural, compositional and functional characteristics, when coupled with an ecologically sympathetic management regime (historical and present), can support high levels of biodiversity in forests (EEA, 2016).

Source: own analysis

2.2.1.2 The biodiversity associated with the main types of farming system in the EU

It is clear from numerous studies (e.g. reviewed in Poláková et al, 2011; Stoate et al, 2009) that the key determinant of the richness and abundance of biodiversity associated with agricultural habitats is the degree to which they have been modified from their natural state as a result of agricultural improvements (e.g. draining, ploughing and reseeding of grass, conversion from grasslands to crops) and the intensification or modernisation of management (e.g. cultivation, the use of fertilisers, irrigation and pesticides) and specialisation in particular intensive systems. Therefore, semi-natural agricultural habitats are of particular value for rare and otherwise threatened species of open habitats because they provide grass and shrub dominated habitats that are similar to previously present natural ecosystems (such as steppic grasslands) and provide the species' specialised ecological requirements. As a result, most natural and semi-natural agricultural habitats in the EU are listed on Annex I of the Habitats Directive (hereafter referred to as HD habitats), and many associated species are listed in Annex II of the Habitats Directive (hereafter HD species) or listed in Annex I of the Birds Directive (hereafter BD birds), as they are also highly or exclusively dependent on natural or semi-natural habitats (Table 2).

Table 2: Agricultural habitats in the EU, their importance for selected threatened habitats and species, and their overall biodiversity

	Permanent grassland and other habitats grazed by livestock					Crops					
Habitat types	Natural habitats	Semi-natural habitats		Improved grassland		Cultivated			Permanent		
		Pastures	Meadows	Organic	Conventional	Extensive	Organic	Intensive	Extensive	Organic	Intensive
HD Annex I habitats[*1]	63										
BD Annex I birds[*2]	54			32					5		
HD Annex II Butterflies[*3]	9	25		0	0	0	0	0	0	0	0
European threatened amphibians[*4]	3	5		0		1	0		0	0	
European threatened reptiles[*5]	1	4		0		0	0		4	0	
Overall biodiversity importance	Very high, many species are restricted to such habitats	Very high, these habitats tend to be species-rich and declining; some species are restricted to such habitats and dependant on specific agricultural practices		Moderate, species diversity is much reduced compared to natural and semi-natural habitats, but some species of conservation importance use such habitats, sometimes in important numbers		High, such habitats are now rare and support some threatened species (esp. birds)	Low, especially in intensive farmland dominated landscapes, but biodiversity levels can be enhanced by appropriate measures		Moderate - High, such habitats are declining and support some threatened species	Low, especially in intensive farmland dominated landscapes, but biodiversity levels can be enhanced by appropriate measures	

Source: Poláková et al (2011). 1 Halada et al (2011); 2 adapted from Tucker and Evans (1997); 3 adapted from Van Swaay, Warren and Lois (2006) using updated annexes available from Butterfly Conservation Europe (http://www.bc-europe.org/upload/Butterfly%20habitats%20-%20Appendix%201.pdf): 4 Temple and Cox (2009); 5 Cox and Temple (2009). Note: Habitat divisions for each taxa group reflect the habitat types distinguished in the available data.

Agriculturally improved grasslands are at least an order of magnitude lower in their biodiversity value than semi-natural grasslands, as a result of the impacts of drainage, fertiliser use, and reseeding, and consequently do not include any Annex I habitats. Silage fields are often sown grass monocultures with no plants of high conservation value present at all, and therefore also have a highly impoverished fauna.

Similarly, most croplands have a highly impoverished biodiversity and are hostile to and unsuitable as habitat for nearly all species that are the focus of the Nature Directives. This is primarily as a result of their high levels of disturbance, the direct and indirect effects of pesticides, the dense and tall structure of many crops and the lack of food resources (e.g. wild plants and their seeds, invertebrates) for species higher in the food chain. However, some extensively grown cereals (for example on poor soils, dry, saline or waterlogged areas, or in remote locations), are of high biodiversity importance. These habitats have sparse crops, high crop rotation diversity and retain a sizeable proportion of fallow and the presence of patches of semi-natural vegetation (Bota et al, 2005; Suárez, Naveso and de Juana, 1997). Such extensive cropping systems are rare but they occur in parts of eastern and southern Europe. Particularly important areas remain in dry areas of Spain and are of very high conservation importance, as they hold large proportions of some BD birds, such as Great Bustard (*Otis tarda*), Little Bustard (*Tetrax tetrax*) and Lesser Kestrel (*Falco naumanni*). Extensive cereal systems may also hold relatively species-rich plant and invertebrate communities.

Nevertheless, even intensively managed croplands can hold significant numbers of common generalist species (particularly birds, as they tend to be relatively adaptable). This is particularly the case in organically managed crops, and areas where other beneficial measures (e.g. wildflower sown field margins) or features (e.g. fallow land, old large hedgerows and other unfarmed habitats) are in place. Some grazing waterbirds such as geese and swans (most of which are Annex I species) use intensively managed grassland and cropland, as they prefer to feed on young nutritious grass or crops and/ or crop residues, rather than semi-natural grassland (which in any case is often absent due to conversion to intensive farmland).

Some permanent crops can provide biodiverse habitats and host a number of HD and BD species. This is particularly true of traditional fruit and nut orchards, vineyards and olive groves, which can be HNV farming systems, when they retain large old trees and a semi-natural understory, which is extensively grazed by livestock (Baldock, 1999; Kabourakis, 1999).

These broad patterns of biodiversity in grasslands and croplands are primarily the combined result of farming practices, which are therefore further described in the next section.

2.2.1.3 The effects of agricultural practices on biodiversity

In order to develop the intervention logic (Chapter 3) and the resulting methodological approach it is necessary to understand how the CAP measures may affect biodiversity, habitats and landscapes. As a starting point, this section therefore provides a summary of the agricultural characteristics and Table 3 provides a summary of the agricultural practices that have been shown to have the most significant influence on biodiversity, whether positive or negative in relation to the habitat typology described in Table 1.

Table 3: Summary of principal impacts of key agricultural practices on biodiversity

Agricultural system	Permanent grasslands and other grazed habitats					Crops					
Habitat types / Agricultural practices	Natural habitats	Semi-natural habitats		Improved grassland		Cultivated			Permanent		
		Pastures	Meadows	Organic	Conventional	Extensive	Organic	Intensive	Extensive	Organic	Intensive
Grazing	Grazing is normally not required, and may be detrimental to sensitive species	Extensive grazing is normally the prime factor that maintains the habitat, appropriate grazing also increases botanical diversity, and associated fauna	Seasonal grazing helps to maintain botanical diversity, and associated fauna	Outdoor grazing can provide benefits, especially for invertebrates and birds	Grazing levels are often too high to maintain plant diversity and associated fauna; can provide feedings benefits for birds, but high nest losses from trampling	Grazing of fallows and stubbles is important for biodiversity	Temporary grasslands are sometimes grazed, but stocking levels too high to maintain plant diversity and associated fauna; can provide feedings benefits for birds, but high nest losses from trampling		Grazing of fallows and stubbles is beneficial for biodiversity		Not grazed
Mowing	NA	NA	Mowing for hay at appropriate times maintains the habitat and increases biodiversity	Mowing is normally for silage and is early and frequent, reducing plant and animal diversity, and causing high losses of ground nesting birds, but losses can be reduced by wildlife friendly cutting		NA	Mowing of temporary grasslands is normally for silage and is early and frequent, reducing plant and animal diversity, and causing high losses of ground nesting birds, but these can be reduced by wildlife friendly cutting		Some mowing for hay, which can increase biodiversity		Not mown
Cultivation & planting	Destroys the habitat	Normally causes significant damage, restoration can be difficult or impossible		Cultivation and reseeding of grasslands results in loss of semi-natural elements and much reduced biodiversity, recovery is possible if seedbanks remain but is slow		Frequent cultivations used to control weeds etc., damages soils and reduces biodiversity	Frequent cultivations used to control weeds etc., damages soils and reduces biodiversity		NA		NA
Rotations and fallow periods	NA	NA		NA		Rotations, especially those that contain fallow, increase crop diversity, which provides more options for species in terms of food and breeding habitat. Fallow land also reduces cultivation frequency and associated soil impacts, and can also provide good breeding habitats for birds due to the lack of farming operations.			NA		

Hydrology	Drainage is highly damaging, and hydrological management is not normally necessary	Drainage is highly damaging, but some habitats require or benefit from appropriate hydrological management e.g. to allow winter flooding, or high water tables		Some habitats may benefit from appropriate hydrological management e.g. to allow winter flooding, or high water tables		Field drains on arable land can result in further marginal declines in biodiversity		NA		
Fertiliser	Usually destroys the habitat	High rates of artificial fertiliser, slurry and farmyard manure use reduces plant diversity and associated fauna				Absence of use helps support biodiversity	Very high rates of artificial fertiliser, slurry and farmyard manure use reduces plant diversity and associated fauna, and creates vegetation that is often too tall and dense for birds to nest and feed in		Low rates of use may reduce plant diversity	Use of manure may provide some benefits	Use has little impact due to highly artificial nature of the vegetation
Pesticides	NA	NA		Organic compounds used occasionally, usually with few significant impacts	Herbicide use has significant impacts on many species as a result of direct toxicity and indirect impacts from the disruption of food webs	Not normally used, but major impacts if they are	Organic compounds used occasionally, with similar biodiversity impacts to other pesticides	Pesticide use has significant impacts on many species as a result of direct toxicity and indirect impacts from the disruption of food webs	Not normally used, but major impacts if they are	Pesticide use has significant impacts on many species as a result of direct toxicity and indirect impacts from the disruption of food webs	
Irrigation	Destroys the habitat but not normally carried out	Not normally carried out	Traditional irrigation systems can increase habitat diversity	Traditional systems can increase habitat diversity, modern systems lead to significant intensification and associated significant detrimental impacts		Normally destroys the habitat if carried out	Leads to significant intensification and associated significant detrimental impacts		Normally destroys the habitat if carried out	Leads to significant intensification and associated significant detrimental impacts	

Source: Poláková et al (2011)

2.2.2 FORESTRY SYSTEMS AND THEIR BIODIVERSITY

2.2.2.1 The main types of forest habitats in the EU

The EU has a large variety of forest types, due to the nine different biogeographical regions and the range of environmental conditions within each of these, with different climates, soil conditions, geography and disturbance dynamics. Furthermore, the natural characteristics of forests, including structure and species composition, vary greatly depending on the degree to which they have been subject to forestry management, and almost all forests in Europe have been influenced by forestry to some extent. Most European forest types are defined by the dominant naturally occurring tree species and one or two features of the understorey vegetation that would occur if the forest were not influenced by man, but some forest types have been created through the influence of traditional forestry management practices, including coppicing, pollarding, and grazing of livestock within forests, which has changed the structure of forests and favoured certain tree species over others. These management practices include coppice under medium and long rotations, coppice with standards, wood-pasture and wooded meadows.

The EU Habitats Directive lists 82 forest habitat types and 15 other types of wooded land in Annex I (i.e. as HD habitats). All the HD forest habitats are (sub)natural woodland vegetation comprising native species forming forests of tall trees, with typical undergrowth, and meeting the following criteria: rare or residual, and/or hosting species of Community interest (European Commission, 2013).

The EEA forest type classification divides European forests into 14 broad categories which include 78 forest types, some of which are divided into sub-types (EEA, 2006). The classification is based on dominant tree composition and biogeographical factors[13], with anthropogenic influence considered according to three categories: undisturbed by man, semi-natural forest, and plantation. A more detailed typology of forest management approaches with five categories (nature reserve, close-to-nature, combined objective, even-aged forestry, short rotation) was produced by Duncker *et al* (Duncker, Spiecker and Tojic, 2007; Duncker et al, 2012).

For the purposes of this study, these classifications can be simplified into the typology set out in Table 4 (although it should be noted that any type of forest can be managed in any way according to the objectives set for that site). Around 4% of the EU forest area is undisturbed by man, 87% is semi-natural and 9% consists of plantations (Forest Europe, 2015). Of the plantations, about half comprise introduced species.

Table 4: A simplified forest typology based on broad forest type, anthropogenic influence and management

Forest type	Anthropogenic influence	Forest management
Predominantly broadleaved forest	Undisturbed by man	Nature reserve / protected area
	Semi-natural forest	Close-to-nature
		Combined objective
	Plantation	Even-aged forestry
Predominantly coniferous forest	Undisturbed by man	Nature reserve / protected area
	Semi-natural forest	Close-to-nature
		Combined objective
	Plantation	Even-aged forestry
Mixed forest	Undisturbed by man	Nature reserve / protected area
	Semi-natural	Close-to-nature
		Combined objective
Other wooded land	Semi-natural	Combined objective
	Plantation	Short rotation

[13] The broad categories include: boreal and hemiboreal forests, coniferous forests (alpine and others), beech forests, oak and other deciduous forests (acidophilous, mesophytic, thermophilous, non-riverine alder, birch or aspen), broadleaved evergreen forests, mire and swamp forests, floodplain forests, and plantations.

2.2.2.2 The biodiversity associated with the main types of forest in the EU

The biodiversity value of forests is influenced by a combination of structural, taxonomic, and functional characteristics, including the presence of old growth stands and dead wood, regeneration areas and open glades, water features such as wetlands, lakes, ponds, streams, and by habitat fragmentation. Key factors include the tree species mix (native and site-typical or non-native or not site-typical), the presence of invasive alien species, the proportion of standing, snagged or fallen deadwood, the species richness of the ground flora, and the age structure of the forest. Some species such as large carnivores and some specialist forest bird species require large contiguous blocks of forest, whilst other species are typical of forest edge habitats as found in forest glades, regenerating areas such as old clear cuts, or natural boundaries to wetland or water bodies.

Non-intervention forests are very important for some very sensitive species, such as the bryophyte *Buxbaumia viridis*, and the Capercaillie (*Tetrao urogallus*). The EU Habitats Directive Annexes list 257 species which have forest as preferred habitat, and the Birds Directive Annex I lists 49 birds associated with forest as breeding and/or wintering habitat (ETC/BD, 2015).

Most European forests are classified as semi-natural, as their species composition and structure is affected by their present and past management, with a predominance of native species but also widespread presence of planted (i.e. not site-typical) forestry species, mainly conifers. Their value for biodiversity varies greatly depending on the intensity of the management. The overall influence of non-site-typical species will depend on their relative dominance, distribution and invasiveness. Most European forests currently have a largely even-aged structure i.e. between 20 and 80 years old, due to the removal of older trees. Some forest habitat types such as bog woodland, riparian and alluvial plain forests have greatly decreased in area and extent, so that the conservation and appropriate management of the remaining fragmented habitat areas has a high biodiversity significance.

Some forest habitats such as wooded pasture, wooded meadows, coppice woodland, and pollard agro-forestry are of importance for biodiversity and are the result of long periods of traditional low intensity management. Some of these habitats are recognised by their inclusion in the EU Habitats Directive, including *Castanea sativa* forests, dehesa and montado, and boreal wooded meadows and pastures. Other habitats, such as traditional low intensity orchards and olive groves, are priorities for conservation because of their value as habitat for birds and other species of conservation concern.

Plantations of non-native tree species and even-aged forests dominated by monocultures of forestry species that are managed by clearcutting are generally of low value for biodiversity, and do not generally host any species or habitats of European conservation concern.

2.2.2.3 The effects of afforestation and forestry management

The net biodiversity impacts of afforestation depend on the type of habitat lost through afforestation, on the landscape context and situation, and on how the afforestation is carried out. In terms of lost habitat, afforestation can be beneficial on degraded arable soils or species poor grassland or heath or if it replaces non-native species. However, if it replaces grassland, wetland, scrub or heath habitats that are species rich or characterised by rare species it may be detrimental. In terms of situation, afforestation can be beneficial if it prevents soil erosion or protects other valuable habitats such as water bodies. In terms of landscape context, afforestation may provide benefits from increased structural and habitat diversity but in other situations be detrimental if it increases predation on rare species such as ground nesting birds (e.g. by crows and raptors), and/or if it creates barriers in open landscapes that have a detrimental impact on specialised open land species such as Great Bustard (*Otis tarda*). In terms of how the afforestation is carried out, impacts will vary significantly in the short term depending on the extent of soil disturbance or compaction or track creation, whether drainage or other site alterations are undertaken, whether pesticides and fertilisers are used, and in the long term on the arrangement and density of trees, the mixture of species planted and whether native or exotic species are planted.

The impact of forestry management on biodiversity depends on the original forest type that is replaced and the new forest management. Forestry practices can have both positive and negative effects on biodiversity, depending on the type of management and taxonomic group. However, a general negative effect on biodiversity has been identified with increasing management (Paillet et al, 2010). Furthermore, the requirements of specialist species of conservation concern may not follow general biodiversity patterns. The following typical effects were identified from the literature:

Positive effects:

- The creation of small gaps in closed forest canopies through thinning or selective felling can increase overall species richness (e.g. of plants, lichen and bryophyte species), due to the creation of patches of sunny, dry exposed conditions (Nordén et al, 2012; Paltto, Nordén and Götmark, 2008).
- Some forest types were created by traditional management systems that maintain an open forest structure, including coppicing, pollarding, and forest pastures or meadows[14]. These forests provide suitable habitat for invertebrates (such as butterflies) and plant communities that require an open canopy, and also host different bird communities than closed forest.

Negative effects:

- Selected felling of old trees has a negative impact on various taxonomic groups, including bryophytes, lichens, fungi, saproxylic beetles, molluscs and birds (Bouget et al, 2014; Brin et al, 2011; Brunialti et al, 2010; Cuttelod, Seddon and Neubert, 2011; Fritz and Brunet, 2010; Gutowski et al, 2014; Horák, Vávrová and Chobot, 2010; Jonsell, Hansson and Wedmo, 2007; Kostanjsek et al, 2018; Lassauce, Lieutier and Bouget, 2012; Moning and Müller, 2009; Paillet et al, 2010).
- Clear cutting destroys entire habitats and species communities (e.g. epiphytic species) found in forests since all standing trees are removed (Dynesius, 2015; Dynesius and Hylander, 2007; Knorn et al, 2013; Sahlin, 2010; Zaghi, 2008).
- Stump and whole tree harvesting has a significant negative impact on saproxylic invertebrate diversity (Brin et al, 2013; Horák, Vávrová and Chobot, 2010; Jonsell and Hansson, 2011; Jonsell and Schroeder, 2014; Russo, Cistrone and Garonna, 2011; Victorsson and Jonsell, 2013a, b).
- Thinning of small and intermediate sized successional trees may have an impact on biodiversity. For instance, it may increase the extinction rate of specialist epixylic bryophytes that depend on closed canopy (Paltto, Nordén and Götmark, 2008).
- Small and large diameter dead wood removal has a negative impact on species of conservation concern in forests, including saproxylic bryophytes, lichens, fungi and invertebrates (Bergmeier, Petermann and Schröder, 2010; Brin et al, 2011; Humphrey et al, 2002; Jonsell, Hansson and Wedmo, 2007; Lassauce et al, 2011; Moning and Müller, 2009).
- Forestry operations can lead to disturbance of local fauna e.g. machinery noise (Benítez-López, Alkemade and Verweij, 2010; Capitani et al, 2006; Gurarie et al, 2011; Güthlin et al, 2011; Kaartinen, Kojola and Colpaert, 2005).

[14] Annex I habitats of this type include Fennoscandian wooded pastures (H9070), sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion-betuli (H9160), Galio-Carpinetum oak-hornbeam forests (H9170), Castanea sativa woods (H9260), Quercus suber forests (H9330).

2.3 BIODIVERSITY STATUS AND TRENDS IN AGRICULTURAL AND FOREST HABITATS AND SPECIES

2.3.1 SPECIES AND HABITATS

Member State monitoring, and other scientific studies, of the conservation status and trends of habitats and species have provided very strong evidence of severe and widespread declines in the extent and condition of agricultural and forest habitats and species populations in the EU over recent decades, particularly in agricultural areas. This is evident from a number of EU biodiversity indicators, and other scientific data, including the examples listed below.

2.3.1.1 SEBI 1: Abundance and distribution of selected European species

Common birds

According to the latest indicator data available on the EEA website[15] up to 2016, the common farmland bird population index has shown a fairly steady decline since 1990, by 32% (EEA, 2019). In addition, numerous national and regional studies have demonstrated similar or greater rates of decline, e.g. in Denmark (Heldbjerg, Sunde and Fox, 2018) and the UK (Hayhow et al, 2019) over several decades, and more recently since EU accession in Hungary (Szép et al, 2012) and Czechia (Reif and Vermouzek, 2019). In contrast, the common forest bird index has declined by 34% since 1990.

Grassland butterflies

The index of grassland butterflies declined by 39% between 1990 and 2017 in the 15 EU Member States where butterfly monitoring schemes exist.

2.3.1.2 SEBI 3: Species of European interest (i.e. HD species and BD birds)

According to Member States reports summarised in the State of Nature in the EU (EEA, 2015) over the period 2007-2012:

- 70% of assessments of HD species associated with cropland ecosystems had an unfavourable conservation status, and 30% were declining.
- 64% of assessments of HD species associated with grassland ecosystems had an unfavourable conservation status, and 21% were declining.
- 60% of assessments of HD forest species had an unfavourable status, and 17% were declining.
- 12% of assessments of cropland and 23% grassland bird populations were classified as threatened and 20% of cropland and 21% grassland bird populations as near threatened, declining or depleted.
- 9% of forest bird populations were classified as threatened and 13% as near threatened, declining or depleted.

2.3.1.3 SEBI 5 : Habitats of European interest (i.e. HD habitats)

According to Member States reports summarised in the State of Nature in the EU (EEA, 2015) over the period 2007-2012:

- 86% of grassland habitat assessments had an unfavourable conservation status, and 39% were declining.
- 80% of forest habitat assessments had an unfavourable conservation status, and 28% were declining.

Furthermore, draft results for HD habitats and species in agricultural and forest areas from the 2013-2018 monitoring period indicate that there has been little change in their status and trends, and particularly high proportions of agricultural habitats and species have an unfavourable status and declining trends.

2.3.1.4 Other species

In addition to the results from the monitoring of biodiversity indicators described above, many other scientific studies have recorded declines in a wider range of taxa in agricultural habitats. For example,

[15] https://www.eea.europa.eu/data-and-maps/indicators/abundance-and-distribution-of-selected-species-8/assessment

losses of arable weeds have been substantial primarily as a result of regular and intensive fertiliser and herbicide use (Storkey et al, 2012). A widespread decline in many pollinators in the EU has been documented in many studies, e.g. in Denmark (Dupont, Damgaard and Simonsen, 2011), Sweden (Bommarco et al, 2011) and the UK (Powney et al, 2019).

2.3.2 AGRICULTURAL AND FOREST GENETIC RESOURCES

Information on the status of agricultural and forest genetic diversity is scarce. Nevertheless, the latest global assessment of animal genetic resources by the FAO found that in absolute terms, the Europe and the Caucasus region has by far the largest number of at-risk breeds and the greatest proportion of breeds classified as at risk (45% of mammalian breeds and 43% of avian breeds) (FAO, 2019). At least 11.5% of the high priority European crop wild relative species are threatened (Bilz et al, 2011; Kell, Maxted and Bilz, 2012). Whilst it is particularly difficult to assess the threats facing European plant landrace diversity, as the threat assessment techniques are not well developed, Negri, Maxted and Veteläinen (2009) conclude that landrace diversity is likely to be the most threatened element of all biodiversity in Europe.

3 DESCRIPTION OF CAP MEASURES AND THEIR INTERVENTION LOGIC

Intervention logic is the reasoning behind how a CAP instrument or measure has been designed to achieve its objectives. It involves a complex series of relationships between individual measures and each of the CAP's objectives. Protecting and improving biodiversity may be the intervention logic for a specific instrument – as with EFAs – or those with a different intervention logic – such as direct payments – may produce impacts on biodiversity indirectly. These relationships are summarised in Table 5 below.

Table 5: Intervention logic of the CAP instruments and measures

CAP Measures	Specific measure/sub-measure	CAP instrument/measure's objective	Intervention logic focussed on biodiversity?	Potential impacts on biodiversity
Horizontal Regulation (Regulation (EU) No 1306/2013)				
Farm Advisory System	Art. 12-15	The Farm Advisory System (FAS) aims to 'help beneficiaries to become more aware of the relationship between agricultural practices and management of farms…and standards relating to the environment, climate change, good agricultural condition of land, food safety, public health, animal health, plant health and animal welfare' (preamble (10)). Member States must offer advice to farmers on cross-compliance, the Pillar I green payments, the conditions for the maintenance of land eligible for direct payments, the Water Framework and Sustainable Use of Pesticides Directives, as well as certain rural development measures (measures contributing to farm modernisation, enhancing competitiveness, innovation and market orientation, etc.). Moreover, if Member States choose to, FAS may cover other subjects such as the promotion of conversions of farms, the diversification of their economic activity, risk management, environmental issues (climate change mitigation and adaptation, biodiversity and protection of water, etc.).	Yes	The FAS is expected to reinforce the implementation of cross-compliance rules by farmers, which should help reduce negative impacts on biodiversity by improving farmers' awareness of the importance of compliance with existing environmental legislation. If Member States decide their FAS should cover biodiversity issues, then this is expected to increase farmer awareness of biodiversity issues, particularly with respect to farmer awareness of their legal obligations in Natura 2000 areas, and this is expected to reinforce compliance with basic management restrictions. However farmer awareness of biodiversity issues may be more strongly influenced by other sources. It is also difficult to show whether increased farmer awareness leads to changes in management that benefit biodiversity.
Cross-Compliance	Statutory Management Requirement SMR 2: Directive 2009/147/EC Art. 3(1), Art. 3(2) (b), Art. 4(1), 4(2) and 4(4) SMR 3 Directive 92/43/EEC Art. 6(1) and 6(2) Good Agricultural and Environmental Conditions GAEC 7 Retention of landscape features Art. 91-95	Cross-compliance is expected to contribute to the 'development of a sustainable agriculture through a better awareness of beneficiaries of the need to respect basic standards' and to ensure better consistency of the CAP 'with the environment, public health and animal welfare policies' (preamble 54 of Regulation (EU) No. 1306/2013).	Yes	SMRs 2 and 3 are expected to reinforce farm-level compliance with national or regional legal restrictions that protect certain habitats and species covered by the Nature directives. GAEC 7 requirement to retain certain landscape features, including a ban on cutting of hedges and trees during bird breeding and rearing season, is expected to help maintain habitats for some species as well as green infrastructure and landscape connectivity. If Member States have included measures for avoiding invasive plant species, this may also have a beneficial impact on some semi-natural

CAP Measures	Specific measure/sub-measure	CAP instrument/measure's objective	Intervention logic focussed on biodiversity?	Potential impacts on biodiversity
				habitats – but this depends on how Member State define 'invasive'.
	SMR 1 Nitrates Directive 91/676/EEC Other Good Agricultural and Environmental Conditions (GAEC) standards including: GAEC 1 Establishment of buffer strips along water courses GAEC 2 Use of water for irrigation GAEC 3 Protection of groundwater against pollution GAEC 4 Minimum soil cover GAEC 5 Minimum land management reflecting site specific conditions to limit erosion GAEC 6 Maintenance of soil organic matter level through appropriate practices […]		No	SMR 1 and the other GAEC standards may have an indirect impact through the avoidance of water pollution (SMR 1, GAEC 1, 2, 3) and the protection of natural resources including soils and carbon stock (GAEC 4, 5 and 6). While the soil GAEC standards may help improve soil biodiversity, this is not their primary objective.
Pillar 1				
Direct Payments Regulation (Regulation (EU) No 1307/2013)				
Basic direct payments	Basic Payment Scheme Single Area Payment Scheme Art. 21-19	The aim of basic direct payments is not stated clearly in the legislation but they are commonly understood to have the purpose of supporting farm incomes. Recital 21 to Regulation (EU) No 1307/2013says that basic direct payments aim to 'ensure a better distribution of support across agricultural land in the Union').	No	As an additional, non-market source of income, BPS/SAPS may, in some circumstances, contribute to preventing abandonment in economically vulnerable farming systems that are of biodiversity value and avoid the consequential loss of habitats and species, including of many EU protected habitats and species. The extent of this potential beneficial impact may be limited by the way payment eligibility is defined. Conversely, this additional source of income may help to support agricultural improvements/intensification with negative impacts on biodiversity.
Redistributive payment	Art. 21	The voluntary redistributive payment is aimed at sufficiently supporting smaller holdings in order to achieve the objective of income support effectively (preamble 36).	No	As above. NB the redistributive payment supports smaller farms proportionally more than larger farms.
Payment for agricultural practices beneficial for the climate and the environment	Crop diversification Art. 44	Crop diversification is expected to achieve 'enhanced environmental benefit … in particular the improvement of soil quality' (preamble 41 of Regulation (EU) No 1307/2013).	Yes	The measure is expected to result in more diverse crops being grown on arable farms (and potentially in more diverse and longer crop rotations as a result), particularly in areas of intensive cereal monoculture. It is therefore expected to increase crop and habitat diversity in the landscape, thereby increasing species richness. The resulting greater crop diversity is also

CAP Measures	Specific measure/sub-measure	CAP instrument/measure's objective	Intervention logic focussed on biodiversity?	Potential impacts on biodiversity
				expected to improve soil condition, and thereby soil biodiversity.
	Maintenance of permanent grassland Art. 45 (2)	The maintenance of the ratio of permanent grassland to total agricultural area is aimed at protecting permanent grassland from conversion to other uses 'for the sake of the environmental benefits of permanent grassland, and in particular carbon sequestration' (Art. 45).	Yes	Depending on the management regime, keeping long-term permanent grassland can help maintain habitats and their associated plant, fungal and invertebrate species richness (both below and above ground), and can also help maintain landscape diversity. However, the Permanent Grassland ratio rule is not intended to conserve species rich grassland. The CAP rules permit regular ploughing and re-seeding of the grassland and the use of PPP and fertilisers, all of which damage or destroy the biodiversity associated with grasslands.
	Designation of environmentally sensitive permanent grassland (ESPG) Art. 45 (1)	The designation of ESPG aims to protect the environmental benefits of areas covered by the Nature Directives (i.e. Natura 2000 sites) which 'need strict protection in order to meet the [Directives] objectives'. The intervention logic is therefore directly linked to biodiversity protection in this case. Member States may also designate additional ESPG outside Natura 2000 sites. ESPG cannot be converted or ploughed by farmers.	Yes	The ban on conversion and ploughing is expected to help maintain biodiversity-rich permanent grassland. In those Member States which have designated environmentally sensitive grasslands outside Natura 2000 areas, additional protection against ploughing can be expected compared to what the Nature directives offer.
	Ecological Focus Areas (EFAs) Art. 46	EFAs are expected to 'safeguard and improve biodiversity on farms (preamble 44 of Reg (EC) 1307/2013). EFAs can include • land laying fallow; • terraces; • landscape features, including those adjacent to eligible agricultural areas covered by arable land; • buffer strips including those covered by permanent grassland; • agro-forestry as supported under EAFRD; • strips of land along forest edges without cultivation; • strips of land along forest edges with cultivation; • short rotation coppice; • areas afforested under EAFRD; • areas with catch crops or green cover established by the planting and germination of seeds; • nitrogen fixing crops. From January 2018, three new EFA options are available: • areas with Miscanthus • areas with *Silphium perfoliatum* • land lying fallow for melliferous plants	Yes	Elements of EFAs have the potential to be beneficial to biodiversity through increasing the area of habitats such as fallow, nectar- and pollen-rich and/or seed rich vegetation, some multi-annual fodder crops, species rich grass margins, and landscape elements such as hedgerows. Actual impact will depend significantly on Member State implementation choices e.g. types of crop and species allowed, whether use of fertilisers and pesticides* is restricted, as well as proportion of arable land subject to EFA. * for pesticide use, new greening rules came into force on 1 January 2018 banning pesticide use on fallow land, nitrogen-fixing, catch and cover crops. Pesticides are also banned on areas with *Miscanthus* and *Silphium perfoliatum*.
Payment for areas with natural constraints	Art. 48	The aim of this instrument is to 'promote the sustainable development of agriculture in areas with specific natural constraints'. Its objective is to enable agricultural activity to continue on land subject to natural constraints which would otherwise result in its abandonment (Art. 48).	No	See M13 measure below.

CAP Measures	Specific measure/sub-measure	CAP instrument/measure's objective	Intervention logic focussed on biodiversity?	Potential impacts on biodiversity
Voluntary coupled support (VCS)	Support for certain types of animal and crop production to the level necessary to maintain current levels of production Art. 52	Coupled support is expected to support 'specific sectors or regions facing particular situations where specific types of farming or specific agricultural sectors are particularly important for economic, environmental and/or social reasons' (preamble 49). Since 1 January 2018, voluntary coupled support is defined as a production-limiting scheme but the requirement, previously applicable, that it could only be granted to the extent necessary to create an incentive to maintain current levels of production was removed from legislation. Coupled payments are therefore expected to maintain or increase the economic viability of these farming systems.	No	Some elements of VCS have the potential to support extensive grazing systems that maintain semi-natural habitats and HNV farmland that might otherwise be abandoned. However, payments may have the effect of increasing grazing rates that may be detrimental for biodiversity on sensitive grasslands. Coupled support for crops may maintain intensive cropping systems that are not expected to provide biodiversity benefits and may be associated with negative externalities from fertiliser and pesticide use.
Small Farmers Scheme (SFS)	Art. 61-65	The scheme aims to 'reduce the administrative costs linked to the management and control of direct support' for small farmers and to 'support the existing agricultural structure of small farms in the Union without countering the development towards more competitive structures' (preamble 54).	No	See BPS/SAPS and redistributive payment above. The Small Farmers Scheme is expected to increase the number of small farmers receiving a basic annual payment decoupled from production, by reducing the administrative costs linked to the management and control of direct support. Farmers in receipt of support via the SFS are exempt from cross-compliance and greening requirements.
Crop-specific payment for cotton	Art. 56	The crop-specific payment for cotton, available in BG, GR, ES and PT, aims to ensure against any risk of disruption to production in the cotton producing regions.	No	Intensive cotton production is associated with pesticide use and high water demand and therefore is likely to have negative potential effects on biodiversity. Organic cotton production may be less damaging for biodiversity.
Common Market Organisation (Regulation (EU) No 1308/2013)				
Aid in the fruit and vegetables sector (Operational Programmes)	Art. 32-33	Producer Organisations' operational programmes in the fruit and vegetables sector require the mandatory inclusion of two or more environmental actions; or that at least 10% of the expenditure under operational programmes covers environmental actions. Member States also need to 'ensure that investments which increase environmental pressure shall only be permitted in situations where effective safeguards to protect the environment from these pressures are in place' (Art. 33(6)). The CMO Regulation also states that 'the production and marketing of fruit and vegetables should fully take into account environmental concerns, including […] the maintenance of biodiversity and the upkeep of the countryside' (preamble 38).	No	Positive impacts can be expected if the environmental actions planned in the operational programmes are beneficial to biodiversity. If they aim to reduce pesticide input and/or introduce wildlife-friendly cropping practices such as flowering field margins, a positive impact on invertebrate populations and arable weeds can be expected, with associated knock-on effects on birds and mammals.
EAFRD – Pillar 2 (Regulation (EU) No 1305/2013				

CAP Measures	Specific measure/sub-measure	CAP instrument/measure's objective	Intervention logic focussed on biodiversity?	Potential impacts on biodiversity
M1 Knowledge transfer and information actions Art. 14	M1.1 - Support for vocational training and skills acquisition	This measure aims to 'enable farmers, forest holders, persons engaged in the food sector and rural SMEs to, in particular, enhance their competitiveness and resource efficiency and improve their environmental performance while…contributing to the sustainability of the rural economy' (preamble 12). The measure aims to improve the access for farmers, forest holders, persons engaged in the food sector and rural small and medium-sized enterprises ('SMEs') to technical and economic knowledge and information. It should enhance their competitiveness and environmental performance and could meet many objectives.	Yes, possibly	Some indirect positive impact of training and other actions is possible where funding is prioritised under Focus Area 4A, but this will depend on the overall focus and target groups of the action. However farmer awareness of biodiversity issues may be more strongly influenced by other sources. It is also difficult to show whether increased farmer awareness leads to changes in management that benefit biodiversity.
	M1.2 - Support for demonstration activities and information actions			
	M1.3 - Support for short-term farm and forest management exchange as well as farm and forest visits			
M2 Advisory services, farm management and farm relief services Art. 15	M2.1 - Support to help benefiting from the use of advisory services	This measure aims to help 'farmers, young farmers, forest holders, other land managers and SMEs in rural areas to improve the sustainable management and overall performance of their holding or business' through the provision of training and advice (preamble 13). Priority topics for advice can be set by Member States.	Yes, possibly	Some indirect positive impact of advice is possible where prioritised under Focus Area 4A, but this will depend on the overall focus and target groups of the action. Use of these measures to support compulsory training of beneficiaries of M10.1 and M15 could lead to improved management for biodiversity. However farmer awareness of biodiversity issues may be more strongly influenced by other sources. It is also difficult to show whether increased farmer awareness leads to changes in management that benefit biodiversity.
	M2.2 - Support for the setting up of farm management, farm relief and farm advisory services as well as forest advisory services			
	M2.3 - Support for training of advisors			
M3 Quality schemes for agricultural products and foodstuffs Art. 16	M3.1 - Support for new participation in quality schemes	This measure encourages the participation of active farmers in 'union or national quality schemes, including farm certification schemes for agricultural products and food'. This should in turn 'provide consumers with assurances on the quality and characteristics of the product or the production process…achieve added value for the products concerned and enhance their market opportunities' (preamble 14).	No	May support the marketing of quality products from HNV farmland including Natura 2000, thereby indirectly supporting the economic viability of farming systems that manage large areas of semi-natural habitats and the species they support.
	M3.2 - Support for information and promotion activities implemented by groups of producers in the internal market			
M4 Investments in physical assets Art. 17	M4.1 - Support for investments in agricultural holdings	The aim of measure 4 is to improve the economic and environmental performance of farms through investments. Investments under sub-measures M4.1-4.3 are intended to contribute to one or both of these objectives.	Yes, possibly	Investments may have net positive or negative impacts depending on the circumstances and the situation should the investment not take place. Investments may help maintain the economic viability of HNV farmland, and could have positive impacts, if e.g. they reduce pollution. Indirect negative impacts might arise where actions increase the intensity of farm production, for example by installing drainage or irrigation, or the area subject to the use of fertilisers, pesticides etc.
	M4.2 - Support for investments in processing/marketing and/or development of agricultural products		Yes, possibly	Investments may have net positive or negative impacts depending on the circumstances and the situation should the investment not take place. Some indirect positive impacts are expected from investments in quality product production associated with wildlife friendly farming systems (see M3 above). Some indirect positive impacts may arise from investments

CAP Measures	Specific measure/sub-measure	CAP instrument/measure's objective	Intervention logic focussed on biodiversity?	Potential impacts on biodiversity
				that reduce water or air pollution from food processing. It is possible that some investments might be linked to increased volume or intensity of production e.g. larger dairy capacity, which may be associated with a net negative impact on biodiversity.
	M4.3 - Support for investments in infrastructure related to development, modernisation or adaptation of agriculture and forestry		Yes, possibly	Investments may have net positive or negative impacts depending on the circumstances and the situation should the investment not take place. As for 4.1, investments may help maintain the economic viability of HNV farmland, and could have positive impacts, if e.g. they reduce pollution. Indirect negative impacts might arise where actions increase the intensity of farm production. Indirect negative impacts might also arise for example from land consolidation actions that lead to removal of landscape features.
	M4.4 - Support for non-productive investments linked to the achievement of agri-environment-climate objectives.	The aim of the non-productive investments measure is to 'support non-remunerative investments necessary to achieve environmental aims' (preamble 15). It supports non-productive investments linked to the achievement of agri-environment-climate objectives, including biodiversity conservation status of species and habitats as well as enhancing the public amenity value of a Natura 2000 area or other high nature value systems (Art. 17).	Yes	Positive impacts are expected from M4.4 where actions complement the use of AECM to maintain or enhance habitats and species.
M5 Restoring agricultural production potential damaged by natural disasters and catastrophic events and introduction of appropriate preventive actions Art. 18	M5.1 - Support for investments in preventative actions aimed at reducing the consequences of probable natural disasters, adverse climatic events and catastrophic events	The objective of this measure is to 'restore agricultural potential which has been damaged' following 'natural disasters, adverse climatic events and catastrophic events' (preamble 16).	No	Investments may have net positive or negative impacts depending on the circumstances and the situation should the investment not take place. It is possible for preventative and restoration actions to have net positive impacts for example by producing new or larger wildlife habitats within agricultural areas, or to have net negative impacts for example by reducing periodic flooding of wet grassland important for breeding waders or by draining or irrigating semi-natural grasslands.
	M5.2 - Support for investments for the restoration of agricultural land and production potential damaged by natural disasters, adverse climatic events and catastrophic events		No	
M7 Basic services and village renewal in rural areas Art. 20	M7.1 - Support for drawing up and updating of plans for the development of municipalities and villages in rural areas and their basic services and of protection and management plans relating to Natura 2000 sites and other areas of high nature value	This measure provides a contribution to 'the restoration and upgrading of the cultural and natural heritage of villages and rural landscapes' through the development of local infrastructure and services (Art. 20).	Yes, possibly	Positive impacts are expected from support from M7.1 for Natura 2000 management planning. By facilitating better management of Natura 2000 sites, M7.1 can contribute to generating benefits for biodiversity. It may have negative impacts if measures focus on infrastructure developments and biodiversity considerations are not taken into account.

CAP Measures	Specific measure/sub-measure	CAP instrument/measure's objective	Intervention logic focussed on biodiversity?	Potential impacts on biodiversity
	M7.6 - Support for studies/investments associated with the maintenance, restoration and upgrading of the cultural and natural heritage of villages, rural landscapes and high nature value sites including related socioeconomic aspects, as well as environmental awareness actions		Yes, possibly	Positive indirect impact can be expected if Member States or regions have allocated support under M7.6 for studies/investments in maintenance and restoration of rural landscapes and HNV sites, including Natura 2000 and other protected areas, and for environmental awareness, especially among land managers. It may have negative impacts (e.g. for bats) if biodiversity considerations are not taken into account in the maintenance/restoration actions supported.
	M7.7 - Support for investments targeting the relocation of activities and conversion of buildings or other facilities located inside or close to rural settlements, with a view to improving the quality of life or increasing the environmental performance of the settlement		No	Positive indirect impacts can be expected if investments target relocations of activities causing wildlife disturbance and from wildlife friendly building conversion e.g. for bats or swifts.
M8 Investments in forest area development and improvement of the viability of forests Art. 21-26	M8.1 - Support for afforestation/creation of woodland Art. 22	Forestry is an integral part of rural development and support for sustainable and climate friendly land use should include forest area development and sustainable management of forests (preamble 20 of Regulation (EU) No. 1305/2013). The measure therefore provides a range of investment opportunities for forestry. Support under M8 'shall be conditional on the presentation of the relevant information from a forest management plan or equivalent instrument in line with sustainable forest management as defined by the Ministerial Conference on the Protection of Forests in Europe of 1993' (Art. 21, 24 and 34). For all forest investment measures Member States must determine in their RDPs the size of holdings above which support becomes conditional on the drafting of a forest management plan (or an equivalent instrument).	No	Variable. In some circumstances afforestation with appropriate species on agricultural land can be expected to have positive biodiversity impacts by restoring woodland habitat connectivity in deforested areas, providing buffer zones and/or connecting small isolated forest patches. In other cases afforestation may take place on areas valuable for biodiversity associated with open habitats, which is lost or negatively affected by the afforestation, such as species-rich semi-natural grasslands or wetlands and/or bird species that require open landscapes (such as Great Bustard).
	M8.2 - Support for establishment and maintenance of agro-forestry systems Art. 23		No	Positive impacts can be expected from new agro-forestry if native species are used, and from maintenance of traditional agroforestry systems such as *dehesas* in ES. Negative impacts may arise if new agro-forestry systems are developed in inappropriate situations (e.g. on semi-natural grassland, or in open landscapes).
	M8.3 - Support for prevention of damage to forests from forest fires and natural disasters and catastrophic events Art. 24		No	May have net positive or negative impacts depending on the circumstances and the situation should the prevention not take place. Positive indirect impacts can be expected from support for grazing of fire breaks in Mediterranean forests, which maintains areas of semi-natural grassland and scrub associated with forests. Negative impacts result from clearance of deadwood,

CAP Measures	Specific measure/sub-measure	CAP instrument/measure's objective	Intervention logic focussed on biodiversity?	Potential impacts on biodiversity
				and management that interferes with natural sustainable fire ecology and leads to less frequent but more intense and damaging fires.
	M8.4 - Support for restoration of damage to forests from forest fires and natural disasters and catastrophic events Art. 24		No	It is possible for restoration actions to have indirect positive impacts for example by diversifying the species mix (more native species) and age structure of the forest. Some negative indirect impact might occur from funding for inappropriate replanting, or clear felling to reduce pest infestations, as this will affect saproxylic beetles and reduce habitat for other species associated with dead wood.
	M8.5 - Support for investments improving the resilience and environmental value of forest ecosystems Art. 25	M8.5 support is provided for the achievement of commitments for environmental aims, the provision of ecosystem services, to enhance the public amenity value of forest and wooded land, and to improve the climate change mitigation potential of ecosystems.	Yes	Positive impacts for biodiversity can be expected from some investments aimed at improving forest ecosystems. For example, these could be investments in pest management that reduce pesticide use.
	M8.6 - Support for investments in forestry technologies and in processing, mobilising and marketing of forest products Art. 26		No	Either positive or negative impacts may arise from new roads or methods of extraction of timber or other products from forests, and from more efficient processing plants and machinery.
M10 Agri-environment-climate (AECM) Art. 28	M10.1 - Payment for agri-environment-climate commitments	The objective of the AECM is to 'preserve and promote the necessary changes to agricultural practices that make a positive contribution to the environment and climate.' (Art 28). It should encourage farmers and land managers to introduce or continue to apply 'agricultural practices that contribute to climate change mitigation and adaptation and that are compatible with the protection and improvement of the environment, the landscape and its features, natural resources, and the soil and genetic diversity' (preamble 22). This measure is a key measure of the EAFRD to support the sustainable development of rural development areas and respond to the society's increasing demands for environmental services. It is compulsory and must therefore be included in all RDPs. Note: in the POSEI programmes for outermost regions, while there should be no overlap with RDP or CMO measures, agri-environment-climate payments may be increased up to twofold in the case of the measure to preserve the landscape, biodiversity and traditional features of agricultural land and the conservation of stone walls in the outermost regions.	Yes	Positive impact expected on biodiversity, habitats and species. Impact will depend on precisely what sort of actions are prioritised under the various schemes in place, the level of targetting and implementation of the measures.
	M10.2 - Support for conservation and sustainable use of genetic resources in agriculture		Yes	Targeted funding under M10.2 should help slow the decline of the populations of rare breeds and varieties. Positive impact is expected where indigenous breeds of plant or livestock species are supported, especially where these are associated with management of HNV farmland.

CAP Measures	Specific measure/sub-measure	CAP instrument/measure's objective	Intervention logic focussed on biodiversity?	Potential impacts on biodiversity
M11 Organic farming (OF) Art. 29	M11.1 - Payments to convert to organic farming practices and methods	This measure supports the conversion or the maintenance of organic farming to encourage farmers to adopt or maintain environmentally friendly farm practices and high standards for animal welfare. Amongst the objectives of organic farming is the contribution to a high level of biological diversity (Art. 1 of Regulation (EC) No 834/2007).	Yes	Positive impacts are expected in general for biodiversity through restrictions on use of chemical pesticides and inorganic fertilisers. However, impacts will vary depending on the organic farming practices carried out, previous land use, as well as the intensity of the farm management. Impacts can be negative if e.g. high amounts of slurry are applied to maintain grassland fertility.
	M11.2 - Payment to maintain organic farming practices and methods			
M12 Natura 2000 and Water Framework Directive payments Art. 30	M12.1 - Compensation payment for Natura 2000 agricultural areas	Support under this measure is provided to compensate beneficiaries for additional costs and income foregone from disadvantages in the areas concerned relative to the implementation of the Birds and the Habitats Directives and of the Water Framework Directive and to 'contribute to the effective management of Natura 2000 sites' in agricultural and forest areas. M12 thereby supports compliance with the objectives of these Directives.	Yes	Positive contribution to maintaining status of semi-natural habitats and associated species by compensating for compliance with restrictions in Natura 2000 agricultural areas is expected, thereby increasing acceptance of and compliance with the rules associated with Natura 2000.
	M12.2 - Compensation payment for Natura 2000 forest areas		Yes	
	M12.3 - Compensation payment for agricultural areas included in river basin management plans		No	Positive impacts can be expected from the reduction in water pollution from implementation of river basin management plans.
M13 Payments to areas facing natural or other specific constraints (ANC) Art. 31	M13.1 - Compensation payment in mountain areas	The aim of the ANC measure is to 'contribute to maintaining the countryside as well as to maintaining and promoting sustainable farming systems' by 'encouraging continued use of agricultural land' (preamble 25).	No	Schemes generally do not include any specific land management requirements that benefit biodiversity conservation (beyond adherence to cross-compliance). M13 may improve the economic viability of HNV pastoral systems and/or EU protected habitats and thereby indirectly contribute to preventing abandonment of these systems and consequential loss of habitats and species. Conversely, the payments may help to support agricultural improvements/intensification of these systems, with consequent negative impacts on biodiversity.
	M13.2 - Compensation payment for other areas facing significant natural constraints			
	M13.3 - Compensation payment to other areas affected by specific constraints			
M15 Forest-environmental and climate services and forest conservation Art. 34	M15.1 - Payment for forest-environmental and climate commitments	This measure provides support for 'commitments to enhance biodiversity, preserve high-value forest ecosystems, improve their climate change mitigation and adaptation potential, and reinforce the protective value of forests' (preamble 28).	Yes	Positive biodiversity impacts expected depending on precisely what sort of actions are prioritised under the various schemes in place, but they have the potential to help maintain and restore semi-natural habitats and associated species in forests including in Natura 2000 sites.
	M15.2 - Support for the conservation and promotion of forest genetic resources		Yes	Targeted funding under M15.2 is expected to conserve or increase genetic resources of forests. Positive impact is expected where native forest species are supported.
M16 Cooperation Art. 35	M16.1 - Support for the establishment and operation of operational groups of the EIP for agricultural productivity and sustainability.	This measure aims to encourage cooperation between two entities, including producer groups, cooperatives and inter-branch organisations, creation of clusters or networks, and the establishment of operational groups of EIP. These can for instance take the form of joint approaches to environmental projects and practices to produce greater and	No	The EIP-AGRI is expected to foster competitive, innovative and sustainable farming and forestry sectors that 'achieve more and better from less'. Innovative farm management systems which may be developed under EIP-AGRI could benefit biodiversity, e.g. by improving the economic viability of HNV

CAP Measures	Specific measure/sub-measure	CAP instrument/measure's objective	Intervention logic focussed on biodiversity?	Potential impacts on biodiversity
		more consistent environmental and climate benefits than those which can be produced at individual scale.		systems, or reducing pollutions (such as from improved waste handling). Negative impacts could arise from actions that lead to more intensive farming.
	M16.5 - Support for joint action undertaken with a view to mitigating or adapting to climate change and for joint approaches to environmental projects and ongoing environmental practices		Yes	Positive impacts can be expected from joint approaches to environmental projects or practices, depending on their focus. Farmers' cooperation to collectively enrol to agri-environment-climate schemes can for example increase the landscape-scale benefits on habitats and species.
	M16.8 - Support for drawing up of forest management plans or equivalent instruments		No	Positive impacts are expected from the drawing up of forest management plans. By facilitating more sustainable forest management, possibly with specific biodiversity measures including Natura 2000 site management, M16.8 can contribute to generate benefits for biodiversity.
M19 support for LEADER local development (CLLD) Art. 42-44	M19.2 - Support for implementation of operations under the CLLD strategy	LEADER aims to 'promote the development of rural areas by fully taking into account the multi-sectoral needs for endogenous rural development' (preamble 31). The LEADER measure focuses on community-led local rural development projects which can address a range of objectives, including projects whose focus is on addressing environmental and climate needs and priorities locally.	No	Positive impacts can be expected from LEADER/CLLD funded projects, for example if they focus on habitat and species management or through increased visitor and awareness about the local biodiversity and support. LEADER was however not used as a significant funding source for Natura 2000 in the previous programming period.
	M19.3 - Preparation and implementation of cooperation activities of the local action group			

Source: own compilation based on Regulation (EU) No 1305/2013, Regulation (EU) No 1306/2013, Regulation (EU) No 1307/2013 and Regulation (EU) No 1308/2013.

4 GENERAL PRINCIPLES AND METHODS FOR THE EVALUATION

4.1 DEVELOPMENT OF AN EVALUATION FRAMEWORK

The evaluation approach is based on the Commission's Better Regulation guidance and toolkit (European Commission, 2015a) and follows a logical chain from the design of the CAP instruments and measures at EU level and as implemented by Member States, the decisions by land managers which result and the changes in farming and forestry practices those decisions lead to. Those changes in turn lead to impacts on biodiversity and it is these impacts which determine the extent to which biodiversity objectives have been achieved.

4.2 IDENTIFYING THE COUNTERFACTUAL

The CAP is by no means the sole influence on biodiversity and landscape. Factors such as market conditions, social trends, climate and others also affect outcomes. Distinguishing the results of the CAP from those of such other factors is challenging, and not always possible. The Better Regulation guidelines recognise the difficulty of establishing counterfactual scenarios in cases like this where no true 'policy off' scenario is available because the CAP applies to all 28 Member States. Such scenarios can be modelled, however, and the evaluation draws on the results of such modelling work in ESQ 3 to address the impacts of the Basis Payment Scheme (BPS), Single Area Payment Scheme (SAPS) and Voluntary Coupled Support (VCS).

In other cases the differences in Member States' implementation can be analysed temporally (to see what has changed over time in a single Member State) and spatially (to compare different Member States). Such analysis often produces results which are qualitative rather than quantitative. Overall, isolating the net impacts of the CAP inevitably relies on a range of assumptions, which must be made transparent when reporting the results of any analysis.

4.3 METHODOLOGICAL TOOLS

Methods used to answer each ESQ are described in the answer. The main methodological tools used are literature reviews, analysis of statistical data, and case studies. Modelling by others of the impact of direct payments at EU level, and administrative costs, contributes to the analysis in ESQs 3 and 9. Primary data from the Farm Accountancy Data Network (FADN) for the ten case study Member States was analysed for ESQ 3 to provide contextual information on how certain indicators of the intensiveness of farming, such as livestock concentrations, have changed between the period under evaluation and the previous one. However, as noted above the CAP is not the sole factor affecting such indicators. Where assessments rely on expert judgement, information is triangulated where possible across multiple sources, or the partial nature of available information is acknowledged.

4.4 INDICATORS AND OTHER STATISTICAL DATA USED

The study used context, output, result and impact indicators from the CAP's Common Monitoring and Evaluation Framework (CMEF), the Streamlining European Biodiversity (SEBI) indicators, indicators of Sustainable Forest Management (SFM) reported by Member States to Forest Europe and the agri-environmental indicators compiled by Eurostat. Data at farm level for production, profitability, location (inside or outside a Natura 2000 area) and uptake of CAP measures were sourced from the Farm Accountancy Data Network (FADN).

4.5 LIMITATIONS OF THE METHODS PROPOSED

There are significant challenges associated with the methods used. These unavoidably limit the extent to which it is possible to draw some conclusions.

The challenges can be summarised as follows:

- The difficulty of establishing a true counterfactual and so identifying the net impacts of the CAP as opposed to other contributory factors;
- The fact that some of the instruments and measures which have impacts on biodiversity are designed and implemented for other purposes, meaning that little consideration may to date have been given to those impacts;
- The absence of recent data for many of the statistical indicators;

- Difficulties in assuring the reliability of information provided by stakeholders including through interviews;
- Difficulties finding recent literature on certain topics (for instance, the impact of cross-compliance) or for certain Member States (particularly the EU13);
- The difficulty of scaling up results from case studies to form generalised judgments at EU level.

To mitigate these difficulties, methods have been combined where appropriate to provide greater robustness.

4.6 APPROACH FOR THE CASE STUDIES

4.6.1 OBJECTIVES AND SELECTION OF THE CASE STUDIES

Case studies were used to gather information which is not otherwise available at EU level. By focusing on one Member State or region, case studies can be a means of accessing qualitative or quantitative information which would otherwise be difficult or impossible to access. This was an important component of the current evaluation given the complexity and site-specificity of many of the relationships between policy and its impact.

The case studies were chosen based on a series of criteria covering four broad themes in order to provide a reasonably representative picture across the EU. These were: biogeographical characteristics and main land use types; farm sector structure and land management; habitats and biodiversity trends in the agricultural sector; and CAP instrument and measure implementation choices (using a first examination of the available statistical data on key CAP instruments and measures relevant to biodiversity). An equal weighting was applied to the values of indicators considered under the four themes, to ensure a balanced selection of Member States across all these aspects.

Ten case studies were chosen in Croatia, France (département of Val de Loire), Germany (Land of Baden-Württemburg), Hungary, Ireland, Latvia, the Netherlands, Portugal, Slovakia and Romania.

4.6.2 EXECUTION OF THE CASE STUDIES: CONTENTS AND METHODOLOGY

The case studies were carried out between February and April 2019 and consisted of:

- A literature review of publications (including national publications in the language of the relevant Member State) relevant to questions raised by the ESQs;
- Analysis of CAP implementation decisions including a detailed analysis of the RDP;
- Semi-structured interviews with national authorities, environmental and farming stakeholders and farm advisors; and
- Collation and analysis of national level data and statistics.

All case studies were carried out by local experts according to a common template.

5 CAUSAL ANALYSIS

5.1 ESQ 1: WHAT IS THE ARCHITECTURE OF CAP IMPLEMENTATION IN MEMBER STATES IN RELATION TO ALL CAP INSTRUMENTS AND MEASURES HAVING EFFECTS ON BIODIVERSITY AND LANDSCAPES (I.E. CHOICES CONCERNING PILLARS I AND II)?

5.1.1 UNDERSTANDING OF THE QUESTION AND PROCESS AND METHODOLOGICAL APPROACH

This ESQ requires a description of the choices made by Member States when implementing the CAP instruments and measures capable of impacts on biodiversity. This information has been sourced from notifications made to the Commission by Member States, Member States' Annual Implementation Reports for 2017 under the Rural Development Regulation, from the AGRI-dashboard, and, for the case study Member States, more detailed information requested of the national authorities.

5.1.2 ANALYSIS

Analysis is presented below of how Member States have implemented the horizontal, Pillar 1 and Pillar 2 instruments and measures. The measures examined are those that have the potential to influence biodiversity both positively and negatively, where Member States have options about how to implement the measures. For those whose intervention logic is not specifically focussed on biodiversity, only those that have a significant budget allocation have been examined in detail.

Before looking at the CAP instruments and measures, it is important to note that Member States have the option of transferring funds between the two pillars as follows:

- Pillar 1 to Pillar 2: All Member States permitted to transfer 15%; and
- Pillar 2 to Pillar 1: All Member States permitted to transfer 15%, and 12 Member States permitted to transfer up to 25%[16].

Five Member States have chosen to move funds from Pillar 2 to Pillar 1 and between them they transferred €3.4 billion over the six-year period. Twelve Member States have chosen to transfer funds from Pillar 1 to Pillar 2 amounting to €7.12 billion. The net result of the transfers[17] shows an overall shift of € 3.4 billion from Pillar 1 to Pillar 2 over six years (DG AGRI, 2018)[18]. Over the period, some changes in the transfers between Pillar 1 and Pillar 2 for 2018 and 2019 have taken place – France has increased the transfer rate from 3.3% to 7.5%; the Netherlands from 4.3% to 8.3% (8.4% in 2019); and Lithuania from zero to 3.4% in 2018 and 6.5% in 2019. This has increased the amount transferred to Pillar 2 by €0.72 billion. It should be noted that where transfers are taking place between Pillar 1 and Pillar 2, these are at a lower rate than the compulsory transfer level in the 2007-13 period.

5.1.2.1 Choices relating to horizontal measures

Horizontal measures comprise cross-compliance and the Farm Advisory Service (FAS).

Cross-compliance

Member States do not have flexibility over the implementation of SMRs 2 and 3 which must be applied automatically to existing requirements. The most significant choice relevant to biodiversity they have under cross-compliance is which landscape features to protect through GAEC 7, although the design of soil GAECs 4, 5 and 6 also has some potential to affect soil biodiversity. The extent to which GAEC 7 has been used by the case study Member States varies widely, with protection most commonly applied to groups of trees (7/10 Member States), hedges and isolated trees (6/10) and trees in a line and terraces (5/10). However in the Netherlands the only GAEC 7 requirement is that farmers obtain a permit before felling trees. Minimum and maximum dimension limits for GAEC 7 features – where set

[16] These Member States are Bulgaria, Estonia, Finland, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Spain, Sweden, and the United Kingdom.

[17] Figures from 2018.

[18] Member States transferring funding from Pillar 1 to Pillar 2 were: Belgium, Czechia, Denmark, Germany, Greece, France, Latvia, Lithuania, the Netherlands, Romania, the United Kingdom and those transferring funds from Pillar 2 to Pillar 1 were: Croatia, Hungary, Malta, Poland, Slovakia.

– also vary between Member States. In some (but not all) cases these same landscape features also count as the eligible area under the EFA greening measure (see below).

In Ireland designated habitats which were formerly newly created habitats under a Pillar II environmental scheme are designated as landscape features where the farmer opted to retain these habitats on exiting the scheme and declared them on the SPS application as 'designated habitats'. Where this has been done, these habitats are protected through cross-compliance and cannot be damaged or removed for as long as they continue to be declared for CAP support. In addition to these differences in the landscape features chosen for protection, only three of the case study Member States have chosen to introduce cross-compliance measures to protect against invasive species (HR[19], IE[20] and LV[21]).

Farm Advisory System

All Member States are required to put in place a Farm Advisory Service (FAS). This is required to provide information to farmers about cross-compliance obligations, the operation of the Pillar 1 greening measures, the application of rural development measures relating to farm competitiveness, farm modernisation, innovation and market orientation and entrepreneurship. Member States may also choose to provide information on a range of other topics. Although all Member States have put an FAS in place, the way they operate varies significantly in terms of the information provided, the organisations providing the advice, the content of the advice provided and the way it is communicated to farmers. The FAS must include advice on how to meet the requirements of cross-compliance and the Pillar 1 greening measures, both of which have biodiversity components.

The operation of the FAS in Romania is reported as being weak and fragmented particularly in relation to cross-compliance and the agri-environment measure (Rusu, 2014; Toderiţă, 2019). Beyond the mandatory requirements, case studies also highlighted that a number of Member States provide biodiversity advice to farmers, often in relation to agri-environment-climate schemes via the FAS (see Box 3). Other Member States provide biodiversity advice for land managers, funded under EAFRD measures, but separate from the FAS, and these are covered in section 5.1.2.3.

Box 3: Examples of where the FAS is used to provide support for biodiversity

In **Slovakia** the FAS includes advice on restoring, preserving and enhancing biodiversity including Natura 2000 sites, as well as fertiliser and pesticide storage and application (alongside other environmental advice). In addition, farmers are required to enrol in training schemes/receive advice to receive support under different measures, e.g. an applicant for a payment under the AECM is obliged to complete a training course by the end of the first year of the commitment.
In **Portugal**, nature conservation is highlighted as a theme on which the FAS provides advice to improve the sustainable management of agricultural areas.
In **Croatia**, biodiversity is included as a topic on which advice is available under the FAS, funded under the advice and training measures in the rural development regulation. Farmers have to enrol in training scheme/receive advice to receive support under the agri-environment and organic measures and must attend six hours of training or demonstration programmes each year. By 2018, 545 farmers had received environmental/biodiversity advice. The FAS also provides compulsory training on the requirements relating to the sustainable use of pesticides as set out in the national action plan on the sustainable use of pesticides.
In **France** the FAS is delivered through a network of organisations, such as chambers of agriculture, farmers' associations, farmers' cooperatives, private consulting companies but also upstream and downstream industries. Some of these will have expertise in biodiversity, although no information is available on how widespread this type of advice is. For greening, a factsheet on EFAs was produced which set out the environmental benefits of different option, with a section focusing on actions that are beneficial for biodiversity.

Source: case studies

5.1.2.2 Choices relating to Pillar 1 Instruments

The choices Member States must make in respect of Pillar 1 instruments which have the greatest potential impact on biodiversity are:

- Which land to make eligible for direct payments;

[19] In Croatia the species covered are Ragweed (Ambrosia artemisiifolia L.), abutilon (Abutilon theophrasti Med.), perennial weeds and woody plants.

[20] In Ireland the species covered are Rhododendron, Giant Hogweed, Japanese Knotweed, Himalayan Balsam, Montbretia, Old Man's Beard, Giant Rhubarb.

[21] In Latvia the species covered is Sosnowsky's Hogweed (Heracleum Sosnowskyi).

- Whether to offer Voluntary Coupled Support, and if so for which livestock or crops, at which rates and in which locations;
- To what extent to restrict ploughing and conversion of permanent grassland by using the greening ratio to discourage conversion and ESPG designation to ban ploughing altogether;
- Which EFA types to allow farmers to declare.

Eligibility criteria for direct payments

Decisions available to Member States affect which areas of land are eligible for direct payments in the following ways:

Member States may define 'permanent grassland' – one of the three categories of land eligible for payments – broadly to include trees and shrubs within the definition as long as grasses and herbaceous forage remain predominant (over 50%) and the trees and shrubs are used for grazing. They may also decide to include as permanent grassland 'land which can be grazed and which forms part of established local practices' even if grasses do not predominate. Such local practices can be those important for the conservation of habitats in Annex I of the Habitats Directive, those covered by the Birds Directive or 'practices for livestock grazing which are traditional in character and are commonly applied on the areas concerned'. If they opt for this broad definition then further decisions are required about which ligneous areas to include. Regulation (EU) 2017/2393 extended the options to include land on which animal feed is produced, even though it cannot be directly grazed. Four Member States (EL, FR, ES and the UK (except Wales)) opted in 2015 to include some land on which herbaceous grasses do not predominate, whilst four (EL, FR, ES and PT) took advantage of the new flexibility for 2018 to include areas producing animal feed. Examples of how four Member States have defined permanent grassland are set out in Box 4.

Member States may exclude areas of land which are naturally kept in a state suitable for grazing (for instance, by wild deer) from eligibility for CAP support by setting other minimum activity requirements. They must establish criteria to determine whether land on which no grazing or production takes place has been kept in a state suitable for grazing or cultivation, which is necessary in order for it to be eligible. In addition they must determine how potentially ineligible features on agricultural parcels, such as trees and other landscape features, are to be dealt with, according to the rules set out in Articles 9 and 10 of the delegated regulation relating to IACS[22]. However features, including trees, which have been protected under GAEC 7 are automatically eligible.

Box 4: Permanent grassland eligibility in Bulgaria, Croatia, France and Ireland

In **Ireland**, eligible 'permanent grassland' includes ryegrass-dominated swards typical of intensively managed areas and less productive swards with rush (Juncus) and other non-grass herbaceous species; heather which is grazeable is eligible and also blanket bog provided it is accessible to livestock. Vegetation which does not meet the criteria, including rushes that are too dense or heather that is too tall, lead to proportional reductions in payments for that parcel of land to exclude the ineligible parts of the parcel.

In **France**, national authorities have designed a pro-rata system to make it possible for farmers to get direct payments for heaths and grazed wooded pastures. Under the revisions to rules about what can constitute permanent grassland (since 2018), it is possible for these areas to be eligible for direct payments, but only to a limited extent and under certain conditions.

Three types of pasture land where grass cover does not dominate are considered eligible for direct payments in France, but only partially: pastoral areas dominated by ligneous cover ('maquis') located in the south of France, and grazed oak and chestnut groves in specific Protected Denominations of Origin areas (Pelardon in Cévennes and Jambon de Corse). The French administration calculated the admissible area using a pro-rata system. However, in 2018, the EC accused the French government of being too generous over the calculation of admissible area. As a result the Ministry has placed more restrictions on the eligibility of these areas.

In **Croatia**, permanent grassland comprises meadow, pasture and karst pasture that has not been included in the crop rotation of the farm for five years or more. Pasture is defined as permanent grassland where, in addition to grass and low vegetation suitable for grazing livestock, landscape features, rocks or trees/shrubs can be found. Karst pasture is an extensive pasture in the coastal and mountain areas where, in addition to grass and low vegetation suitable for grazing, landscape features and elements of karst can be found. The eligible pasture area is determined by multiplying the total area of the IACS parcel by a reduction coefficient, depending on the extent of unsuitable areas (e.g. rocks, trees, etc.) larger than 500 m² within the parcel. If less than 10% of the parcel is unsuitable, the farmer receives 100% of the payment), for 10 – 30%, 80% of the full payment is received, for 30 – 50%, 60% and for more than 50% no payment is received.

[22] Commission Delegated Regulation (EU) No 640/2014.

In **Bulgaria**, permanent grassland is defined as eligible for CAP support if it meets the following conditions:

- There are not more than 100 trees and/or shrubs per hectare with a height over 0.5m (for dwarf pine and juniper – regardless of height) that are scattered over the area;
- There are scattered buildings, facilities, rocks, rocky areas, eroded or bare areas which occupy not more than 10% of the total area of pasture, after the exclusions of ineligible areas.

Source: case studies and Bulgaria ministerial ordinance

Pillar 1 Greening measures

The greening measures, as for other Pillar 1 instruments, are typically implemented at the national level, except in Belgium and in the United Kingdom where there are differences in their implementation between regions. Member States must allocate 30% of their national ceiling for direct payments to the greening measures. However, they do have a number of implementation flexibilities open to them[23], which are reported below.

Member State notifications to DG AGRI show that 79% of all EU agricultural land was subject to at least one greening obligation in 2018 (or 85% of arable and permanent grassland). The following areas were exempt from greening obligations:

- 5.27% (4.4 million ha) under the Small Farmers Scheme
- 5.63% (6.4 million ha) classified as organic and therefore compliant with the greening requirement without the need to respect the three greening obligations
- 7% was under permanent crops - this accounts for over 10% of total agricultural area in Malta (10%), Italy and Cyprus (19%), Portugal and Spain (20%) and Greece (25%)

The remainder was under other exemptions, such as the forest exemption (applies in EE, LV, FI and SE). There is a wide variation in these figures between Member States, with Member States with large areas of small farms, organic area and/or permanent crops having a lower proportion of land covered by the greening measures (e.g. EL, IT, RO).

Environmental Focus Areas

In 2017, some of the rules relating to EFAs changed, which took effect from 2018. This included a ban on the use of pesticides on nitrogen fixing crops declared as EFA as well as the introduction of three new EFA types: *Miscanthus*, *Silphium perfoliatum* and land lying fallow covered with melliferous plants (which has a higher weighting than other fallow land in recognition of its perceived additional benefits).

Data for the 2019 claim year showed that the EFA types offered to farmers by the most Member States were land lying fallow and nitrogen fixing crops (26 Member States), landscape features (24 Member States) and catch crops and buffer strips (21 Member States). Of the new EFA types available, 12 Member States have offered melliferous fallow (BE (Fl), BE (Wa), DE, DK, ES, FR, IT, LU, NL, AT, PL, SI, SE). Eight have made miscanthus areas eligible (BE (FL), BE (Wa), DE, ES, FR, LU, NL, AT, RO) and six permitted areas with Silphium perfoliatum (BE (FL), DE, ES, LU, NL, AT).

There have been some significant changes in the uptake by farmers of the different EFA types between 2017 and 2018 in the area of land under EFA and changes in the uptake of the different EFA types (see Table 6). This coincides with changes in the EFA rules in 2017. Overall there was a decrease in the area declared as EFA of two million hectares from 11.5 million ha in 2017 to 9.6 million ha in 2018 (before weighting factors). This is the equivalent of 9% of the total arable area in 2018 or 13% of the arable area eligible for EFA. This was possible because farmers had allocated more hectares than were strictly necessary to fulfil the requirement of declaring 5% or their arable land at farm level. In terms of the uptake of the different EFA types, the following changes can be noted:

Catch crops have taken over as the most popular EFA element from nitrogen fixing crops (NFC) in 2018, as a possible consequence of the introduction of a ban on pesticide use both on catch crops and on NFC in 2017. The area under NFC which was declared as EFA declined from 40% to 24% of total EFA area (from 4.6 million ha to 2.3 million ha). By contrast the area declared as catch crops increased from 37% to 51% - up from 4.3 million ha to 4.9 million ha.

The area declared as fallow declined by 13% (300,143 ha) between 2017 and 2018. The area declared in 2018 was 2.04 million hectares. Over 50% of the EFA area is fallow in five of the 26 Member States

[23] As set out in Regulation (EU) No 1307/2013 and Delegated Regulation (EU) No 639/2014.

offering land lying fallow as an option (ES, CY, LV, PT, and FI). The new option for 'melliferous fallow' was offered by 14 Member States but taken up by farmers in six of these in 2018 covering a total of 18,869 ha (mostly in DE 15,036 ha and FR 2,761ha).

In 2018, 16.4 million ha of arable land was exempted from EFA. Of this, 10.3 million ha was on farms that had less than 15 ha of arable land, 2.3 million ha was exempted under the forest exemption (only in EE, LV, FI and SE) and 3.8 million ha for other reasons (e.g. organic). Table 6 shows absolute figures for areas declared under each EFA element in the years 2015-2018 and the changes in uptake over time. This shows that the area under all elements has gone down apart from catch crops, buffer strips and a slight increase for landscape features.

Table 6: Change in areas (before weighting factors) under different EFA elements between 2015 and 2018 in the EU-28

	2015	2016	2017	2018	2018 area: % eligible arable area	Change 2015-2018	% change 2015-2018	% change 2017-2018
Land lying fallow	2,494,961	2,377,412	2,344,990	2,044,847	2.8%	-450,114	-18%	-13%
Silphium				1,241	0.0%	1,241		
Miscanthus				3,898	0.0%	3,898		
Nitrogen fixing crops	3,752,852	4,080,022	4,630,841	2,314,535	3.2%	-1,438,317	-38%	-50%
Catch crops	3,943,963	4,195,635	4,263,639	4,879,501	6.7%	935,538	24%	14%
Short rotation coppice	15,377	19,895	16,604	16,477	0.0%	1,100	7%	-1%
Agro forestry	66	89	85	62	0.0%	-4	-6%	-27%
Buffer strips*	69,507	58,100	67,682	136,950	0.2%	67,443	97%	102%
Terraces	153	136	82	60	0.0%	-93	-61%	-27%
Strips along forest	17,601	15,178	17,023	9,001	0.0%	-8,600	-49%	-47%
Landscape features	236,876	197,575	160,160	167,536	0.2%	-69,340	-29%	5%
Afforested areas	52,708	51,467	35,306	21,590	0.0%	-31,118	-59%	-39%
Totals	**10,584,064**	**10,995,509**	**11,536,412**	**9,595,698**	**13.1%**	**-988,366**	**-9%**	**-17%**

* From 2018, field margins are recorded under the 'buffer strip' category, rather than 'landscape features' which explains the changes in these two categories for 2018.
Source: European Commission, DG Agriculture and Rural Development, Greening monitoring indicators for 2015, 2016, 2017, 2018

Environmentally Sensitive Permanent Grassland (ESPG)

ESPG inside Natura 2000 areas: In 2018 figures show that there were 16.6 million ha of permanent grassland in Natura 2000 areas. Of this, 57.6% was designated as ESPG (9.54 million ha). However, only 4.9 million ha were declared by farmers as ESPG[24] – 51% of the area designated as ESPG, or 29.6% of the total area of permanent grassland in Natura 2000 areas.

Ten Member States designated 100% of their permanent grassland in Natura 2000 areas as ESPG in 2018 (BG, CZ, EL, IT, HU, NL, RO, SK, FI, SE) up from seven in 2016. The main change here is in Romania, where the area designated rose from 70% in 2016 to 100% in 2018. In contrast, seven Member States have designated less than 25% of the permanent grassland in Natura 2000 areas as ESPG: Austria (9.7%), Denmark (21.1%), Estonia (10.1% - although this has increased from 0.9% in 2015), Ireland (3.9%), Latvia (16.1%), Luxembourg (17.7%) and Portugal (1.3%).

24 The area declared by farmers is the area that receives support under the CAP and is therefore subject to the ESPG rules, excluding exempt farmers (i.e. those under the Small Farmers Schemes and organic farmers).

In total, 12 Member States increased the area designated as ESPG (BE, DK, EE, ES, FR, CY, LV, LU, HU, SI, SK, UK), either because new Natura 2000 sites were designated, or because the accuracy of mapping has allowed new areas to be verified for CAP control purposes[25]. However, three Member States have decreased the proportion of their Natura 2000 grassland area designated as ESPG since 2015 (DE, HR, PL). The reasons for this in Germany are mainly related to technical changes in the recording of parcels, excluding part of parcels from the calculations. Information on Croatia and Poland were not available. Variations in other Member States occur as the accuracy of the data on the area of permanent grassland requiring protection in Natura 2000 areas improves[26].

In terms of the proportion of ESPG that is actually declared by farmers under greening, in 2018 this ranges from less than 15% in Bulgaria (14%) and Portugal (9%) to 100% in Croatia, Denmark, Ireland, Romania and Sweden. The EU average is 51%, down from 62% in 2016 and 52% in 2017. The reasons for this provided by Member States in their notifications to the European Commission vary. In some cases, the areas designated as Natura 2000 have increased or the areas defined as permanent grassland within these areas has increased, but the area eligible for CAP support has not increased proportionately, in other areas land has gone out of agricultural production or farmers have not included these areas on their aid application.

The area declared as ESPG within Natura 2000 areas represents varying proportions of the total area of permanent grassland eligible for CAP support in a Member State (12.8% on average in the EU-28). In four Member States, it represents over 30% of all permanent grassland (CZ, EL, HU, and RO). In 10 Member States, however it accounts for less than 5% of all permanent grassland (BE (Wa), DK, EE, IE, LV, LU, AT, PT, FI, UK (NI)).

ESPG outside Natura 2000 areas: Five Member States designated ESPG outside their Natura 2000 areas in 2018 (see Table 7).

Table 7: Areas designated as ESPG outside Natura 2000 and hectares declared (2018)

	Designated ESPG (ha)	Declared ESPG (ha)	% designated ESPG declared by farmers
BE	3,463	3,284	95%
CZ	283,405	209,545	74%
IT[1]	no data available	no data available	
LV	13,902	9,517	68%
UK (Wales)	18,020	17,313	96%
TOTAL EU	318,790	239,660	75%

[1] Figures for Italy are not included as they are currently being reviewed by the European Commission
Source: European Commission, DG Agriculture and Rural Development, ESPG data 2015-2016-2017-2018 revised

Permanent Grassland ratio

Eight Member States have stipulated that permanent grassland can be ploughed and reseeded to grass (BG, DE, EL, ES, HR, IT, CY, LT). Only four Member States (BE, DE, FR and the UK) chose to manage their permanent grassland ratio at regional level while all other Member States manage it on a national basis. The area of permanent grassland covered by the ratio requirements for the EU-28 is 42.16 million hectares and excludes 0.9 million hectares of permanent grassland covered by the Small Farmers Scheme and 3.8 million hectares of organic permanent grassland.

Voluntary Coupled Support (VCS)

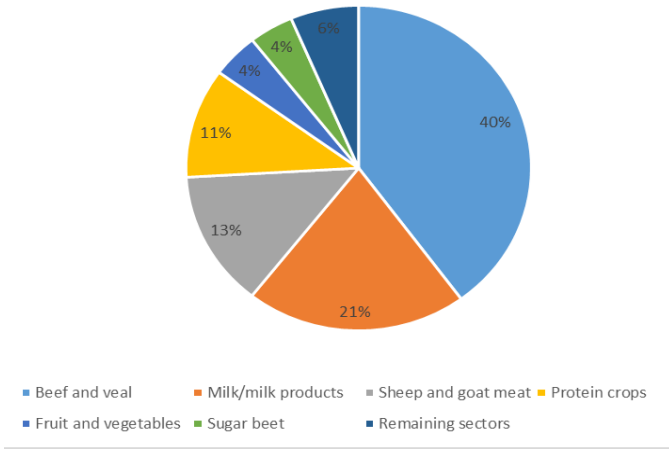
As with other Pillar 1 support, implementation of VCS is carried out at Member State level (and regionally in BE and UK). All Member States apart from Germany offer VCS to a combination of sectors and types of production.

21 Member States support the beef and veal sector, while 21 support the sheep and goat meat sector and 19 provide support to milk or milk products. 19 Member States provide support for different types of fruit and vegetable production, 15 provide support for protein crops and 11 provide support for sugar beet.

25 Information provided by Member States when submitting their data to the European Commission.
26 As previous footnote.

Across the EU28, €4.3 billion is allocated to VCS per year which is approximately 10% of the direct payments budget. The beef and veal sector receives most support under VCS (40% of all VCS in 2018) followed by milk/milk products (21%), sheep and goat meat (13%), closely followed by protein crops (11%) (see Figure 1). There are no major changes in the amount of support before and after the revised decisions with one notable exception - the sheep and goat meat sector. Here, support has increased by €100 million per year. Although the number of Member States offering support to the sheep and goat sector has decreased by only one (EE), a number of Member States have increased the number of support measures offered (BG, EL, ES, FR, AT, FI) (European Commission, 2017)

Figure 1: Allocation of VCS across sectors in the EU28 (2018)



Source: European Commission, DG Agriculture and Rural Development Informative Note, 2017

In relation to protein crops, one Member State (SI) decided to withdraw VCS to the protein crop sector, Spain and Hungary each deleted one of their measures related to the protein sector and new measures were put in place by Greece, France and Poland. In 2016 49.5% of all beef and veal cows and 36.5% of dairy cattle were supported through VCS[27].

In the case studies, one example was highlighted in the Netherlands where VCS has been targeted at areas of land of environmental value but which are not eligible for direct payments. The 'grazing animal premium' provides support for grazing cows or sheep on natural land such as dunes, heaths and salt marches. The aim of the support is to encourage the grazing of these habitats which are important for biodiversity to minimise unwanted natural succession. None of the other eight case study Member States which offer VCS for livestock had imposed any environmental conditions such as maximum or minimum stocking densities.

In addition to VCS, a small number of Member States can provide coupled support for cotton. A maximum of 302,000 hectares are eligible for coupled support each year. Of this, 250,000 hectares is in Greece and 48,000 hectares in Spain.

5.1.2.3 Choices relating to Pillar 2 measures

Information is provided below on the choices Member States have taken for the implementation of those Pillar 2 measures that have the potential to influence biodiversity. Data are provided on budget allocations and the area anticipated to come under agreement. Where available, data on uptake to 2017 are provided (the latest date for which data were available) and any changes in targets and budget allocations during the programming period are identified. For those measures affecting agricultural land, the focus is primarily on those measures that are prioritised for the environment. Other measures that are programmed under other priorities can have impacts on biodiversity but data were not available at a sufficiently disaggregated level to show what the focus of Member States' implementation choices on such measures had been.

Measures chosen for implementation in Member States (2014-2020)

The implementation choices relating to the measures which have impacts on biodiversity as their intervention logic are set out below. This include the AECM (M10), the organic farming measure (M11), the Natura 2000 measure (M12), the forest-environment measure (M15), the measure to support investments improving the resilience and environmental value of forest ecosystems (M8.5) as well as the physical investments measure (M4), particularly non-productive investments. Measures for advice and training (M1 and M2) and other forest measures are also covered where these have been used to

[27] Based on there being 32,895,000 beef and veal cows in 2016 and 23,525,000 dairy cows: data from the Meat Market Observatory – see https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/beef-production_en.pdf

support biodiversity. The ANC measure (M13) is also covered, as it is primarily programmed under Priority 4 and can indirectly support biodiversity, depending on how it is implemented, even though its intervention logic is not biodiversity focussed.

Table 8 shows which Member States and regions have programmed those Pillar 2 measures with an intervention logic linked to biodiversity. M10 (AECM) is not displayed as it is a mandatory measure and programmed everywhere.

Table 8: Overview of the implementation choices made in the EU Member States for a selection of CAP instruments with biodiversity as their intervention logic

Member State	Measure 4.4 (non productive investments)	M7.1 (N2000 management plans)	M8 (any of M8.1-8.5; forest measures)	M11 (organic payments)	M12.1 (N2K – agriculture & forest)	M15 (M15.1 or 15.2; Forest-environment	M16 (any of M16.1, 16.5 or 16.8; cooperation)
BE	X (Fl.)	X (Fl.)	X (Fl.)	X	X (Wall.)		X (Fl.)
BG	X		X	X	X	X	X
CZ			X	X	X	X	X
DK	X		X	X		X	X
DE (16 Länder)	X (in 9 Länder)	X (in 10 Länder)	X (in 10 Länder)	X	X (in 5 Länder)	X (in 3 Länder)	X (in 12 Länder)
EE	X		X	X	X		X
IE	X			X			X
EL	X	X	X	X	X		X
ES (17 regions)	X (in 11 regions)	X (in 11 regions)	X (in 17 regions)	X	X (in 4 regions)	X (in 8 regions)	X (in 15 regions)
FR (27 regions)	X (in 23 regions)	X (in 21 regions)	X (in 25 regions)	X	X (in 14 regions)	X (in 1 region)	X (in 25 regions)
HR	X	X	X	X			X
IT (20 regions)	X (in 20 regions)	X (in 14 regions)	X (in 20 regions)	X	X (in 9 regions)	X (in 6 regions)	X (in 20 regions)
CY	X		X	X	X		X
LV			X	X	X		
LT	X		X	X	X		X
LU				X			
HU	X		X	X	X	X	X
MT	X		X	X			X
NL	X						X
AT	X	X	X	X	X	X	X
PL			X	X			X
PT	X		X	X	X	X	X
RO			X	X		X	X
SI			X	X			X
SK			X	X	X	X	X
FI	X	X		X			X
SE	X		X	X			X
UK (4 UK countries)	X (in the 4 countries)	X (in 2 countries)	X (in the 4 countries)	X		X (in 3 countries)	X (in the 4 countries)
EU-28	**21**	**10**	**24**	**27**	**16**	**13**	**26**

Source: Member State RDPs

Examples of measure design in the case study Member States

The way in which the CAP Pillar 2 measures are structured and implemented varies significantly between Member States, resulting in an array of different approaches and detailed operations available to beneficiaries. Some examples of the ways in which key measures have been implemented in the case studies examined for this study are set out below.

Some of the measures are used in combination. For example, in Croatia, Hungary, Ireland and Latvia, training courses operating under Measure 1 are compulsory for some or all those receiving funding under the AECM or organic farming measures. In Hungary, the non-productive investments measure operates alongside the AECM.

Advice and training on biodiversity is provided to varying degrees in the case study Member States, funded under M1 and M2. In some cases, this is provided under the FAS (see section 5.1.2.1), but in many Member States, it is provided separately. In most of the case study Member States, advice is

provided in relation to the AECM (M10) and the organic farming measures (M11) and occasionally the Natura 2000 measures (M12), where this is used. In Germany (B-W), M2 is used to fund a range of advisory modules that farmers can choose from, with the biodiversity modules linked to M10 and M11 funded at 100% (other modules are funded between 50-80%). To date, however, uptake has been low (2% of the advice contracts), with a focus on farmland birds, the extensive management of grassland and organic/integrated crop protection. In France, general communications have been provided to farmers about the potential for the AECM to deliver for biodiversity, with interactive sessions available focussing on hedge management and farmland birds. In Member States where compulsory training is required to enter specific measures (e.g. AECM, OF, Natura 2000), this can consist of one-off advice sessions (e.g. in IE where farmers are provided with information on the AECM commitments, the impacts of pollution and the importance of protected sites) or ongoing training (e.g. in HR where farmers must attend six hours of compulsory training each year for the five years of the agreement). In Ireland, specialist advice is also available for certain schemes, such as the Burren Programme for managing semi-natural grasslands as well as the locally-led biodiversity results-based pilot projects, funded under M16. In Latvia, advice is also provided linked to the M8 forest measures for which optional forest-related training courses are available focusing on protecting biodiversity during logging and on managing private forests to maintain or enhance their biological diversity.

Measure 4.4 (non-productive investments) is used by a number of the case study Member States to support biodiversity objectives through funding investments beneficial for nature conservation. Some examples of how this measure is used are set out in Box 5.

Box 5: Examples of the design of non-productive investments measure (M4.4)

In **Germany** (Baden-Württemberg), M4.4 is used to provide investments in nature conservation and landscape management which include, for example, support for: site construction, including technical equipment, machinery; and for exhibitions, nature trails, visitor guidance, and visitor information.

In **Hungary**, this measure works in conjunction with the AECM and provides support for farmers to decrease farming intensity by putting in place grassland, pollinator margins, green fallow, and plant hedgerows.

In **Portugal**, the measure is used for the creation and recovery of riparian forests, eradication of woody invasive species and recovery of stone walls.

In **Croatia**, although not yet implemented, the eligible investments will be for building terraces, stone walls and planting hedges; removing invasive alien species from agricultural land; procuring electric shepherds with related equipment and/or indigenous sheepdogs; building new and restoration of existing livestock housing in areas of natural distribution of large carnivores; restoring habitats important for biodiversity preservation on agricultural land primarily focused on grasslands which are overgrown by scrub or other woody vegetation; and for the renovation of derelict traditional ponds for livestock.

Source: case studies

The AECM is designed in very different ways in the case study Member States. Many Member States/regions offer both horizontal measures that are available across the majority of arable, grassland or permanent crop areas as well as more targeted measures for specific habitats and species (e.g. DE, IE, FR, HU, SK) whereas in other Member States, only more targeted measures are available, for example focussing the AECM in Natura 2000 areas (PT) or on protecting specific habitats and species (HR, NL, PT). Box 6 provides some examples of the different ways in which Member States have chosen to orient their AECMs. Uptake also varies significantly (see below).

Box 6: Examples of the design of the AECM in selected case study Member States

In **Baden-Wurttemberg (DE),** the AECM is divided into two types of measures: there are measures that are open to all interested farmers under the Funding Programme for Environment, Climate Protection and Animal Welfare Baden-Württemberg (FAKT) and more highly targeted nature conservation contracts, run by the nature conservation authority and targeted specifically to areas of high conservation value. Farmers are approached directly to enter these contracts which are funded nationally and managed under the Landscape Conservation Regulation. The measures and their targets focus on maintaining semi-natural grassland management more than on actions on arable land. In this region there is also a combined EFA/AECM option, where flowering mixtures can be planted on EFA fallow areas under the AECM.

In **France** a national framework of measures is produced, from which the regions can pick those that are appropriate for their regional situation to design their AECM. There are four types of measures available to regions: 'system measures' which apply to the whole farm, 'localised measures' which are farm parcel specific and organised under eight themes: phyto, cover, irrigation, linear, habitats, open environment, hamster, grassland; measures to protect genetic resources; and a specific measure for honey bees. The system and localised measures are implemented through agri-environment-climate projects in priority areas (defined by the

region). The projects are designed by a group of organisations in these priority zones and if approved are then opened to applications from farmers.

In **Ireland**, the Green, Low Carbon Agri-Environment Scheme (GLAS) is based around a tiered approach of Priority Environmental Assets (PEA) and (Priority/General Actions) as follows:

- Tier 1 (a): Farms that have one or more of the pre-identified assets (farmland Habitat (private Natura sites), farmland Birds, Commonages (50% target participation in GLAS Commonage Plan), High Status Water Area, Rare Breeds (livestock) has priority access to the scheme. In return all required actions to protect and enhance the PEAs must be fulfilled.
- Tier 1 (b): Farms with livestock ≥140kg N/ha or ≥ 30ha arable crops must apply at least 1 action - arable (Minimum Tillage, Catch crop establishment from a sown crop), livestock (Low-Emission Slurry Spreading, Wild Bird Cover). Organic farmers also have priority access to relevant actions under Tier 1 (b), but must choose action relevant to applicable assets.
- Tier 2 (a): Farms in Vulnerable Water Area who do not have Priority Environmental Assets who must apply the appropriate actions.
- Tier 2 (b): Farms with livestock <140kg N/ha or <30ha arable crops also entering Tier 2 (a) must apply at 1 action - arable (Minimum Tillage, Catch crops, wild bird cover if more than 75% grass), livestock (Low-Emission Slurry Spreading, Wild Bird Cover).
- Tier 3: Comprises priority and general actions.

A scoring matrix is used to allow farmers to join GLAS for Tier 3 if take-up of Tier 1 and Tier 2 actions permits as well as for Tiers 1 and 2 (depending on the number of applications).

Hungary has changed the design of its AECM for the 2014-2020 period to introduce a modular system. This offers horizontal arable and grassland schemes with compulsory practices to which optional additional management prescriptions can be added, such as the creation of field margins, and bird-friendly mowing techniques. In addition, farmers who chose the additional management options had a greater chance of being offered an agreement.

Latvia's approach has been to offer just four very specific measures to farmers to promote: overwinter stubbles; maintaining the biological diversity of grasslands (focussed on grasslands protected under the Birds and Habitats directives); creating habitats to promote pollinator species; and integrated farming techniques for the horticulture sector.

In **Netherlands**, the focus has been on four key habitats protected under the Birds and Habitats directives to which specific actions are tailored are: open grassland habitat; open field habitat; dry green infrastructure; wet green infrastructure. The measure is only available to farmers in areas covered by collectives.

Portugal provides support to integrated farming and traditional permanent crops throughout the Member State, but targets specific actions within Natura 2000 areas. In each of these areas, the focus of the AECM is different – e.g. the management of grazing on common land, maintenance of terraces, conservation of particularly notable forests, maintenance of dry cereal-fallow rotations. It also supports particular habitats (e.g. montado) or species (e.g. Iberian wolf) outside Natura 2000 areas.

Alongside measures to protect HNV grasslands, **Romania, Slovakia** and **Croatia** provide targeted support for specific habitats and species (birds and butterflies) in both grassland and arable areas.

Most of the case study Member States (all except LV and NL) have also provided support for preserving endangered native and protected breeds of domestic livestock and some also for protecting traditional plant species (HU, PT).

Source: case studies

Examples of how the Natura 2000 measure is implemented are set out in Box 7.

Box 7: Member States' use of the Natura 2000 measure – agriculture and forests.

In **Portugal**, the Natura 2000 payments support beneficiaries for restrictions on intensification and afforestation of grassland areas, covering costs and loss of income. The payments are designed to work together with agri-environmental options targeted at specific Natura 2000 zones (covering common lands, terraced lands, chestnut forests, dry cereal steppes, meadows, montado, areas with wolves etc.).

The **German** region of Mecklenburg-Vorpommern has implemented the forest Natura 2000 payments for private forest owners in Natura 2000 areas with native deciduous forests (Landesforst MVP, 2018). The basic annual payment of €25 is available for all forest areas within Natura 2000, but the payment is significantly higher in areas of one of the HD forest habitat types (HD habitats 9110, 9130, 9150, 9160, 9180, 9190, 91D0, 91E0), in areas designated for *Osmoderma eremita*, *Myotis myotis* or *Barbastella barbastellus*, and in forest areas protected for *Aquila pomarina*. The highest payment rate of €200 is available for areas with a combination of these conservation objectives. In order to receive the payment, forest owners must:

- Mark the location of at least 6 native habitat type typical mature trees per ha on a map of their forest. Mature trees must be at least 40 cm in diameter. If the forest does not contain enough such mature trees, the map should mark the location of at least 6 of the largest trees with the potential to grow to sufficient size. If the forest is *Osmoderma eremita* habitat, the trees should be the ones with tree holes,

clear rotten areas, lightning strike areas, low branches. If the forest is habitat for one or both of the bat species, the trees should be deciduous species or conifers with peeling bark, split or cracked trunk, visible tree holes including woodpecker holes.
- Mark the trees themselves with a blue ring, if the forest is *Osmoderma eremita* habitat. This is not required for the other forest areas, but recommended.
- Keep a diary of forest management practices.

Forest owners can download a map of their forest area from the internet. The federal state has developed a forest parcel database (FORST-INVEKOS) and applications must be made online.

Although not directly focussed on achieving biodiversity outcomes, the ANC measure (M13) has been programmed primarily under Priority 4. However, seven of the ten case study Member States did not identify any eligibility criteria in place for the measure. In Ireland and Latvia, minimum stocking densities have been put in place (see Box 8).

Box 8: Case study Member States' use of stocking density eligibility criteria for the ANC payment

From 2019, in **Ireland**, the eligible area under the ANC has been changed, to meet EU requirements to base eligibility on bio physical criteria. In practice, the vast majority of land that was eligible under the LFA criteria will remain eligible under the new approach, and farmers with land that is no longer eligible will receive degressive phasing out payments. The ANC eligibility includes a minimum stocking density requirement, which for 2019 is set at 0.15 livestock units per forage hectare.

In **Latvia**, to receive the payment there must be at least 0.3 livestock units per hectare, the aim of which was to promote cattle grazing on grassland, so that it was not just mown to receive the payments and this was considered better for biodiversity. However, because no criteria were set for arable land in ANC areas, grassland can be converted to arable and still receive the payments, leading to biodiversity losses where semi-natural habitats have been affected. NGOs have therefore called for grassland of EU importance to be exempt from the livestock grazing criterion.

In **France**, a new ANC map was introduced in 2019 as a result of the application of the revised EU ANC criteria. This has led to an increase in the number of farms supported by 13% (from 52,500 to 60,000 beneficiaries). However, it has also led to the exclusion of some farms, especially livestock farms in intermediate areas. Support to these farms will be reduced digressively in 2019 and 2020. In addition, the French government has introduced a number of eligibility criteria to target ANC payments especially for livestock farms.

Source: case studies

Finally, measures for forest areas where expenditure is linked explicitly to biodiversity (M8.5 and M15) were only implemented in a few of the case study Member States. Examples of the focus of these measures are set out in Box 9. The afforestation and agro-forestry measures (M8.1 and 8.2) can provide biodiversity benefits, however Member States have primarily programmed them under Priority 5 for climate. Examples from the case studies show that in some places, implementation choices have also taken into account biodiversity – for example Latvia, support for woodland creation (M8.1) is intended to encourage land owners to create more biologically diverse forest stands instead of monocultures and in Portugal, the agro-forestry measure (8.2) supports the creation of new areas of agro-forestry systems, based on native oak species and under low-intensity management.

Box 9: Examples of implementation choices for forest related measures M8.5 and M15

M8.5 - support for investments improving the resilience and environmental value of forest ecosystems

In Croatia the focus of this measure is to convert degraded forest stands (coppice forests, shrubs, scrubland, macquis and garigues) into high quality forest stands and to convert plantation forests into forest stands with mixed indigenous tree species.

In **Germany (Baden-Württemberg),** under this measure a scheme has been introduced called 'Nature conservation in forests and improvement of forests' regeneration function'. This targets forest biotopes, habitats, species, small structural elements, and nature-compatible infrastructure in the forest areas. It also supports the creation, development and expansion of (1) forest biotopes; (2) habitats for forest species under Annex II of the Habitats Directive; as well as (3) wetlands and small water bodies; and (4) nature-compatible infrastructure to improve the recreational value of the forest.

In **Portugal**, this measure supports management actions on holdings with forestry or agro-forestry to promote: the protection and enhancement of biodiversity; adaptation to climate change through natural regeneration or changing the structure and composition of forest patches; and, improving the delivery of ecosystem services (namely carbon sequestration).

M15 – Forest-environment-climate payments

In **Portugal**, this measure is targeted specifically to maintain and improve the conservation status of riparian forests (priority habitat), and to support their regulation function (water) and to provide support to agricultural and agro-forestry landscapes to maintain and promote good conditions for the conservation status of the Iberian lynx. Support to preserve and improve forest genetic resources is also included.

In **Slovakia**, the measure aims to protect a range of threatened bird species as follows:

- Birds of Prey and Owls: European Honey-buzzard, Black Kite, Red Kite, White-tailed Sea-eagle, Short-toed Snake-eagle, Lesser Spotted Eagle, Eastern Imperial Eagle, Golden Eagle, Saker Falcon, Peregrine falcon, Eurasian Eagle-owl, Eurasian pygmy owl, Ural Owl, Boreal Owl Waders: Black Stork
- Cavity nest: Grey-faced Woodpecker, Black Woodpecker, Middle Spotted Woodpecker, White-backed Woodpecker, Three-toed Woodpecker, Red-necked Flycatcher, White-necked Flycatcher
- Forest grouse: Capercaillie, Black Grouse

There are also requirements for forest birds in SPAs: restricted time for logging, other close to nature sylvicultural practices. This measure has high uptake to date – the target uptake of 24,000 ha of supported forests in Natura 2000 was already reached after two years of implementation (2017).

In **Hungary**, the measure is targeted at Natura 2000 with the following aim: to establish & maintain microhabitats, selective felling & reduction of clearcutting, leave tree groups standing, conversion of forest stands (removing non-native and invasive species), establish and maintain forest clearings, maintenance based on manual work, environmentally friendly wood handling methods.

In **Romania**, two packages of measures are offered to land managers: package 1 'Ensure quiet areas' and package 2 'Use of the harnesses to collect the wood from woodlands'. Package 2 is dependent on taking up Package 1. There has been no uptake to date.

Source: case studies

Under M16.5, Member States have the option to support 'joint action' to deliver environmental objectives, including biodiversity. This can involve bringing together multiple actors to work collaboratively to manage land that delivers environmental objectives. Some examples of how this measure is used are included in the Box below.

Box 10: Examples of collective approaches in the case study Member States

In **Hungary**, M16.5 has been used to pilot a landscape wide results based approach to environmental management, based on the coordinated action of several producers. The aim of the measure is to facilitate, by encouraging cooperation between farmers and supporting implementation, the application of harmonised regional approaches to improve the environmental performance of agriculture. In the target areas for 'landscape farming' payments are based on the environmental performance of farms, calculated by a green point assessment (points awarded for performance against different 'green' indicators). No information is available on implementation to date.

In **Ireland**, the agri-environment scheme supports and gives priority access to farmers who own common land (peat and grass). Farmers are required to submit a five-year Commonage Management Plan, to which at least 50% of active shareholders (farmers) or a group of shareholders together owning more than 50% of the shares in the commonage have signed to. The agreement has to be drawn with support from a qualified adviser, with the aim to achieve a balanced grazing regime over an area, including maximum and minimum stocking levels.

In **France** some measures are open to both individuals and groups of farmers, for example the M10.1 pastoral management (for summer pastures, mountain pastures, heaths, rangelands, etc.). Others, such as the preservation or re-introduction of value chains for rare poultry breeds are only open to associations or collective organisations owning breeders threatened by abandonment (M10.2).

In **Netherlands** from 2016 the agri-environment-climate measure has been operated via collectives. All agri-environmental schemes targeting open arable and grassland are organised on a collective basis with the management performance by cooperatives of farmers and other stakeholders.

Germany uses M16.7 to support the coordination of a large scale project targeting Nature parks that contributes to the promotion of culture and the preservation of the cultural heritage, including nature conservation. It also uses M7.6 to provide services for nature conservation and landscape management (plans, conceptions, environmental awareness), development of natural and cultural heritage in nature parks and projects for the conservation, restoration and improvement of rural landscapes and areas with high nature value.

In **Portugal**, payments are made under M10.1 to 'Common Land' Associations for the maintenance of grazing in pastures and meadows to support habitats within Natura 2000 areas.

Result-based agri-environment type schemes operate in a number of Member States, although some are implemented as pilot projects using the cooperation measure under the EAFRD (M16). These schemes are characterised by the annual payments to farmers being directly linked to the quality of the biodiversity on their farms (rather than to compliance with detailed management requirements as

in other M 10.1 schemes). Some examples of the use of result-based schemes are included in the Box below.

Box 11: Examples of results-based approaches in the case study Member States

Ireland has operated a results-based payment scheme in the Burren for many years, but only under this programming period has it been funded under M10.1. This scheme pays farmers for the management of high nature value farmland in the Burren with a specific focus on the management of species-rich limestone grasslands and associated grazed Habitats. It has also introduced a number of new pilot results-based schemes under M16.5, both management of farmland to support quality habitat for the Hen Harrier (where the payment is awarded based on the type of habitat present and foraging potential) and the management of specific water catchment areas to support the freshwater pearl mussel.

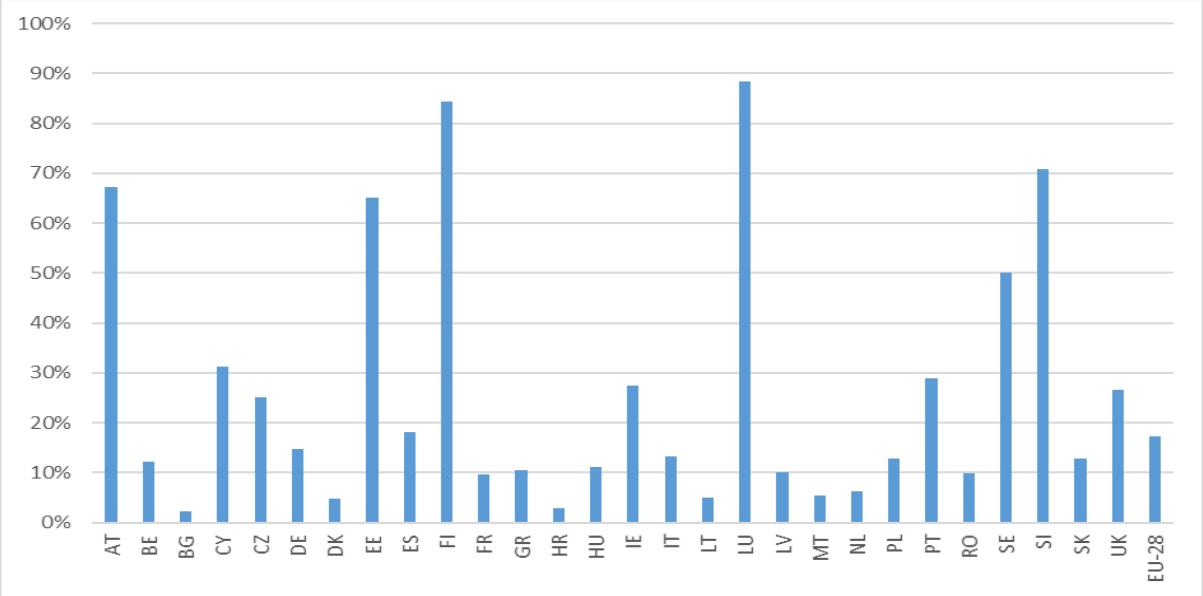
Both **France** and **Germany** operate results based agri-environment schemes for the maintenance of the species-rich grassland (M10.1).

In **Romania**, using funding from the European Parliament, a pilot Agri-Environment Scheme for the Tarnava Mare and Pogány Havas regions was operated between 2016 and 2019. The scheme pays farmers for the delivering species-rich meadows which are measured using indicator plant species. Thirty plant indicator species have been identified which are easy to recognise and flower in spring/summer and are associated with high plant and animal species-richness and sensitive to changes in management. Farmers have the freedom to manage their meadows according to local conditions and annual weather variations in order to deliver the results required. Three different payment levels are available: €213/year for 5 species; €229/year for 8 species; and €259/year for 10 species. Most contracts were for achieving the basic 5 indicator species. Uptake was as follows:

- Tarnava Mare – 16 farmers covering 68 ha
- Pogány Havas – 60 farmers over 162 parcels covering 110 ha

Figure 2 shows the figures for the **AECM (M10)** as a proportion of UAA at Member State level. At an EU level, 30.6 million ha are planned to be under an AECM agreement by 2020 (for priority 4), the equivalent of 17% of UAA[28]. The figures by UAA give a feel for the coverage of the schemes. Figure 2 shows that, in five Member States, over 50% of UAA is programmed to be covered by an AECM agreement (for priority 4) - Austria (67%), Estonia (65%), Finland (84%), Luxembourg (88%) and Sweden (50%). In contrast, 10% or less of UAA is programmed in nine Member States - Bulgaria (2%), Croatia (3%), Denmark (4.8%), France (10%), Lithuania (5%), Latvia (10%), Malta (5%), Netherlands (6%), and Romania (10%).

Figure 2: Priority 4 M10 area as a proportion of UAA at Member State level



Source: European Commission, DG Agriculture and Rural Development, EAFRD Indicator Plan, 2017 November, UAA data from Eurostat, 2018

Member States report progress against their output indicators relating to the area under agreement in their Annual Implementation Reports (AIR). For the AECM, they break down the area according to a

[28] Figures at November 2017.

number of sub-indicators. Uptake reported in the 2017 AIRs for the sub-indicators that are relevant for biodiversity are set out in Table 9.

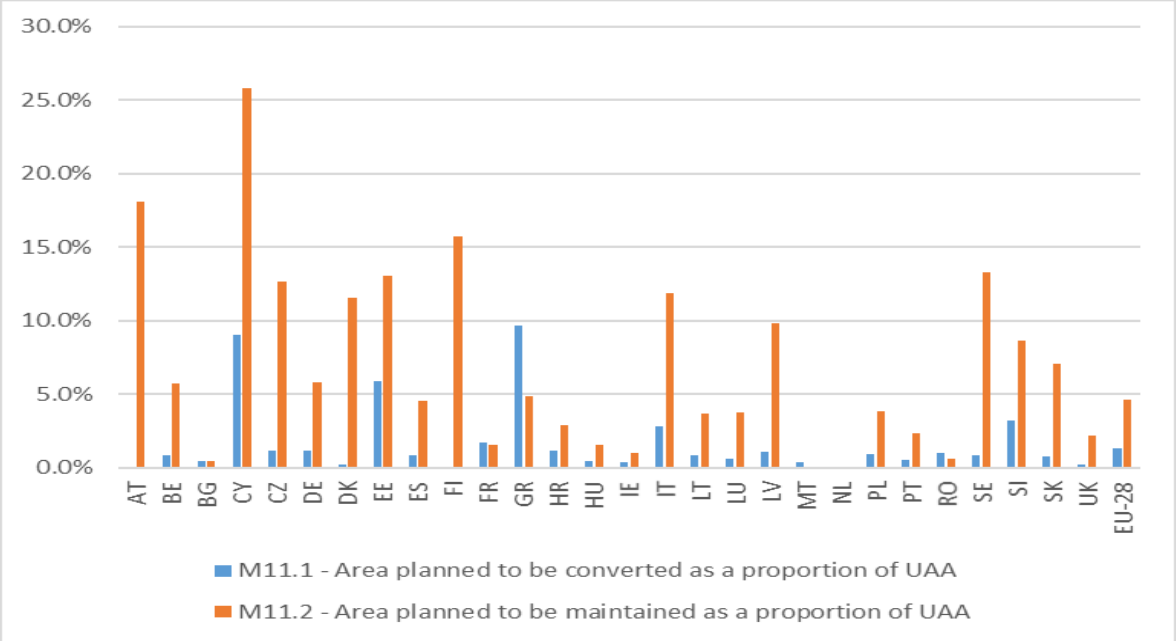
Table 9: Area under agreement for M10.1 by 2017 at EU level

Measure 10.1 – sub-indicator	Area under agreement (ha) by mid-2017) – EU 28	Number of Member States reporting uptake against these categories
Maintenance of HNV arable and grassland systems (e.g. mowing techniques, hand labour, leaving of winter stubbles in arable areas), introduction of extensive grazing practices, conversion of arable land to grassland.	8,938,098 (11.6% of area estimated to be HNV)	All except CY, EL, MT
Creation, upkeep of ecological features (e.g. field margins, buffer areas, flower strips, hedgerows, trees)	2,244,752 (2.1% of total arable area)	All except BG, DK, EE, EL, CY, EL, HU, MT, RO
Management of inputs incl. integrated production (reduction of mineral fertilisers, reduction of pesticides)	5,752,696 (5% of total arable area)	All except BG, DK, PL, RO, SE
Reduction of drainage, management of wetlands	541,191	Only ES, IT, HU, PL, FI, SE, UK
Reduction of irrigated areas and/or irrigation rate, irrigation techniques	103,024	Only EL, FR, IT, CY, LT, PT, UK

Source: AGRI-dashboard

A similarly varied picture can be seen for the **organic farming measure (M11)**, as shown in Figure 3. Overall, at EU level, all Member States except Netherlands have offered M11, with a total of 2.3 million ha planned to be converted to organic (1.3% UAA) and 8.2 million ha to be maintained (4.6% UAA)[29]. Those Member States planning to convert the greatest proportion of UAA to organic are Cyprus (9%), Estonia (6%), Greece (10%) and those planning to maintain the greatest proportion of UAA under organic management are Austria (18%), Cyprus (26%) and Finland (16%), with Czechia, Denmark, Estonia, Italy and Sweden all planning to maintain between 10 and 15%. Austria is the only Member State (apart from NL) that is not providing funding for the conversion of land to organic farming. Member States planning to fund the maintenance of organic farming on less than 3% of UAA are Bulgaria (0.5%), France (1.6%), Croatia (2.9%), Hungary (1.6%), Ireland (1%), Malta (0.1%), Portugal (2.3%), Romania (0.6%) and the United Kingdom (2.2%).

Figure 3: Area programmed to come under agreement for M11 as a proportion of UAA



Source: European Commission, DG Agriculture and Rural Development, EAFRD Indicator Plan, 2017 November, UAA data from Eurostat, 2018

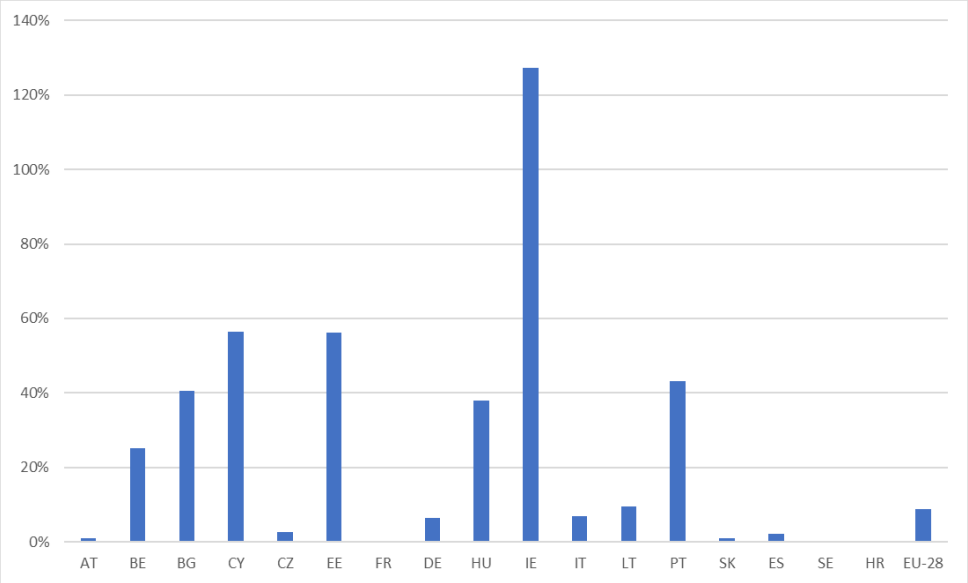
By the middle of 2017, the AIRs showed that, at EU level, 1.4 million ha had been converted to organic and 6.4 million ha were being maintained using the organic measure (approximately 54% of the total

[29] Figures at November 2017.

organic area). In Croatia, the target for organic conversion had been exceeded by more than four times by 2018.

A total area of 1.4 million hectares is planned to be covered by **compensation payments for agriculture in Natura 2000 areas (M12.1)**. This equates to 8.2% of permanent grassland area in Natura 2000 areas or 8.9% of the UAA, ranging from under 3% of UAA in Austria, Czechia, France, Slovakia and Spain and as much as 56% in Cyprus and Estonia (see Figure 4). The majority of this area is in Bulgaria, Hungary, Ireland and Portugal. By 2017 1.26 million ha (89% of the target area) was under agreement in 10 of the 12 Member States in which this measure was programmed (no data provided in FR or CY). In Hungary and Portugal the target has been exceeded.

Figure 4: Area programmed to come under agreement for M12.1 as a proportion of UAA in Natura 2000 areas

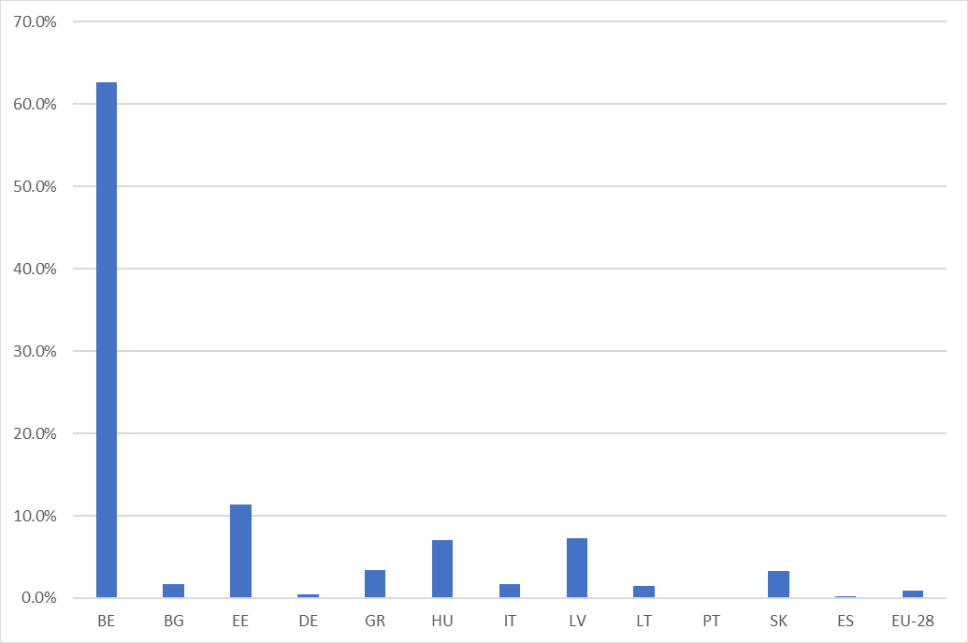


Source: European Commission, DG Agriculture and Rural Development, EAFRD Indicator Plan, 2017 November, UAA data from Eurostat, 2018, UAA in Natura 2000 sites from Con ext indicator 34.

Measure 12.2 (compensation payments in forest Natura 2000 areas) is programmed in 12 Member States, with a total area planned to come under agreement of 382,339 ha. This is 0.9% of the total forest area within Natura 2000 areas (42.2 million ha in 2015[30]). This ranges from less than one per cent in Germany, Portugal and Spain to 63% in Belgium. By 2017 293,270 ha (77% of the target area) was under agreement in eight of the 12 Member States (no uptake data was reported for Bulgaria, Greece, Spain and Italy).

[30] Eurostat data: for_protect.

Figure 5: Area programmed to come under agreement for M12.2 as a proportion of FOWL in Natura 2000 areas



Source: European Commission, DG Agriculture and Rural Development, EAFRD Indicator Plan, 2017 November

Data for the **forest-environment measure (M15)** shows that 1.4 million ha have been programmed to come under agreement in 14 Member States, with over 50% of this planned in Romania (820,000 ha). By 2017 only 163,821 ha had come under agreement and with no uptake in Romania. The case study suggests that applicants have been put off by the low level of payments. In Portugal the measure was not introduced until 2017.

The **forest measures (M8)** include measures for afforestation (M8.1), agro-forestry (M8.2) and support for investments improving the resilience and environmental value of forest ecosystems (M8.5). Not all these measures are programmed under Priority 4 – afforestation and agro-forestry in particular are prioritised predominantly under the climate objective.

Table 10: Uptake of the forest measures by mid-2017 - EU 28

	M8.1 – Afforestation	M8.2 – Agro-Forestry	M8.5 – forest ecosystems	M15 – forest-environment
Target area	474,919	71,063	2,620,360	1,407,742
Target area allocated to Priority 4	121,880	58,052	2,620,360	1,399,405
Uptake by mid-2017	44,377	515	483,746	163,822
Uptake as % of target area	9.3%	0.7%	18.5%	11.6%
Uptake as % of FOWL	0.0%	0.0%	0.3%	0.1%
No of Member States	11	6	13	10
Area of uptake that is allocated to Priority 4	15,349	16.16	483,746	162,868
Proportion of uptake allocated to Priority 4	34.6%	3.1%	100%	99%

Source: European Commission, DG Agriculture and Rural Development, EAFRD Indicator Plan, 2017 November

These EU-28 figures hide contrasting situations in different Member States in relation to uptake.

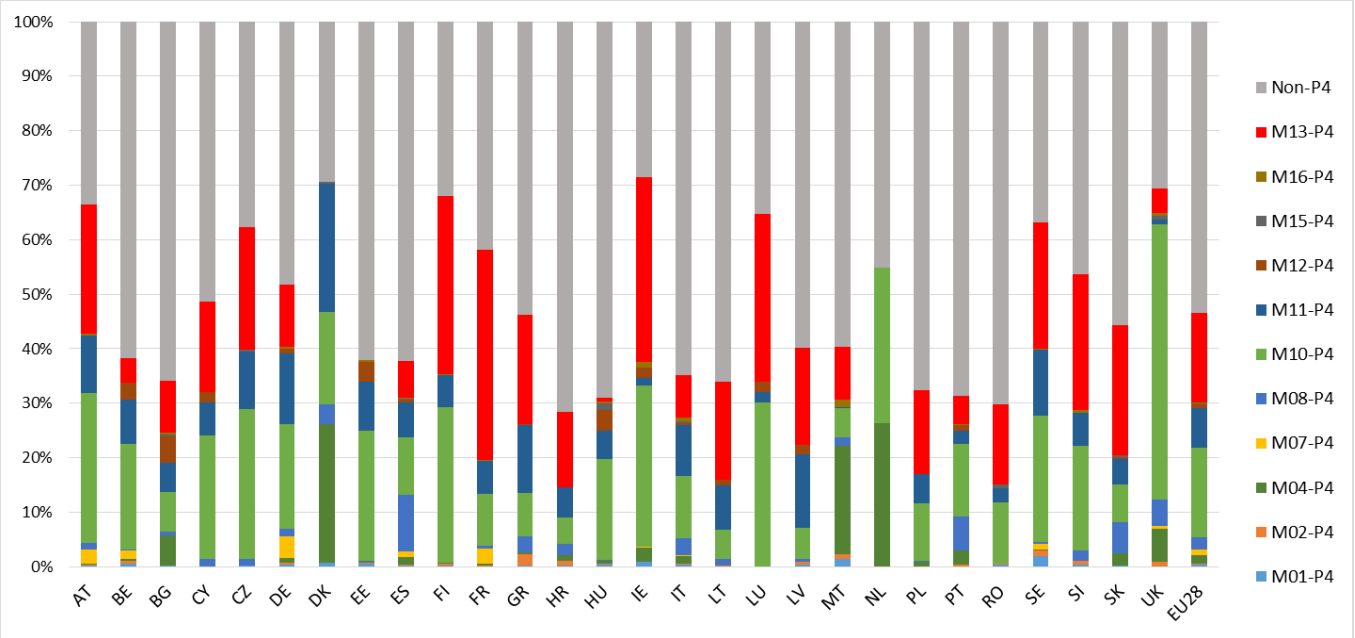
Allocation of budget to biodiversity relevant measures in Pillar 2

The proportion of the budget allocated to Priority 4 under the EAFRD is used to give an indication of the biodiversity focussed expenditure in each Member State. However, because Priority 4 can also relate to expenditure on other ecosystem services, such as water and soils and because measures programmed to other priorities can have co-benefits for biodiversity, this provides only a broad indication of the biodiversity focus of Rural Development Programmes.

Member States on average across the EU have allocated 46.6% of their total RDP budget to Priority 4, the equivalent of €68.8 billion over the 2014-2020 period. At Member State level, the average proportion of the total RDP budget allocated to Priority 4 ranges from 28.5% (HR) to 71.5% (IE). Thirteen Member States have allocated a proportion of their RDP budget higher than the EU average to P4 and are dominated by EU-15 Member States, with the exception of Czechia, Cyprus and Slovenia (DK, DE, CZ, FR, IT, CY, LU, NL, AT, SI, FI, SE, UK)

A range of measures have been programmed under Priority 4, including M1 (knowledge transfer), M2 (advisory services), M4 (physical investments), M7 (basic services), M8 (forest measures), M10 (AECM), M11 (organic farming), M12 (compensation in Natura 2000 areas), M13 (ANC), M15 (forest-environment) and M16 (cooperation). At EU level, the greatest proportion of the Priority 4 budget has been allocated to the AECM and ANC measures (each receiving 35.2% of the total P4 budget), corresponding to approx. €48.5 billion over the 2014-2020 period. The organic farming measure has been allocated 15.7% of the Priority 4 budget, with the forest measures receiving 4.9%. Details of how this differs by Member State can be seen in Figure 6.

Figure 6: Planned Priority 4 expenditure broken down by measure and as a % of the total programmed budget by Member State



Source: European Commission, European Structural and Investment Funds, ESIF 2014-2020 Finance planned details

Modifications to the budget and areas planned to come under agreement for key biodiversity measures during the 2014-2020 period.

During the course of the 2014-2020 programming period, Member States have the opportunity to revise the planned EAFRD expenditure under each measure as well as the target values for their planned area output indicators. The most notable change is that funding for organic farming was increased by at least 10% in 50 of the 118 RDPs between 2016 and 2018. Broadly equal numbers of RDPs increased or decreased planned spending on biodiversity measures over that period.

Looking at the 2018 RDP budgets, Member States overall have increased the amount programmed to Priority 4 by about 3% above that foreseen at the beginning of this programming period.

Looking at the case study Member States, modifications to biodiversity relevant measures had been made in seven of the ten Member States. The most significant changes can be seen in France (CVdL), Germany (B-W), Hungary and Latvia as shown in Table 11. Where changes are relatively large, these are identified. It should be noted that in most cases the change in budget was not proportionate to the change in the target area reported.

Table 11: Changes in budget and target areas for selected Pillar 2 measures between 2016 and 2018 in case study Member States

Case Study	AECM (M10		Organic Farming (M11)		Natura 2000 (M12)		ANC (M13)		Forest-Environment (M15	
	Budget	Target Area	Budget	Target Area	Budget	Target Area	Budget	Target Area	Budget	Target Area
DE (B-W)	↑	↑	↑	↑	↔	↔	↔	↑ (436,000 ha to 526,000 ha	↔	↔
FR (VdL)	↔	↔	↑ (by €16 million)	↑	↔	↔	↔	↔		
LV	↓	↓	↔	↔	↔	↔	↓	↔	↔	↔
HU	↑	↑	↔	↔	↓	↓	↓ By over 50%	↓ By over 50%	↔	↓
NL	↑	↔					↔	↔		
RO	↓	↓	↓	↔			↓	↔	↓ By about 40%	↓ By about 40%
SK	↓	↓	↑	↑	↔	↔	↔	↔	↔	↔

Code: green – increase; orange – static; red – decrease. Grey cells indicate the measure is not implemented.
Source: case studies

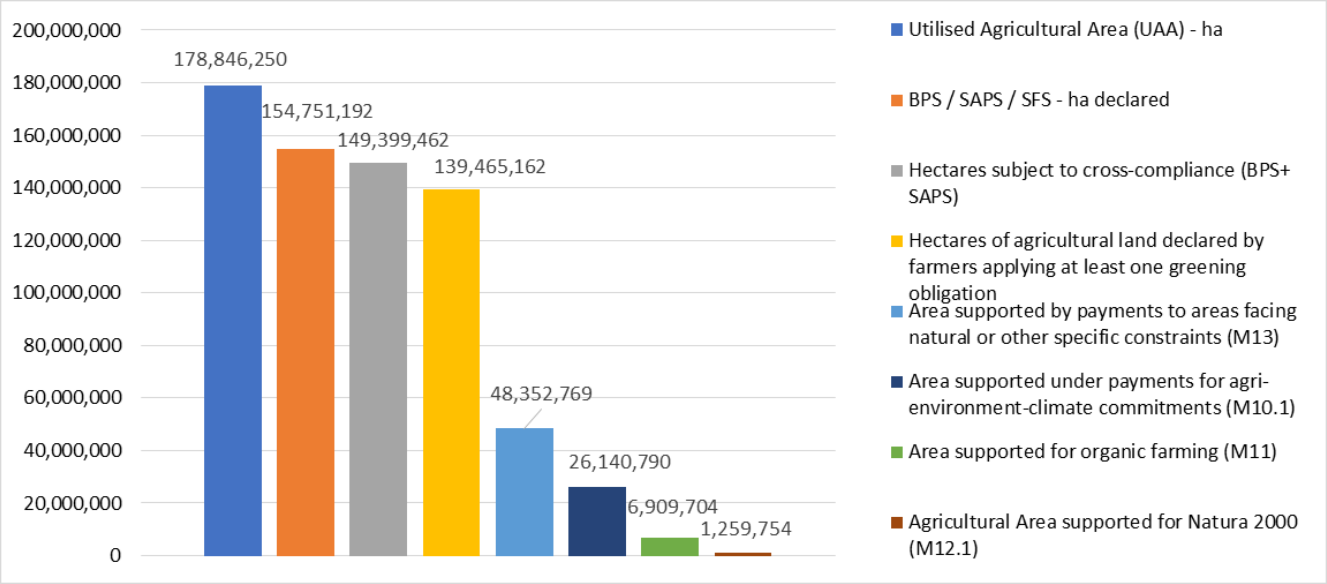
Changes in EAFRD budget and measure coverage between the 2007-13 and 2014-2020 programming periods

A comparison of the budget allocations for some of the key biodiversity measures (M10, M11, M12 and M15) between the 2007-13 programming period and the current one shows that, at EU level, the overall allocations to these measures are 2% lower in the current programming period than they were previously[31]. At the measure level, the comparison shows that the budgets of M12 (Natura 2000 compensation) and M15 (forest-environment) increased substantially – by 70% (from €494 million to €837 million) for M12 and by 140% (from €124 to €298 million) for M15, while allocations to M10 and M11 combined[32] (AECM and organic) have decreased by around 5% (from €38.2 billion to €36.4 billion). The budget allocated to the ANC measure M13 has remained approximately the same between the two periods.

Figure 7 provides an overview of the area for the EU-28 under those CAP instruments and measures for which data on the area supported are available, showing how this compares to the total UAA.

[32] In the 2007-13 period the agri-environment measure included organic farming support, therefore a true comparison of the overall budget allocation must look at both M10 and M11 for the 2014-2020 period.

Figure 7: Area supported under different CAP Pillar 1 instruments and Pillar 2 measures (EU-28), 2017 data (ha)



Source: DG AGRI Data portal (UAA: Eurostat: apro_cpsh1; BPS/SAPS: CATS (OID_01_2a &OID_02_2b); Cross-compliance CATS & RDIS (OIH_01_1a); Greening (ISAMM Greenings OID_05_3); M13 (CATS - OIR_06_1.4); M10 (CATS - OIR_06_1.1); M11 (CATS OIR_06_1.2); M12 (CATS OIR_06_1.3)

5.1.3 MAIN FINDINGS

Member States have used the considerable flexibility they have for implementing certain CAP Pillar 1 instruments and all Pillar 2 measures for the 2014-2020 period in a variety of ways.

Horizontal measures: The way that the FAS operates in Member States varies significantly in terms of the information provided, the organisations providing the advice, the content of the advice provided and the way it is communicated to farmers. Although the FAS must include information provision and advice on cross-compliance and the Pillar 1 greening measures, this does not always include advice on how to protect and improve biodiversity. Beyond the mandatory requirements, a number of Member States provide biodiversity advice to farmers, often in relation to agri-environment-climate schemes, but in others sufficient advice is lacking.

Member State flexibilities under cross-compliance relate to the way that the GAEC standards are implemented. Under GAEC 7, the types of landscape feature included vary widely, with protection most commonly applied to groups of trees, hedges and isolated trees. Only three of the case study Member States include measures to protect against invasive species.

Pillar 1: In 2017 a total of 86.5% of the EU's UAA was declared as being in receipt of BPS/SAPS. Member States have taken quite different approaches to determining which areas of land are eligible for direct payments, particularly in relation to the criteria on what constitutes permanent grassland. Evidence from the case studies shows that this has led to a wide variation in the types of grassland habitats that are included and excluded from receipt of direct payments in the EU. Only five Member States have used an extended definition of 'permanent grassland' in order to include grazed but non-herbaceous areas and/or areas producing animal feed.

Member State notifications to the European Commission show that 79% of all EU agricultural land was subject to at least one greening obligation in 2018 (or 85% of arable and permanent grassland). Overall there was a decrease in the area declared as EFA of two million hectares from 11.5 million ha in 2017 to 9.5 million ha in 2018 (before weighting factors), equivalent to 9% of the total arable area in 2018 or 13% of the arable area required to declare EFA. Catch crops took over as the most popular EFA element from nitrogen fixing crops in 2018 - the area under nitrogen fixing crops which was declared as EFA declined from 40% to 24% of total EFA area. The area declared as fallow has also declined over the same period. In relation to the ESPG measure, of the 16.6 million ha of permanent grassland in Natura 2000 areas, 9.54 million hectares were designated as ESPG (57%) and of this 4.9 million ha was declared by farmers (29.6% of the total area of permanent grassland in Natura 2000 areas). Between 2015 and 2018, 12 Member States increased and three decreased the area designated as ESPG. Only five Member States declared ESPG outside Natura 2000 areas, with data for four of these

covering 0.32 million ha, only 1 % of permanent grassland outside Natura 2000 areas. The area of permanent grassland covered by the ratio requirements for the EU-28 is 42.16 million hectares (90% of all permanent grassland in receipt of CAP support).

Approximately 10% of the direct payment budget is allocated to VCS. 40% of the VCS budget is directed to the beef and veal sector. In 2016 49.5% of all beef and veal cows and 36.5% of dairy cattle were supported through VCS. The evidence suggests that only one of the case study Member States targeted their VCS for environmental purposes – the Netherlands, with a livestock scheme targeted on extensive grazing. None of the other eight case study Member States offering VCS included environmental conditions such as stocking density limits.

Pillar 2: Member States on average across the EU allocated 46.6% of their total RDP budget to Priority 4 (the priority focusing on biodiversity, water and soils) - €68.8 billion over the 2014-2020 period. A range of measures has been programmed under Priority 4, including M1 (knowledge transfer), M2 (advisory services), M4 (physical investments), M7 (basic services), M8 (forest measures), M10 (AECM), M11 (organic farming), M12 (compensation in Natura 2000 areas), M13 (ANC), M15 (forest-environment) and M16 (cooperation). The way in which these measures are structured and implemented varies significantly between Member States, resulting in an array of different approaches to scheme focus, ambition, design, content and targeting. At EU level, the greatest proportion of the Priority 4 budget has been allocated to the AECM and ANC measures, which both operate in all Member States (35.2% or €48.5 billion each). The organic farming measure has been allocated 15.7% of the Priority 4 budget (operating in all Member States apart from NL), with the forest measures receiving 4.9% (operating in 24 Member States). During the course of the 2014-2020 programming period, Member States have revised their planned EAFRD expenditure for some measures, the most notable of which if that funding for the organic farming measure increased by 10% in at least 50 of the 118 RDPs between 2016-18. In terms of the area of land that is supported under Pillar 2 measures and under agreement by 2017, the ANC measure comes first (48.4 million ha / 27% UAA), followed by the AECM (26.1 million ha / 14.6% UAA), and the organic farming measure (6.9 million ha / 3.9% UAA). Use of the Natura 2000 measure and the forest measures are much lower - 1.2 million ha of agricultural land and 0.2 million ha of forest land in Natura 2000 areas and just over one million ha of the EU forest area was under one of the forest measures.

Comparing the budget allocated to particular measures from the 2007-13 period and now, the budgets for M12 (Natura 2000 compensation) and M15 (forest-environment) increased substantially - by 70% (from €494 million to €837 million) for M12 and by 140% (from €124 to €298 million) for M15, while allocations to M10 and M11 combined (AECM and organic) have decreased by around 5% (from €38.2 billion to €36.4 billion). The budget allocated to the ANC measure (M13) has remained approximately the same.

5.2 ESQ 2: What are the drivers and reasons behind the implementation choices regarding the CAP instruments and measures directly or indirectly related to biodiversity?

a) at the level of the Member States and/or regional administrations in terms of CAP instruments and measures and their design in biodiversity strategies at national and regional levels, taking into account the range of possibilities for setting compulsory requirements and voluntary measures for farming practices ,

b) at the level of the beneficiaries (farmers/foresters) by taking up these choices?

5.2.1 Understanding of the question

This question seeks to gain insights into the reasons for the implementation decisions described in ESQ 1 and the degree of importance of the different drivers affecting Member States and land managers.

5.2.2 Process and methodological approach

As a first step a review was carried out of available information at EU-28 level, building on work from previous evaluations, including those of the greening and forest measures (Alliance Environnement and EFI, 2017; Alliance Environnement and Thünen-Institut, 2017; Ecorys, IEEP and WUR, 2016). In addition, to inform the analysis on the rationale for the choices made by beneficiaries, a review was undertaken of the research published within Europe over the past decade on factors relevant to farmers' uptake and participation in environmentally friendly or 'green' measures. The draft EKLIPSE report (Brown et al, 2019), summarising 302 papers on this topic, was used as a starting point. The literature is predominantly focussed on Western Europe, and particularly the United Kingdom, Germany, Spain and Italy. It also focuses on farmer uptake in relation to agri-environment schemes (AES), although a few more recent papers cover participation in the EFA.

More detailed information was collated in the case study Member States on the rationale behind Member State and/or regional administrations' decisions, based on interviews with government officials and any published documentation.

Finally, the case studies also sourced further information on beneficiaries' decisions, reviewing any locally available literature and carrying out interviews with bodies responsible for the implementation of different CAP measures, farmers' organisations, environmental stakeholders and farm advisory bodies. This helped to redress the geographical bias in the literature reviewed.

5.2.3 ANALYSIS

5.2.3.1 Drivers behind implementation choices at the level of Member State administrations

The range of factors influencing Member States' decisions includes political and budgetary pressures, historic factors, administrative and control requirements and costs. Member States sought to balance a range of needs and priorities – for biodiversity, for the broader environment and for production – as well as demands and pressures from a wide range of interests in civil society, institutional capacity and governance issues also played a role.

The environment has not tended to be a key driver of the overall choices made for Pillar 1 and Pillar 2, with socio-economic factors, alongside financial and administrative considerations the key drivers for the decisions made in the majority of the Member States (Ecorys, IEEP and WUR, 2016). Evidence from the case studies identified the following key priorities that drove overall CAP implementation decisions:

- Strengthening the competitiveness of the agricultural sector (all), with a focus on specific sectors in some Member States, for example the livestock sector (FR, HU) and the fruit and vegetable sectors (HU, SK);
- Maintaining and improving rural and agricultural employment, particularly in more marginal areas to keep them populated and farmed (FR, HU, PT, SK), with an emphasis in Portugal on maintaining the viability of traditional farming systems (agro-forestry in particular); and
- Securing continuity of support and minimising the redistribution of support in view of the significant changes in the Pillar 1 instruments for 2014-2020.

In some Member States, it was emphasised that these priorities should be pursued in a sustainable way, minimising harm to the environment (e.g. DE, IE, and NL). In other Member States the environment was a secondary priority to be addressed (e.g. LV), and often considered in relation to the design of specific measures (primarily Pillar 2 measures) rather than being a cross-cutting issue mainstreamed into all CAP implementation decisions.

These priorities can be seen to have influenced many of the implementation choices made with respect to Pillar 1 instruments (e.g. VCS and greening payments) as well as the ANC measure in Pillar 2. For example, many of the case study Member States chose to implement green direct payments so as to provide farmers with as much flexibility as possible so as to disburse the funding with little disruption to existing management practices, as well as keeping the measures administratively simple (e.g. FR, HU, PT, RO, SK). Although some Member States had made efforts to achieve improved environmental outcomes through their use of these measures (e.g. DE, NL), in many cases the final implementation choices were weaker following national or regional consultation than had been first proposed, particularly for the EFA measure. These findings echo those of the evaluation of the greening instrument (Alliance Environnement and Thünen-Institut, 2017).

Where evidence on reasons for offering VCS was found in the case studies, it tended to show that Member States were attempting to replicate support previously available through other measures. For example France explicitly used VCS to promote the economic competitiveness of different sectors, to expand its protein crop production, as well as to maintain the diversity of production and mixed farming, particularly in marginal areas.

Multiple reasons were given for implementing the ANC measure in Member States with the measure seen as a means of maintaining agricultural activity and production in these less favoured areas (e.g. FR, LV, PT), with the Latvian case study also highlighting its importance for maintaining the agricultural landscape and for balanced territorial development. Despite the general failure of Member States to cite environmental reasons for using the ANC measure, most of the budget was allocated to Priority 4.

However, the environment in general, and biodiversity in particular were drivers for decisions about a number of Pillar 2 measures and particularly the AECM. In some cases biodiversity was a cross-cutting priority for the design of the RDP as a whole. For example biodiversity was an important consideration for the design of the RDP in Germany (B-W) as well as in Ireland. This was partly due to political drivers (see below). In Germany (B-W) the region benefitted from the fact that the Nature conservation strategy for the region had just been produced which set out clear goals and identified the CAP measures that would be best placed to meet these, assisting greatly with the design of the RDP. The influence of environmental legislation and biodiversity strategies on RDP design was not seen so explicitly in the other case studies. Public opinion was also identified as an important consideration in Germany. Public concern about biodiversity loss has increased recently, with the publication in 2018 of scientific evidence on the collapse of insect populations in protected areas. This led to the adoption of a special programme for biodiversity conservation in 2019 (Naturschutzstrategie Baden-Württemberg, 2020) and provides context to the continued focus on biodiversity as the RDP for 2014-2020 is implemented.

Financial and budgetary issues were key drivers affecting decisions made in many Member States (Ecorys et al, 2016). This was a particular issue for the 2014-2020 CAP, given the significant changes in Pillar 1 national envelopes for some Member States and the constraints on the availability of national co-funding for Pillar 2. In addition, some Member States continued to experience the ongoing effects of economic crises (e.g. IE, HR) including difficulties in specific agricultural sectors (e.g. dairy, pigs, extensive livestock systems, for example in France). As identified above, in many Member States the priority was to make sure as many farmers as possible were able to access the funds available and to invest available resources in improving farm infrastructure. These factors have led both to more conservative approaches to scheme design as well as to more ambitious and targeted approaches to address biodiversity issues (see Box 12).

Box 12: Examples of the influence of financial drivers on CAP implementation choices

In **France** the economic crisis and its political consequences significantly affected implementation choices, particularly the need to find ways to increase support to the livestock sector, and particularly to support extensive livestock systems in marginal areas. This led to decisions to include 'wooded pastures' within the areas eligible for CAP support as well as the allocation of 15% of the Pillar 1 budget to VCS, mostly for livestock farms. Under Pillar 2, the high budgets potentially associated with certain measures would have deterred their use, but in the end the reason for implementing certain AECM measures (e.g. creation and maintenance of grass cover and the agro-forestry measure) was due to the fact that the national co-financing was provided by the Water Agency. The shift of the budget for promoting organic farming from Pillar 1 (in 2007-13) to Pillar 2 (for 2014-2020) also reduced the availability of funding for other measures, especially given the popularity of the measure. By the end of 2015, after only one year of implementation, the budget allocated to M11 for the whole period had almost entirely been used. This led to an additional €14 million being transferred from Pillar 1 to Pillar 2, which is planned to support the costs of conversion payments, but there remain questions over the extent to which payments for maintenance of organic farming will be continued, especially as these are considered to be supported via the increasingly buoyant market.

In **Ireland**, the economic crisis in 2008-09 led to significant changes to environmental schemes under the RDP, with a closure of the whole farm approach to AECM and the introduction of a new more targeted scheme. In this period there had also been a long running ECJ case against Ireland for not protecting a 25,000 ha SPA and red grouse habitats more widely from overgrazing by sheep. This case was dropped with commitments from the Environment Minister at the time that action would be taken. As a result, the more targeted approach to AECM was followed through into the 2014-2020 programming period, making the adjustments required to reflect the introduction of greening as well as addressing the serious problems facing Natura 2000 areas. Not only was the new tiered AECM introduced (GLAS) which prioritised the improved management of environmental assets

where they exist (particularly Natura 2000 habitats, commonage and important bird habitats) but also the longstanding outcome focussed Burren Programme was funded under the RDP and the opportunities offered by the cooperation measure (M16) were taken to set up ambitious EIP Operational Groups targeted at Natura 2000 priorities, such as the important Burren limestone habitat, the protection of the freshwater pearl mussel, hen harriers, bogland and upland areas.

In **Latvia**, the total EAFRD budget decreased by 8% between the two programming periods, which had implications for the choices made about which measures to use and the budget to allocate to them. For example, the area covered by the AECM was cut significantly and support for Natura 2000 areas through M12 was removed.

In **Hungary** significant transfers of funding were made from Pillar 2 to Pillar 1 and this, coupled with a reduction in the Pillar 2 budget between the two programming periods, left less funding available for measures aimed at nature conservation. For example, some measures, such as the AECM focussed on protecting HNV areas decreased in scope, through a tightening of the eligible area (albeit with a higher payment rate for the area remaining eligible) and the funding for developing management plans for Natura 2000 areas was stopped.

Source: case studies

In relation to *political factors*, issues such as the political orientation of the governing party, political stability, changes in political majorities due to elections and electoral promises, were each identified as drivers of decision making in many Member States (Ecorys et al, 2016 and the case studies). For example, in Baden-Württemberg the choice to try and optimise the delivery of environmental objectives, including biodiversity, through the RDP was reported to be linked to the fact that the region was led by a Green Minister-President from 2011, within a socialist democrat government from 2011-2016. The Ministry of Agriculture was also led by a Green Minister at the time the RDP was designed. Some environmental stakeholders interviewed in the case study noted that the change in party of the Minister for Agriculture in 2016 led to a reduction in the willingness to be as proactive on environmental issues. In France also, the implementation choices for the CAP delivered electoral commitments that the President had made during his campaign, namely to support livestock farming and employment in rural areas.

Political choices, coupled with financial considerations have also influenced the measures used to support environmental management, particularly when the desired management can be incentivised in different ways. Latvia for example chose to reduce ploughing within the Natura 2000 network by widely designating ESPG (and so banning it) rather than by offering AECM or M12 support as compensation. The opposite is happening in Romania whose Agriculture Ministry is reported to be unwilling to see actions which is currently funds through the AECM required as part of Natura 2000 management plans, which would mean that the AECM could no longer pay for them (although compensation using M12 could be introduced).

The lack of progress with developing management plans for Natura 2000 sites was also identified as a barrier to use of the Natura 2000 measure in three of the case studies (IE, NL, RO). In all three of these Member States the AECM was used instead to support management in these areas.

The process for the design of CAP instruments and measures at national and regional level is led by the Agricultural departments in Member States. Ministries involved include those responsible for environmental issues but in some cases the views of governmental environmental institutions are not taken into account as fully as they might have been. This is also true for stakeholders. The extent to which *external environmental stakeholders* were involved in the decision-making process was very variable between Member States. In many Member States efforts were made to engage stakeholders representing a wide range of interest groups (including environment) and to aim for agreement between the different stakeholders on the approach taken. Despite this, however, environmental stakeholders often felt that their views were taken less into account than those from the farming sector in determining the prioritisation and focus of the measures used (e.g. DE, FR, SK). However, although they considered themselves not to have been sufficiently involved at a strategic level, examples from the Latvian and Slovakian case studies show that they did play an important role in successfully improving the environmental content of AECM measures. Examples from the case studies of the ways in which environmental institutions and organisations have been involved with the RDP development process are set out in Box 13.

Box 13: Involvement of environmental institutions and organisations in the development of RDPs

The ex-ante evaluation of the **Latvian** RDP stated that the involvement of stakeholders during the RDP development process placed too much emphasis on agricultural organisations. There was a lack of organisations representing rural non-governmental initiatives, science and forestry. Such organisations were missing both in the debates on training as well as on environmental and climate change issues. It was noted that during the first meetings the Managing Authority promised to set up a working group on agri-environmental measures, but no such group was created. In general, the ex-ante evaluation concluded that the communication on environmental issues had been insufficient and many of the proposals and discussions had been based on the formal conditions/criteria for measures, rather than the biodiversity targets and needs.
However, the environmental NGOs were successful at countering a proposal to reduce the budget of a key AECM option (maintaining biodiversity on grasslands) by 42% compared with the previous programming period and helping refine the content of the measure, including preparing conservation and management guidelines for the grassland habitats involved which are the subject of compulsory training sessions for beneficiaries.

In **France**, the Federation of regional natural parks received funding from the Ministry of agriculture in 2012 to source policy suggestions for AECM design from the natural regional parks. They suggested in particular to create the 'system' level measures to complement the local AECMs in order to bring about change in the sustainable management of farming systems. However, environmental experts feel that the ambitions of this proposal were weakened during the negotiation process, with certain options proposed being removed. A study (Gaudefroy, 2018) seems to confirm this view, highlighting that the national framework for the AECM is the result of power relations, with a number of measures focussed more on providing socio-economic support to farmers rather than on environmental objectives. The involvement of environmental organisations in scheme design, however seems to vary by region. In Centre-Val-de-Loire the regional authorities seem to have taken into account environmental considerations and set up quite favourable conditions for an effective implementation of AECMs - when developing the RDP, the Region involved a range of environmental experts ; in the selection of RDP measures, the Region opted for a large variety of types of operations, in order to offer all existing possibilities for 'tailored' AECMs, responding to the local environmental issues identified; and in the call for and selection of local AECM projects, the Region has promoted AECPs co-managed by environmental and agricultural organisations, established coherent priority areas for action[33], and selected the AECPs using environmental criteria.

In **Slovakia**, a previous cooperation agreement between the Ministries of Agriculture and environment was not renewed in the run up to the 2014-2020 period, due to disagreements on the extent to which the CAP should fund environmental actions. The agricultural ministry argued that the CAP should focus as much as possible on agricultural issues, with environmental priorities funded from other sources. This meant that the environmental NGOs were primarily those pushing for environmental priorities to be addressed via the AECM and Natura 2000 measure, with some success.

Source: case studies

Member State capacity and experience was also highlighted in the case studies as an important factor influencing decision making processes. In new Member States, such as Croatia, Member State officials told the case study experts that there was little experience with designing and administering EU-financed measures and no previous experience with designing environmental measures since the pre-accession funds had provided support only to farm investments and rural infrastructure. This meant that biodiversity was not the focus of the policy makers and experts involved in designing the CAP. In response to initial proposals which were predominantly focussed on farm viability and agricultural competitiveness alongside the processing and marketing of agricultural products and economic development in rural areas, the Environment Ministry commissioned a capacity building project which led to greater inclusion of biodiversity protection measures within the CAP for the 2014-2020 period (see Box 14). In Romania a similar lack of institutional maturity, as reported by the case study, has led to measures being implemented in as simple a way as possible, following the guidance provided by the Commission very precisely and simply rather than necessarily thinking creatively about how this might be interpreted to introduce measures that are more tailored and targeted. This has been particularly the case for the greening measures, although this was also due to the fact that they did not want to take any risks with offering something that might not meet the requirements of the delegated and implementing regulations which were late to appear. Another reason for putting in place very simple measures has been the lack of understanding and awareness of environmental issues by land managers in Romania and therefore the need to put in place schemes that are straightforward to understand. These latter points were also raised in Croatia.

[33] For biodiversity, these priority areas include: the Natura 2000 sites, areas with specific conservation actions led by the Conservatoire d'espaces naturels or regional natural parks, national and regional natural reserves, biodiversity reservoirs and corridors identified in the SRCE and local green infrastructure schemes, and wetlands of regional importance (source: RDP Centre-Val-de-Loire).

Box 14: Influence of the Environment Ministry in building capacity for the design of environmental elements in the CAP 2014-2020 (Croatia)

As a reaction to the perceived neutral attitude of the Ministry of Agriculture (MoA) towards biodiversity conservation, the Nature Protection Directorate of the Ministry of Environment initiated an international capacity-building project on agri-environment. The project was funded by a World Bank loan (2012-2016) and provided support to the Ministry of Environment to enable them to provide inputs to the MoA in designing biodiversity-relevant operations under the agri-environment-climate measure (AECM, M10), as well as in shaping the biodiversity-related Statutory Management Requirements and GAEC 7 under cross-compliance. The project provided (i) an assessment of cross-compliance conditions related to biodiversity protection, (ii) a set of biodiversity protection measures to be included in RDP M10; (iii) a comprehensive awareness-raising and training programme; (iv) background studies and analytical reports on agricultural and nature conservation policies; and (v) established and ran an agri-environment demonstration programme. As a result of the work provided by this project, biodiversity protection operations are now strongly represented in HR's AECM, with all sixteen M10 operations relevant for biodiversity and nine of these designed primarily to focus on biodiversity protection objectives.

Source: Croatian case study

Capacity and experience also need good evidence of how schemes operate and where they should be targeted. A number of Member States mentioned that their CAP decisions had *built on evaluations of what had worked well and less well over the 2007-13 period.* In Germany (B-W), the case study highlighted that the current design of the AECM builds on 20 years of experience with these types of measures. Although a few specific measures were dropped because they had been identified as ineffective, many were rolled over because they were deemed to be delivering the desired results, including the continuation of the species-rich grassland results-based payments, many with increased payment rates, and a few amendments were put in place for some options to strengthen them. Also in Germany (B-W), in response to the findings of the *ex post* evaluation that showed that the success of biodiversity conservation measures was closely linked to the advisory services for farmers, fully subsidised advice on biodiversity has been made available under the 2014-2020 RDP. In addition the region is one of the only case studies to have introduced AECM options that build on EFA measures, by providing support to enhance EFA fallow through sowing with flower mixtures. In Hungary, evidence from the previous period had shown that it was the more targeted measures that delivered more for biodiversity than broad and shallow type measures. As a result, significant changes to the design of the measures were made, introducing a modular system with basic schemes open to all farmers, but with more targeted measures available and applicants picking the more targeted measures had a higher chance of being selected for an agreement.

However, the majority of the case study Member States continued broadly with the same Pillar 2 measures that had already been in place in the 2007-13 period in relation to biodiversity, for example in Portugal where no needs were identified to change the way measures were designed or targeted and Latvia where similar measures continued. Although not explicitly specified in the case studies, this may also have been due to the fact that the 2014-2020 reform introduced a lot of changes to Pillar 1 and therefore time and efforts were focused on designing these measures, leaving alone those aspects of Pillar 2 where there were few pressures to change approach.

The *availability of scientific data* was highlighted as an important driver of measure design in a number of Member States, particularly for the ESPG measure. In Latvia for example, the decision on which grasslands to designate as ESPG was based on the maps available about the location of important EU habitats with the intention of excluding areas of intensively managed improved grassland judged to be of low biodiversity value. Since Latvian officials knew that an inventory of grassland habitats of EU importance would take place during the programming period under the Nature Census project (Nature Conservation Agency, 2019), they planned to add new areas to the ESPG layer annually, which has led to new grassland areas being continuously added to the ESPG area. In France, also the decisions about which areas of grassland to consider as ESPG was informed by a scientific study on important areas in terms of biodiversity conducted by the French Natural History Museum. This identified important areas both inside and outside Natura 2000 areas. However in this case, due to economic and political considerations (e.g. the dairy crisis), the Ministry of Agriculture did not follow all the recommendations of the MNHN and decided to limit the area of ESPG to the areas identified within Natura 2000 areas. Improvements in the mapping of different habitat types has also improved the way that measures are able to work together in Latvia. In the previous programming period, certain habitats (agro-forestry and semi-natural grasslands not on agricultural land) were excluded from the AECM to maintain the

biological diversity of grassland. However improved mapping means that individual field blocks can now be identified and measured and therefore enter the scheme.

5.2.3.2 Drivers behind farmers' implementation choices

From a land manager perspective, there are also a number of choices that can be made. In the case of compulsory measures, such as the green direct payments, there are decisions about which practices or options to use to make up their EFA. In the case of voluntary measures, such as VCS or any of the EAFRD measures, there is a decision both whether or not to apply for the support and if so, which elements to apply for.

A review of the literature shows that there is a range of factors that can influence these decisions. These include:

- Farm specific characteristics (e.g. size (physical and economic), intensity of management, location, soil type);
- Financial factors, such as payment rates;
- The nature of the changes required through the measure (in relation to land management, land use and labour requirements) and their degree of fit with existing business models and succession planning;
- Policy design and ease and certainty of access to the support (including the application process and whether or not entry is competitive);
- Potential beneficiaries' understanding and awareness of, and attitudes towards biodiversity and broader environmental issues;
- The availability of advice and the form in which it is available;
- Socio-demographic factors, such as age, education but also relationships with and actions of other land managers locally;
- The economic context, including uncertainty about future market prices and hence cropping/stocking patterns.

Of all these, it is a combination of financial factors, policy design and degree of fit with existing practices, environmental awareness and market developments that are the factors that appear to influence engagement with environmental measures the most.

The AECM is the CAP measure on which most evidence is available. In relation to the AECM, although farm size can affect uptake, the evidence is mixed as to whether large or small farms are more likely to participate in environmental schemes (Dessart, 2019; Pascucci et al, 2011). The results of the case studies showed that it is less the size of the farm than the type of farming system involved and the degree of change required in relation to the level of the payment on offer that impacts farmers' willingness to engage in AECM (M10). For example, arable farmers in Croatia, France (CVdL), Germany (B-W), Latvia and Slovakia are all reported to consider the AECM payment rates too low compared to the gross margins achieved with intensive cropping systems to provide sufficient inducement to engage in the arable measures. Evidence of the effect of payment rates on uptake can be seen by examples in Member States where these have been changed. For example in Portugal, uptake of the measure to promote the rotation of dry cereal and fallow increased following an increase in the payment rate. Conversely, a decrease in the payment rates for certain grasslands in Latvia is thought to be the reason that the target uptake for the measure to maintain the biological diversity in grasslands has not been met (only 37,000 ha under agreement to 2018 against a target of around 84,000), alongside other factors such as the lack of support to restore overgrown /abandoned grasslands prior to entering the scheme. Some additional specific examples of the way in which payment rates and the degree of change required affect the uptake of different AECM options, drawn from the case studies, can be seen in Box 15.

Box 15: Factors affecting uptake of different types of management actions under the AECM – examples from the case studies

In **France, centre Val de Loire**, the uptake data for the more demanding measure COUVER 5 (Creation and maintenance of a network of ecological control zones targeted at arable land), showed just three beneficiaries for the period 2015-2018 while for the more straightforward measure HERB 3 (Total absence of mineral and organic nitrogen fertilisation (excluding possible grazing) on meadows) there were more than 300. In addition,

the recent increase in the payment for the AECM COUVER_06 (Creation and maintenance of a grass cover) to 450€/ha has led to an increase in the uptake of this AECM, especially among grain farmers.

In **Croatia**, no farmers implemented M10 *Establishment of field strips* in 2018. Besides the lack of awareness and lack of understanding of the need for such a measure, the payment rates were apparently too low to attract farmers according to the case study. In fact, many of the farmers believed and expected that the payment of €899-976 per hectare was the payment per hectare of arable crop if they established a field strip. They had not initially understood that the payment was per hectare of field strip (and not per hectare of arable crops), which led to disappointment and even protests.

In **Slovakia**, the protection of biodiversity on semi-natural grasslands (135,000 ha uptake of a target of 150,000 ha), is the most popular scheme. It existed already in the previous programming period and there has been an increase in uptake in the current period (135,000 ha by 2018 compared to a target area of 150,000 ha). It is therefore a well-established measure which means farmers are aware of it, and it is seen as financial support for undemanding extensive management practices. In contrast the management of HNV grassland in Natura 2000 areas is much more demanding due to their fragmented character, difficult terrain, difficult access and the fact that they are often overgrown and lack the necessary infrastructure for grazing (e.g. access to water). Uptake of these measures is much lower as the payment rates are considered too low to recompense for these challenges. The creation of biostrips on intensive arable land also has low uptake (18.5 ha uptake of a target 5,000 ha). In this case it is the low payment rate combined with the requirements of the measure which are seen to introduce risks to the arable crop (e.g. weed infestation and increase in small mammals) that have put farmers off applying.

In **Portugal**, the case study highlighted that farmers are more likely to take up those measures that are compatible with existing extensive management systems, e.g. agro-forestry or maintenance of traditional permanent crops, such as olive groves.

In **Ireland**, a survey was carried out of the AECM (GLAS) which revealed that the main reasons for farmers participating were increased income/the scheme payment (68%), increasing the sustainability of the farm for future generations (66%) and increased income stability (62%). The most popular measures were the low-input permanent pasture and traditional hay option (as well as the low-emission slurry spreading option). Measures, such as arable options were not as popular as they were seen as time consuming and labour intensive.

In **Germany (B-W)**, the payment rates for both grassland and arable measures are considered too low: for grassland options it is felt that the payments do not cover the labour costs of managing the land and for arable farming, it was felt that the AECM payment rates do not sufficiently reward farmers for taking land out of production or taking measures which reduce yields.

A number of other elements of scheme design that influence farmers' decisions about whether or not to take up a measure were identified in the case studies. Factors deterring farmers from applying for AECM schemes included: bureaucracy involved in the application process, concerns about the risks of sanctions, particularly for options where there is a greater risk of error in mapping, the length of the agreement and low interest in environmental management and the availability of advice. The option to put 'multi-functional field margins/biostrips' on arable fields in Slovakia is a case in point. In a letter to the Ministry of Agriculture from the NGO 'Raptor Protection of Slovakia', a whole range of reasons for the lack of uptake were given, including: costs and labour not sufficiently reflected in the payment rates; high seed price and lack of availability of seed on the market; fear of weed infestation from neighbouring plots; fear of an increase in small mammals; fear of cuts in payment as a result of inaccurate mapping of the biostrips; insufficient advice provision; low interest in environmentally friendly management practices. In Germany, the participation rate in the AECM dropped from 67% in the 2007-2013 programming period to 53% in the 2014-2020 scheme, with a slight increase in 2018 to 57%. A study found that amongst the main reasons were: the withdrawal of familiar, well accepted, but relatively undemanding measures; the complexity of the requirements of the options available (especially on arable and mixed farms); the restrictions on farmers, frustrations with the bureaucracy of the application process, and concerns about increased risks of sanctions; and the length of the commitment. In this survey, the lack of fit with the production system was lower down the list of concerns. In Portugal, the example of the non-productive investments measure (M4.4) was given where poor uptake of the options to create and restore riparian forests and the eradication of woody invasive species was thought to be due to the need to create a management plan which had to be approved before work could be started. The time and effort required to put such a plan in place was thought to have put beneficiaries off applying. In the Netherlands, the change to implement AECM via cooperatives has reduced the administrative burden on farmers through the simplification of rules, reporting procedures and controls which have increased the willingness of farmers to participate.

Financial reasons and market drivers, alongside the payment rates seem to be behind the significant increase in the uptake of the organic measure (M11). In France the high demand for organic farming

products (alongside with high payments rates) was identified as one of the key drivers of high uptake-forcing the Region to slow down the application process, transfer a significant proportion of funds from Pillar 1 to Pillar 2 and consider stopping support for maintenance of organic farming. In the case of Latvia, the case study highlighted the fact that the drivers for converting to organic had changed over time and were no longer environmental but rather financial and market driven due to the market for organic grain increasing significantly over recent years. However, in Ireland, it seems that the availability of the scheme and the size of the payment was a driving factor behind uptake of organic farming. Here, the level of the payment rate for M11 increased significantly for the 2014-2020 period and uptake followed to the extent that the RDP target has already been achieved, whereas the payment rates for the 2007-2013 period organic farming scheme were widely regarded as inadequate and this was reflected in the low uptake during that period. Payment rates for measure M11 are considered further in ESQ 9.

Farmer awareness and availability of advice: The literature has demonstrated that positive attitudes towards the environment, or to the adoption of environmentally friendly farming practices, can play a significant part in farmers' willingness to participate in an AES (Barreiro-Hurlé et al, 2010; Defrancesco et al, 2008; Ruto and Garrod, 2009). This awareness is often linked to the availability of advice, information exchange and training opportunities. This was confirmed in the case studies, both in highlighting the positive effect that advice can bring as well as highlighting the absence of awareness and advice as a reason for low uptake of schemes. For example, the ex-post evaluation of the previous RDP in Baden-Württemberg (period 2007-2013) stated that the success of biodiversity conservation measures had been closely linked to the advisory services for farmers. A study to examine AECM uptake in 2014-2020 showed that in general the advice available was positively received, although improvements could be made. In addition, in Baden-Württemberg Landscape Conservation Associations[34] (LCAs) play an important role in encouraging positive action and collaboration for the management of Natura 2000 areas. The Ireland case study also highlighted that the training associated with the AECM was proving very popular with farmers and encouraging them to develop an interest in the environment and how their management can help lead to positive environmental change. In the Netherlands the cooperatives that manage the implementation of the AECM have chosen to invest in ways to share knowledge between farmers both within and between cooperatives. The field trips and national working groups on the four key habitats that are the focus of the AECM have increased the exposure of farmers to environmental management, which in turn has improved their understanding and increased their motivation to engage in more demanding activities on their land.

Conversely, in Member States where little advice or promotional activities were apparent, this, coupled with low levels of knowledge and interest in the environment was thought to be one of the reasons for low uptake of the AECM in particular (e.g. HR, LV, HU, SK, RO). For example, in Romania, the absence of a fully functioning Farm Advisory Service (FAS) means that farmers are not always aware of the conditions they need to fulfil to receive support. This was particularly an issue with the introduction of the greening measures on top of cross-compliance in 2015, which were poorly understood by farmers and led to some situations on arable farms where the measures were not properly implemented. Anecdotal evidence suggesting that Paying Agency staff had to work hard to try and fit existing cropping patterns to the greening requirements for the on-line application forms. The issue of fragmented information availability to beneficiaries was also highlighted in Latvia. However, here major efforts have been made to improve the biodiversity knowledge and understanding of beneficiaries through combining the knowledge transfer measure (M1) with other measures (e.g. M10, M11, M8.5) which it is hoped will improve the situation over the coming years.

Finally, the literature indicates that socio-demographic factors, such as *age and education* do not systematically impact farmers' willingness to take part in agri-environment schemes (AES) while some studies found that higher levels of education were not linked to participation in an AES ((Defrancesco et al, 2008) (IT)), others found that younger and better educated farmers were discovered to be more likely to participate ((Peerlings, Polman and Management, 2009) (EU)). Only one of the case studies

[34] LCAs in Baden-Württemberg are formed at a county level, with members including the representatives of counties, municipalities and associations dealing with the nature conservation (e.g. BUND, NABU, hunting associations, farmers' associations, etc.) that work on an equal footing. Although the LCAs do not have regulatory power, they work very closely with the relevant public authorities and support them in their tasks. The LCAs are of particular importance in the implementation of the Natura 2000 network, as they coordinate the cooperation of the participating administrations in the implementation of Natura 2000, promote the implementation of the management plans, and support the land users in contract nature conservation.

(Croatia) identified age as a factor influencing uptake of environmental measures where younger farmers were identified as more aware of the environmental needs and hence more likely to engage in environmental measures.

5.2.4 MAIN FINDINGS

The analysis has shown that socio-economic, financial and administrative factors are the strongest drivers of Member States' choices. Improving the competitiveness of agriculture and maintaining the viability of farming in remote rural areas were identified as especially strong drivers, especially influencing decisions made by Member States to make the new greening measure and ANC funding accessible to farmers with minimal if any changes to existing management practices needed. In many cases, the ease with which funding could be disbursed was prioritised, requiring administrative simplicity where possible as opposed to ambitious design. In two of the case studies the impacts of the economic crisis influenced these decisions and in another two the reduction in their EAFRD budget for the 2014-2020 period affected the choices made.

Biodiversity considerations were found to be a weaker driver of decisions about which measures to offer to farmers and how to design them. Where biodiversity was given more of a priority, this tended to relate to decisions about the implementation of individual measures with an intervention logic explicitly linked to biodiversity, rather than as an overarching priority of relevance to implementation as a whole. Only in one of the case studies was the availability of the PAF highlighted as driving implementation decisions for the RDP as a whole. In practice, however, the majority of case study Member States continued broadly with the same Pillar 2 measures and a similar measure design to those that had been in place in the previous programming period.

The involvement and influence of environmental institutions and stakeholders on RDP design was variable between Member States. Although many Member States sought to involve a wide range of stakeholders in the RDP process, the influence of environmental stakeholders was limited generally to the design of specific AECM options, rather than the overall strategic approach. Feedback from three of the case study Member States indicated that Member State capacity and experience also influenced implementation choices, with those with more years' of experience with measure design found to be in a position to take account of the findings of evaluations or new data to design more tailored schemes, while those with less institutional maturity more often sought to implement measures in a simpler way. Finally, the availability of scientific and monitoring data was highlighted as an important factor influencing measure design in three Member States, particularly in determining which areas to designate as ESPG under the greening measures, but also for targeting and tailoring their AECMs.

In relation to the drivers influencing uptake of the measures by farmers, the literature combined with the information from the case studies shows that it is a combination of financial factors, policy design and degree of fit with existing land management practices, environmental awareness and market developments that appear to influence farmers the most in terms of their decisions to engage or not with environmental measures. Most of the evidence relates to the AECM under Pillar 2. The case studies provided evidence, backed up with uptake data, that showed that payment rates were often considered too low in intensive cropping areas to provide sufficient inducement to make the changes in management that would be required, whereas schemes that provided support to maintain existing management, for example on semi-natural habitats were often more popular. Other factors that were identified as influencing uptake included the level of bureaucracy involved in the application process, the availability of advice to enhance the environmental awareness of land managers, and the attitudes to the environment of the individuals themselves. In one Member State, a move to reduce the administrative burden on farmers has translated into an increased willingness of farmers to participate. For the organic farming measure, it seems to be a combination of the payment rates offered coupled with market drivers which have influenced the significant increase in uptake of the measure during this programming period.

5.3 ESQ 3: WHAT ARE THE IMPACTS OF THESE IMPLEMENTATION CHOICES AT THE LEVEL OF THE BENEFICIARIES (FARMERS/FORESTERS) IN TERMS OF LAND USE PATTERNS, INTENSITY OF LAND USE (INTENSIFICATION AND LAND ABANDONMENT) AND GEOGRAPHICAL DISTRIBUTION OF PRODUCTION?

In answering these questions the evaluator should consider the degree of importance of the different drivers.

5.3.1 UNDERSTANDING OF THE QUESTION

The choices made by Member States about CAP instruments and measures influence the extent, location, type and intensity of management that takes place on agricultural land and in some forest areas. This question assesses the extent to which the choices made by Member States in the 2014-2020 period have influenced these factors. The CAP is only one of the drivers influencing such changes, with market influences, technological developments, climate as well as other policies, including trade agreements, all having an influence on the way in which both agriculture and forestry develop and interact. As such, it can be difficult to distinguish the precise role of policy from that of other drivers and some caution must be exercised in assessing the extent to which apparent responses to specific CAP measures are in fact attributable to the measure in question.

5.3.2 PROCESS AND METHODOLOGICAL APPROACH

Under a first step, the key CAP instruments and measures which have the potential to influence land use, production intensity and geographical pattern of production were identified.

Under a second step, the evolution of land use, geographic location of production and intensity of management since 2014 were analysed using Eurostat annual data and complemented by an analysis of FADN data for the case study Member States. The analysis focused on those agriculture and forestry factors which have the most potential to impact on biodiversity and landscapes, either negatively or positively, based on an extensive literature review (as summarised in section 2.2). It should also be noted that, during the data collection phase of this evaluation, the latest available FADN data was 2016, which was only the second year of the implementation of CAP 2014-2020 Pillar 1 instruments and the first year of the implementation of Pillar 2 measures under EAFRD. This inevitably limited the scope to identify any firmly established trends resulting from decisions taken in 2014.

In a third step, the extent to which CAP instruments and measures have influenced the changes identified was assessed. This is based on a review of the available literature and was conducted (focusing on changes attributable to the 2014-2020 period) in combination with the analysis of the uptake data on implementation choices (ESQ 1) and information from the case studies. The strength of the CAP as a driver of the changes identified is also assessed. This has been done with reference to relevant literature as well as information provided through the case studies.

5.3.3 CAP INSTRUMENTS AND MEASURES WHICH CAN INFLUENCE LAND USE, PRODUCTION INTENSITY AND THE GEOGRAPHICAL PATTERN OF PRODUCTION

CAP measures can be expected to influence land use patterns and land management intensity in several different respects. Potential influences from current CAP policy measures include:

- Horizontal:
    - Elements of cross-compliance, including GAEC requirements which require landscape features such as trees and hedges to be preserved may in doing so impede the creation of larger fields suitable for more intensive farming practices.

- Pillar 1:
    - The impact of Pillar 1 direct payment measures which affects the relative profitability of farming forestry and other land uses including abandonment or conversion to agriculture in the case of the most marginally productive land;
    - More specific influences on land management arising from support coupled to specific types of production through VCS. This has an impact on the distribution of production between sectors and the intensity of that production, as well as its impact on profitability and so on land use;
    - Measures aimed at the retention of permanent pasture, such as the green direct payments.
- Pillar 2:

- The implementation of ANC measures designed to support agricultural incomes in areas which experience natural constraints, potentially inhibiting abandonment, afforestation or other competing land uses.
- The implementation of the AECM where it is used to maintain particular land uses, e.g. extensive grazing or arable systems.
- Measures aimed at afforestation or other specific land uses such as agro-forestry, productive systems such as organic farming, etc., such as the EFA greening measure or EAFRD measures.

Measures with the potential to influence intensity of land use to some degree will include those that have an impact on the profitability of different production systems and therefore interact with other drivers in determining the economically optimum intensity of production. A number of CAP measures either directly or indirectly have the potential either to stimulate particular forms of production, if not intensity *per se* or to inhibit intensity to some degree. These latter include elements of cross-compliance, the permanent grassland greening measure, aspects of EFAs, support for organic farming (although some systems are rather intensively managed) and certain agri-environment-climate schemes.

Other drivers influencing changes in land use, land management intensity and geographic location of production include price developments in agricultural commodities; production costs, such as input prices; technological innovations; the international trade situation, including any developments in bi-lateral or multi-lateral trade agreements or the WTO; as well as the wider macro-economic situation and changes in climate.

5.3.4 ANALYSIS

The evolution of land use patterns, intensity of management and geographical distribution of production are investigated below and the role of the CAP implementation decisions for 2014-2020 in driving these is explored.

5.3.4.1 Role of the CAP in influencing land use patterns

This section first highlights the evolution of different types of land use in the EU, focussing on changing patterns in land use of permanent grassland, arable areas and permanent crops, followed by landscape features and then the forest area. The CAP's role in influencing these changes is assessed for each land use type.

Changes in land use patterns

In 2017, approximately 40% of the EU's total land area was used for **agricultural production (UAA)** (178.8 million hectares) of which 59% was arable (105.7 million hectares), 34% was permanent grassland and meadows[35] (60.5 million hectares) and 7% was under permanent crops (11.9 million hectares)[36]. The proportion of land used for agriculture and the breakdown between different land uses varies significantly between Member States.

The UAA in the EU declined between 2007 and 2016[37] by 2.4%.There has been a steep decline in the number of farm holdings, with average farm size increasing over the same period. Permanent grassland has declined by 3% and the arable area by 2% over the same time period. However, the rate of decline has slowed and since 2014, the area of permanent grassland has started to increase (by 1.6% or 930,000 ha to 2016). Since 2014 the area of UAA has remained fairly stable, but arable land continues

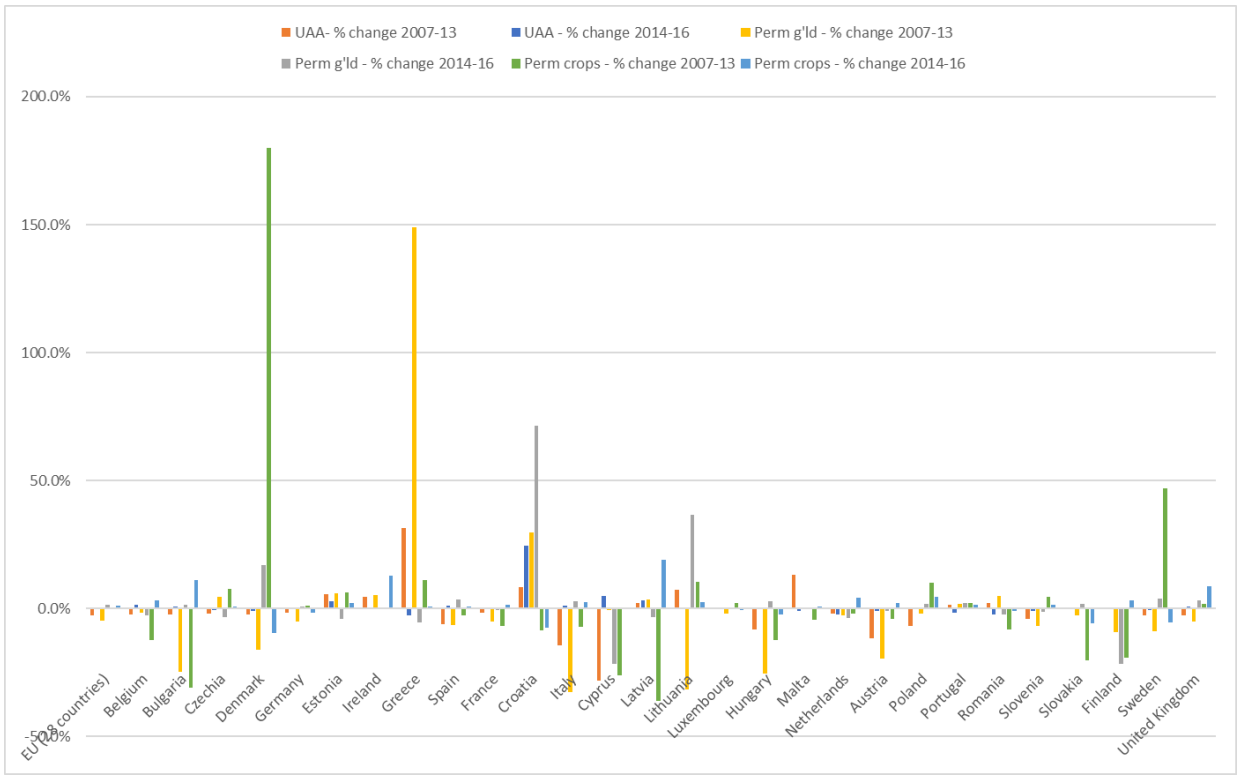
[35] Defined as follows: permanent grassland and meadow is land used permanently (for several — usually more than five — consecutive years) to grow herbaceous forage crops, through cultivation (sown) or naturally (self-seeded); it is not, therefore, included in the crop rotation scheme on the agricultural holding. Permanent grassland and meadow can be either used for grazing by livestock, or mowed for hay or silage (stocking in a silo).

[36] Eurostat dataset: apro_cpsh1.

[37] 2016 is the latest date for which figures are available for all Member States.

to decrease, albeit at a slower rate. These overall trends mask significant variations at Member State and more local level, as shown in the figures below.

Figure 8: Percentage change in UAA, permanent grassland, arable and permanent crops between 2007-13 and 2014



Source: Eurostat dataset: apro_cpsh1

Analysis using FADN data for the case study Member States of the share of both permanent grassland and arable areas as a proportion of total area at NUTS 3 level between 2012/13 and 2015/16 shows significant regional variation of increases and declines in permanent grassland and arable.

Changes in the intensity of grassland management are addressed in section 5.3.4.2 below.

In terms of **arable cropping**[38], the area under cereal crops has declined since 2014 by 3.7% (2.1 million ha) at EU-28 level, after having remained fairly stable between 2007 and 2013, although these figures mask significant variations between Member States. Declines are seen in all Member States apart from Estonia, Latvia and Poland. Changes in the area under pulses and protein crops are much more dramatic, with a sharp increase in 2015. Since 2014, the area has increased by 59% (0.8 million ha), compared to an increase of only 6% between 2007 and 2013 (0.43 million ha). The decline in the area of fallow land has slowed dramatically since 2014. From 2007 to 2014, fallow land decreased by 33% (3.4 million ha), with 91% of these declines accounted for in six Member States (BG, DE, ES, FR, HU, RO). Between 2014 and 2016[39] the fallow area decreased by only 3.2% (0.2 million ha), with decreases of 0.88 million ha (mainly in IT, PL, RO) offset by increases of 0.67 million ha seen in 18 of the 28 EU Member States (the largest increases are in BE, ES, DE). The extent of agroforestry in the EU (technically counted as arable area), focusing on the combination of trees with agriculture, has been calculated to cover an area of 15.4 million ha, equivalent to 8.8% of the agricultural area of the EU-27, excluding Croatia (den Herder et al, 2017)[40].

There are few accessible data on the extent of **landscape features** associated with agriculture, such as hedges, stone walls, tree lines, ditches and other watercourses in the EU. The last survey that examined the situation with the maintenance, restoration and creation of landscape features was

[38] Data for arable cropping are from Eurostat statistics database apro_cpsh1.
[39] The latest date for which data for all 28 Member States are available.
[40] Calculated using the 2012 LUCAS land use and cover dataset.

carried out under the 2010 Farm Structure Survey and therefore it has not been possible for this study to examine the evolution of the area under landscape features since 2014.

The EU-28 had close to 182 million hectares of **forests and other wooded land**, corresponding to 43% of its land area in 2015 (Eurostat, 2018). More than half of the total land area is wooded in seven Member States (EE, ES, LV, PT, SI, FI, SE).

Role of CAP instruments and measures

A range of instruments and measures under both Pillars of the CAP have had some degree of influence over the changes in land use since 2014. However, this influence extends only over the area of UAA that is in receipt of CAP support. 2017 figures show the area of land subject to Pillar 1 direct payments, including the Small Farmers Scheme, to be 154.7 million ha (approximately 86% of UAA)[41]. This leaves 24.1 million ha of UAA not in receipt of CAP support and therefore over which the CAP has no influence. A large proportion of this area is to be found in southern and eastern Member States (e.g. BG, EL, ES, HR, IT, MT, PT, RO). The CAP also has the potential to influence a proportion of the forest area in the EU through the areas eligible for support via the forest measures under Pillar 2. However the data are not available to calculate this figure.

Despite greater flexibility in the definition of what constitutes permanent grassland to be eligible for CAP support, the area of permanent grassland in receipt of CAP support decreased by 3.81 million ha between 2014 and 2015 in the EU28 (Alliance Environnement and Thünen-Institut, 2017). This masks considerable differences between Member States, with an increase in the area supported of 1.5 million ha of permanent grassland in 15 Member States and a decrease of 5.3 million ha in 12 Member States. The declines can be attributed mainly to the fact that a number of Member States took the opportunity offered by the redesign of CAP support to reconsider what land would be eligible to receive payments. There is some evidence to suggest that the way that some Member States define their eligibility criteria continue to encourage the removal of scrub and trees to enable the land to become eligible for CAP support.

A report by Lund University (Brady et al, 2017), modelling the impacts of removing all direct payments[42] by 2025, estimated a reduction in agricultural land use of 6.5%, split between arable (- 3.9%) and grassland (-11.3%). The model predicted that without direct payments, land that is more economically vulnerable in terms of agricultural production would be abandoned, while farming on more productive land would remain economic and would increase. This indicates therefore that one or more of the different types of direct payments are playing a role in supporting the continuation of production on grassland in particular. On the other hand, direct payments may aid farmers in carrying out agricultural investments that increase their production. Evidence of this comes from an Italian study of the impact of decoupled CAP payments on crop diversity (Capitanio, Gatto and Millemaci, 2016), which argues that the existence of stable CAP payments leads to an increase in farmers' willingness to take market risk, and that this has resulted in greater crop diversity as farmers experiment with riskier crops. Similarly, Mittenzwei, Britz and Wieck (2014) states that theoretical studies by Dewbre, Antón and Thompson (2001) or Viaggi, Meri and Gomez y Paloma (2011) 'highlight possible pathways regarding how fully decoupled payments, which are not linked to current production, still might impact allocation decisions. This can happen if decoupled payments affect risk attitude, reduce the costs to finance investments, or if farmers expect updates of entitlements to decoupled payments depending on their current production program. In all cases, the theory suggests higher production levels…', even though this is not always captured in studies based on quantitative simulation models.

The effects of the different direct payments and cross-compliance are identified below.

Cross-compliance: Of the 154.7 million ha in receipt of CAP direct payments, all but the 4.8 million ha under the Small Farmers Scheme (SFS) is subject to cross-compliance requirements. In three Member States the SFS covers a large area of land (10% in RO, 13% in PL and 45% in MT) and this, in

[41] Data from the CAP indicator data portal (https://agridata.ec.europa.eu/extensions/DataPortal/cmef_indicators.html), accessed September 2019

[42] This included BPS/SAPs, greening payments, the Small Farmers Scheme and Voluntary Coupled Support.

conjunction with the lower level of land eligible for CAP support means that in Romania only 60% of UAA is subject to cross-compliance and in Malta this falls to 22%.

Evidence has not been found to suggest that cross-compliance measures are having an influence over land use changes between grassland, arable and permanent crops since 2014[43]. However depending on which landscape features a Member State chooses to protect, GAEC 7 can impede intensification and hence reduce production by preventing the removal of features such as hedges in order to produce larger fields more suitable for mechanised farming. The case studies reported evidence of this from Croatia (landscape features) and Hungary (Cumanian mounds – the last remaining loess habitats). The overall impact cannot however be quantified. In theory, the obligation to protect certain landscape features under the Birds and Habitats directives should be reinforced through SMR 2 and SMR 3 although evidence that such reinforcement is achieved in practice is lacking.

Voluntary coupled support: The modelling carried out by Brady et al (2017) showed that VCS influences the types of crops grown, specifically sugar beet, soy beans and pulses and that the removal of VCS would lead to a decrease in the areas cultivated with these crops. 15 Member States provide support to the protein crop sector under VCS, accounting for 11% of all VCS support in 2017 (see ESQ 1). Indeed the influence of VCS on increases in area in the protein crop sector may have strengthened since 2017, since the VCS changes that took effect in 2017 led to an increase in the area receiving coupled support for protein crops by 0.3 million hectares (to 4.7 million ha). The support also increased on average. However, it should be noted that other economic drivers play an important role in influencing decisions about protein crop production, key amongst these being the gross margin compared to alternative crops and the existence of accessible, viable and profitable markets. These are generally both strong for oilseeds and improving for soybean (Clément et al, 2018) since the demand for EU grown animal feed has increased over the period.

The study by Brady et al (2017) also concluded that VCS support for beef, sheep and goats and dairy was maintaining livestock production in areas where it would otherwise disappear. For example, the withdrawal of all direct support to the Spanish beef sector was forecast to result in a fall of 11.4% in beef production, whilst in Germany, which does not support the sector through VCS, the reduction was forecast to be much lower at 1.6%.

Pillar 1 greening measures:

Maintenance of permanent grassland: The findings from the evaluation of the Pillar 1 greening payment (Alliance Environnement and Thünen-Institut, 2017) showed that the implementation of this measure at national level in all but four Member States meant that significant losses of permanent grassland were still taking place in many regions in some Member States. However, the pre-authorisation system, requiring individual farmers to make a request to local authorities before converting their grassland to another land use, put in place in six of them (DE, CY, FR, IT, LU, PT) did appear to be a disincentive to ploughing permanent grassland, especially in Germany. There is nothing to suggest that these conclusions have changed since 2017. It should be noted that this measure does not distinguish between different types of permanent grassland and therefore any changes in the biodiversity value of permanent grassland would not be picked up here.

With regard to the ESPG designation (which in 2018 affected 4.64 million ha inside Natura 2000 areas and a further 0.24 million ha outside them or 13% of the total permanent grassland area), it has in most cases improved the protection of permanent grassland on the area declared by farmers for support in the ESPG designated areas covering through better enforcement of national legislation and cross-compliance. The evaluation could not, however, establish the extent to which a reduction in ploughing had occurred.

Ecological Focus Areas and crop diversification: In terms of arable cropping, both the EFA and crop diversification measure have had some influence over the area under protein crops (although VCS also plays an important role here) and the area of fallow in particular. It is important however to differentiate

[43] It should be noted that prior to 2014 cross-compliance included similar requirements to those under greening for the 2014-2020 period with respect to the requirement on Member States to maintain the relative proportion of permanent pasture to total agricultural area within a certain reference level (10 % prior to 2013).

the large reduction in the area of protein crops declared for EFA (from 4.6 million ha in 2017 to 2.3 million ha in 2018[44]) from changes in the volume of production. The reduced declaration is almost certainly the result of farmers wishing to continue to grow protein crops using pesticides, which were banned on EFA crops for 2018.

However, research carried out in Italy (Cortignani and Dono, 2019) showed that there has been an increase, in Italy, in the production of alfalfa (+4.6%) and leguminous forage crops (+1.7%) since the introduction in 2018 of the possibility to include these crops amongst those that enable a farm to be exempt from the crop diversification requirements if they total more than 75% of the arable area. The same study also found that the area cultivated for rice had increased, also due to changes in the exemption criteria for this measure.

The EFA measure, together with the crop diversification measure, is likely to have helped to slow the decline in fallow areas and to stimulate an increase in fallow in some Member States. As shown by the evaluation of the greening measures (Alliance Environnement and Thünen-Institut, 2017), the negative trend in the area of EU fallow stabilised in 2015 in most Member States that made fallow eligible as EFA (with the exception of EL, IT and PL), while the trend remained negative in Member States which did not. This has remained true since that time. The case studies for that study showed that the crop diversification measure has also driven switches to fallow in some Member States (ES, LV and UK were identified in the study) where farmers had used fallow as a way to diversify their cropping patterns.

The EFA measure also has the potential to influence the retention of landscape features, but in the majority of Member States, it has not had an impact on maintaining landscape features because uptake has been very low (the exceptions to this are DE, FR, IE and the UK).

Under **Pillar 2,** a range of measures can also be shown to have exerted some influence over the land use changes identified above. These include: the agri-environment-climate measure, the Natura 2000 measure and the ANC measure. These are discussed below.

The agri-environment-climate measure: Most Member States include within their agri-environment schemes one or more measures to maintain extensive grazing, particularly (but not exclusively) in areas of high nature value (see section on land management intensity below). In many of the case study Member States, the AECM has been highlighted as an important mechanism for maintaining extensive and semi-natural grassland (for example DE, FR, HR, LV, HU, PT, RO, SK), however in some places, the areas under agreement are less than 1% of grassland (e.g. in Croatia and PT), with most Member States having between three and 10% of grassland under agreement. The German and Hungarian case studies also report a much smaller area targeted and subsequent uptake of these measures in 2013-2020 than had been the case in the previous period. It is difficult to assess the degree of additionality which these measures bring about, as it is not possible to determine whether or not these areas of grassland would have disappeared without the measures in place, although the *ex post* evaluation in Hungary did highlight that the AECM helps to maintain these areas. Further information on the influence of the AECM on maintaining low intensity grassland areas is provided in the next section.

Data for the uptake of landscape features under the AECM are not available. However, the most relevant category against which Member States report their uptake of the AECM measure is that of 'creation, upkeep of ecological features' which includes field margins, buffer areas, flower strips alongside hedgerows and trees.

Table 12 shows uptake against this category for the AECM since the start of the current programming period, which shows that 2.24 million ha of ecological features were under agreement by 2017 (compared with 167,536 ha of landscape features under the EFA greening measure). It is not possible to determine the proportion of newly created features from those which have been maintained.

[44] This is a larger decrease (-50%) than the overall reduction of EFA areas (-17%) observed in the EU between 2017 and 2018.

Table 12: Uptake of AECM (M10.1) options focused on the creation and maintenance of ecological features (to 2017)

MS	Hectares	% UAA	% arable	MS	Hectares	% UAA	% arable
BE	14,372	1.1	1.8	**LT**	9	0.0	0.0
BG	-	-	-	**LU**	123,471	93.3	194.5
CZ	1,945	0.1	0.1	**HU**	-	-	-
DK	-	-	-	**MT**	-	-	-
DE	98,166	0.6	0.8	**NL**	6,252	0.3	0.6
EE	-	-	-	**AT**	1,131,613	43.7	84.6
IE	113,140	2.5	25.2	**PL**	272	0.0	0.0
EL	-	-	-	**PT**	2,194	0.1	0.2
ES	42,070	0.2	0.3	**RO**	-	-	-
FR	15,035	0.1	0.1	**SI**	719	0.2	0.4
HR	-	-	-	**SK**	23	0.0	0.0
IT	50,321	0.4	0.8	**FI**	197	0.0	0.0
CY	-	-	-	**SE**	6,815	0.2	0.3
LV	-	-	-	**UK**	638,138	44.4	74.9
				EU-28	**2,244,752**	**1.3**	**2.1**

NB: includes field margins, buffer areas, flower strips, hedgerows, trees
Source: Member State 2017 AIRS (AGRI-Dashboard)

Of the other Pillar 2 measures, the *Natura 2000 measure* also has the potential to protect the existing extensive land uses in Natura 2000 areas. The area under agreement so far in this programming period is 1.3 million ha in 13 Member States which in theory means that 8.2% of the permanent grassland area or 7.9% of total UAA in Natura 2000 areas at EU-28 level should be maintained under their current land uses (see also section below). In addition, *the ANC measure*, which covers approximately 57% of the EU's agricultural area in 2018, acts in a similar way to direct payments, providing additional income support to farmers in these areas experiencing natural constraints to their production. As a result it is likely to continue to play a role in maintaining permanent grassland in this programming period, particularly through preventing the abandonment of these areas (see below). Since *the agro-forestry measure* (M8.2) has been targeted by Member States to cover just 71,063 ha (of which 515 ha has been taken up so far) it has had a negligible impact so far on the EU's 15.8 million ha of agroforestry. The support provided through *investment measures* (M4) may also have had an effect on maintaining extensive farming systems (by supporting the development of farm infrastructure) as well as increasing the area under landscape features, by funding their creation (under the non-productive investments measure). In Germany (B-W), for example, the small farm investments programme (under M4.1) is directly focused on supporting smaller producers in areas at risk of abandonment (and focused on grassland, with uptake figures showing that investments cover mainly stables for cattle and machinery for steep slopes).

The main CAP measure that affects changes in the area of forest and woodland is the afforestation measure (M8.1) which supports the creation of woodland. The target area to be afforested under this measure for the 2014-2020 period is 474,919 ha, of which 44,377 had been achieved by the middle of 2017 (9.3%) in 11 Member States. 70% of the area under agreement is in the United Kingdom (18,090 ha or 40%) and Spain (30% or 13,265 ha). Other Member States with more than 2,000 ha under agreement are Denmark (2,440 ha), Italy (2,386 ha), Poland (2,032 ha) and Portugal (2,799 ha). This remains a small addition to the overall forest area in the EU.

5.3.4.2 Role of the CAP in influencing intensity of management, including abandonment

With respect to intensity of management, the key variables of interest to biodiversity, as highlighted above are:

- Fertiliser use (for both cropping and livestock systems)
- Use of plant protection products (mainly cropping systems)
- Irrigation (mainly cropping systems)

- Stocking density

In many cases more intensive uses are associated with more productive and higher yielding systems but yields are not always an accurate indicator of intensity itself.

Changes in intensity of management of agricultural and forest land

Data on the quantities of fertilisers and pesticides used on agricultural land are not available at EU level. As a proxy, data on the expenditure on fertilisers and plant protection products per hectare can be used, corrected for price changes over time so as to give an indication of the amounts used. **Figure 9** and Figure 10 show changes in these indicators between 2012/13 and 2015/16 for the case study Member States at NUTS3 level. This suggests that there have been increases in fertiliser use equating to over €40/ha in many parts of Romania and some areas of France, Hungary, Latvia, Portugal and Slovakia. Given that the application rate of fertiliser is variable, but estimated by the FAO to be 60kg/ha in Romania, 104 kg/ha in Latvia, 128kg/ha in Hungary and 163 kg/ha in France (World Bank, 2019), the increases in fertiliser costs per hectare look as if they indicate a higher increase in use in Romania than in France. Increases in expenditure on pesticides are also reported in many of the case study Member States. Declines in fertiliser expenditure can also be seen in large parts of central France, northern part of Croatia, large areas of Germany and some areas of Hungary, Ireland and Slovakia.

An examination of FADN data[45] looked at whether or not there was a difference in changes in expenditure on these inputs within and outside Natura 2000 areas. This showed that, as would be expected, fertiliser and pesticide expenditure per hectare is consistently less inside Natura 2000 areas than outside, apart from in Croatia. In many Member States expenditure on fertilisers has increased at a lower rate inside Natura 2000 areas than outside (e.g. PT, SK) or decreased inside Natura 2000 areas, while increases have taken place outside these areas (e.g. HU, RO). In Germany decreases in fertiliser expenditure have taken place both inside and outside Natura 2000 areas, with greater decreases inside and France had a decrease outside Natura 2000 areas and a stable situation inside.

[45] Sample too small to use for NL and Ireland.

Figure 9: Changes in the expenditure on fertiliser per hectare between 2012/13 and 2015/16 in the case study Member States

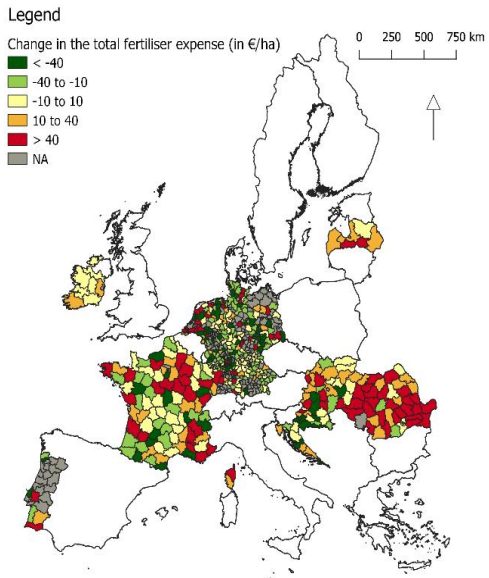
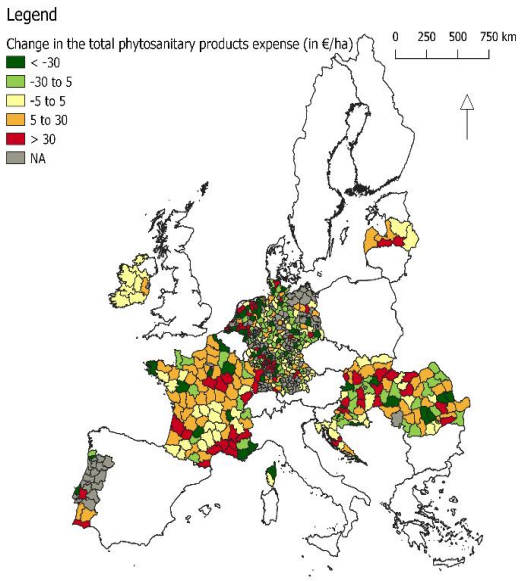
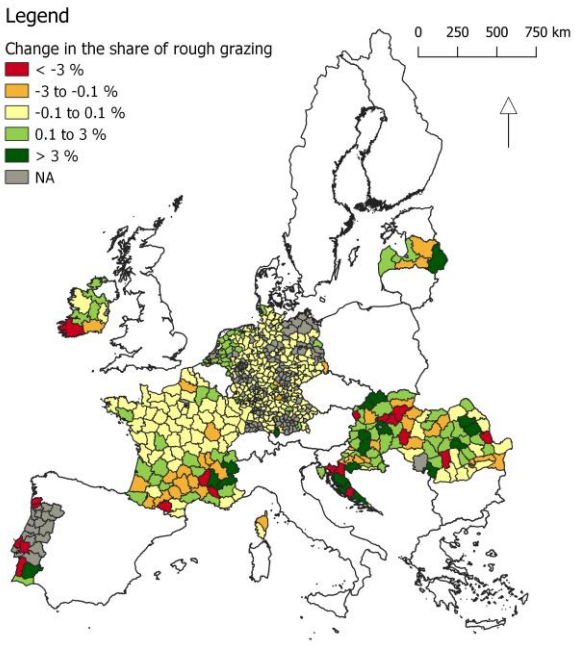


Figure 10: Changes in the expenditure on plant protection products per hectare between 2012/13 and 2015/16 in the case study Member States



NB: Expenditure figures are corrected for price changes over the years.
Source: FADN data

Figure 11: Change in the proportion of rough grazing area between 2012/13 and 2015/16 in the case study Member States



Source: FADN data

One source is to examine changes in the area categorised within the FADN data as rough grazing[46] (**Figure** 11) between 2012/13 and 2015/16. This shows declines of more than 3% in southern Ireland, parts of Portugal, southern France, and a number of NUTS3 areas in Croatia, Hungary and Romania alongside increases in many NUTS3 areas in these same Member States. What this does not indicate, however is what the change is to – it could be into other categories of grassland that are more intensively managed, or to arable.

Information from the literature and the case studies shows that semi-natural grasslands continue to be at risk. For example although the overall area of permanent grassland in Germany has stabilised since 2011 , losses of HD species rich grassland continue, as semi-natural grasslands continue to be lost because of grassland intensification (Benzler, Fuchs and Hünig, 2015). The same trend was identified in Ireland. There are also reports of very high rates of loss of hay meadows in Ireland over recent years, with 28% of the surveyed area of hay meadow habitat lost between 2015 and 2017 due to destruction for arable cultivation (Martin, O'Neill and Daly, 2018). The Ireland case study also highlighted the losses of permanent grassland particularly in upland areas, where land is being abandoned and reverting to scrub.

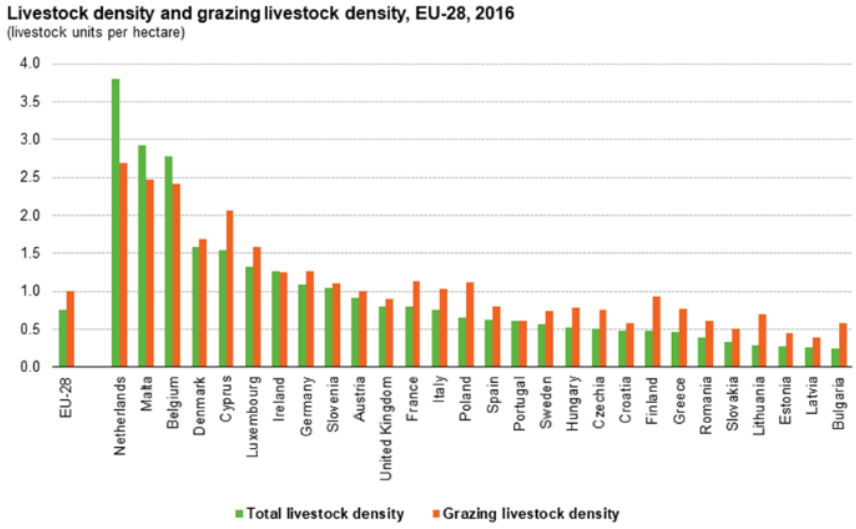
Intensification of production can also be indicated by increases in the area irrigated. FADN data for the case study Member States show that between 2012/13 and 2015/16 there have been increases in irrigation of agricultural land of more than 5% in southern parts of France and Portugal, as well as in the Netherlands and central parts of Croatia. Increases of less than 5% are also seen in large swathes of western and north-eastern France, Latvia, and parts of Hungary. Decreases are less evident, although some NUTS3 areas in France and Slovakia do show reductions.

Looking at livestock density, in 2016, average livestock density in the EU was 0.8 livestock units per hectare of agricultural area, ranging from 0.2 in Bulgaria to 3.8 in Netherlands, slightly higher than in 2013[47]. The areas of highest livestock densities are in Belgium, Denmark, northern Germany, Brittany in France, northern Italy, Ireland, the Netherlands and some northern regions in Spain and Portugal.

[46] Defined in FADN as low yielding permanent grassland, generally uncultivated and non-fertilised land, including scrub, used as poor quality pasture.

[47] The livestock density index measures the stock of animals (cattle, sheep, goats, equidae,pigs, poultry and rabbits) converted in livestock units (LSUs) per hectare of utilised agricultural area (UAA).

Figure 12: Livestock and livestock grazing density (2016) and changes in livestock density 2013-2016



Source: Eurostat
NB: Livestock density = livestock per ha/UAA; Livestock grazing density = livestock per ha/fodder area (fodder crops on arable as well as grassland)

Currently, only 10% of Europe's forests are reported as being intensively managed (Forest Europe, 2015), but a large proportion are significantly modified as a result of forestry, although this is not new. No data have been found to show changes in intensity of the EU's forest area since 2014/15. A number of Member States have plans to significantly increase their wood extraction in order to meet demands for bioenergy and fuelwood.

Role of the CAP instruments and measures

There are a number of measures that have the potential to affect the intensity of management on agricultural land. The AECM is considered first

Uptake to 2017 of the AECM (M10.1) is reported against different types of management that could reduce the intensity of management on land cultivated under arable and permanent crops and is set out in Table 13. These figures represent very small proportions of arable and permanent crop area overall apart from in a handful of cases. For example, 82% of the arable and permanent crop area is under the management of inputs heading in Finland, 83% in Slovenia, 44%, in Austria, 41% in Portugal, 44% in Ireland, 16% in the United Kingdom, 12% in Hungary and 10% in Cyprus.

Although the AECM can also be used to reduce the intensity of management by reducing drainage and the area under irrigation, overall, they are not used to any great extent in Member States. Reduced drainage is taking place on 0.5 million ha of land, of which 0.42 million ha are in Poland, while only 0.1 million ha are under agreement for the purposes of reducing irrigation or improving irrigation techniques.

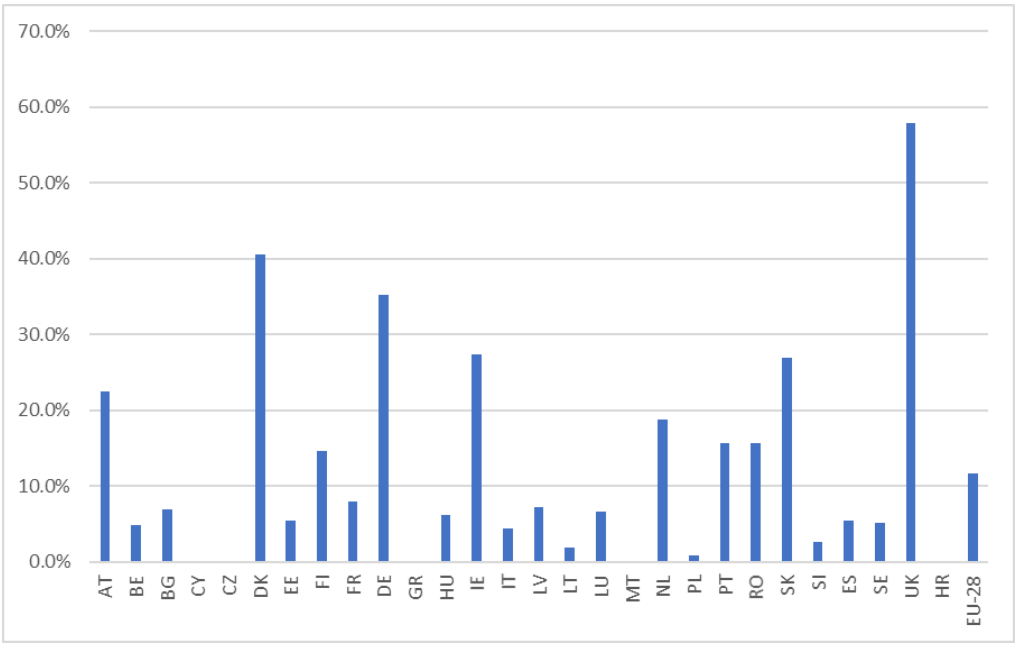
Table 13: Uptake in 2017 of the AECM (M10.1) allocated to Priority 4, broken down by sub-priorities with an impact on intensity of land management

	Management of inputs incl. int prod (reduction of min ferts & pesticides)	Mgt of inputs as % arable and perm crops	Soil cover, ploughing techniques, low tillage, conservation agriculture	Soil cover as % arable and perm crops	Animal feed regimes, manure mgt	Animal feed etc. as % arable	Crop diversification, crop rotation	Crop div/rot as % arable
BE	13,388	1.6%	2,933	0.4%	36,957	5%	146	
BG	-	0.0%	-	-	22,863	1%	-	
CZ	17,613	0.7%	15,754	0.6%	-		-	
DK	-	0.0%	-		-		-	
DE	421,817	3.5%	341,054	2.8%	11,398	0%	797,812	7%
EE	1,007	0.1%	10,413	1.5%	-		451,272	66%
IE	200,337	44.4%	23,549	5.2%	-		19,477	4%
EL	10,192	0.3%	701	0.0%	-		-	
ES	298,276	1.7%	35,853	0.2%	726,652	6%	27,375	0%
FR	180,097	0.9%	1,990	0.0%	227,323	1%	9,016	0%
HR	-	0.0%	212	0.0%	-		-	
IT	469,280	5.3%	108,871	1.2%	-		-	
CY	10,803	9.7%	8,016	7.2%	-		1,050	1%
LV	5,630	0.4%	85,754	6.6%	-		-	
LT	4,491	0.2%	-	-	7,887	0%	337	0%
LU	633	1.0%	-	-	1,335	2%	-	
HU	520,739	11.5%	7,819	0.2%	-		-	
MT	148	1.5%	-	-	-		-	
NL	3,072	0.3%	-	-	-		448	0%
AT	612,003	43.6%	616,737	44.0%	-		-	
PL	-	0.0%	169,757	1.5%	-		672,223	6%
PT	811,224	46.1%	24,673	1.4%	-		-	
RO	-	0.0%	132,156	1.5%	-		-	
SI	165,559	82.8%	71,029	35.5%	-		62,731	36%
SK	22,719	1.6%	-	-	-		-	
FI	1,836,184	82.4%	1,575,565	70.7%	201,907	9%	-	
SE	-	0.0%	4,155	0.2%	-		-	0%
UK	147,484	16.0%	28,674	3.1%	3,978		10,431	1%
EU-28	**5,752,696**	4.9%	**3,265,666**	2.8%	**1,240,300**	1%	**2,052,318**	2%

Source: EC Monitoring Data (MS 2017 AIRs accessed via the AGRI Dashboard)

The AECM also plays an important role in maintaining extensive grassland and arable systems. Figure 13 shows that at EU level only 11.6% of the area estimated by the JRC to be HNV farmland is supported by the AECM (to 2017). In only six Member States, there was more than 20% of the HNV area under agreement (DK, DE, IE, AT, SK, UK), however apart from in SK, these are not the Member States where HNV farming systems are most at risk (see Figure 13). A number of the case study Member States have AECM measures that are specifically focussed on HNV areas (e.g. DE, HR, LV, HU, PT, RO, SK) and in Romania, Portugal and Germany, the schemes are considered an important means of maintaining extensive farming systems. However, in Croatia, only 0.5% of the HNV area is targeted which is too small to have any significant impact. In Hungary, the case study reports that although the *ex-post* evaluation of the 2007-13 AECM had shown that the AECM helped maintain HNV areas, there has been a much lower uptake of the HNV measure in this period, partly due to the reduction in the area targeted as a result of budgetary constraints (see ESQs 1 and 2).

Figure 13: Area under agreement in 2017 for the maintenance of HNV arable and grassland systems (M10.1) as a proportion of HNV area (EEA, 2012)



NB: This includes: mowing techniques, hand labour, leaving of winter stubbles in arable areas, introduction of extensive grazing practices, conversion of arable land to grassland.
Source: MS 2017 AIRs (AGRI Dashboard) and EEA, 2012.

A large proportion of farmland in Natura 2000 areas is HNV, therefore the area under agreement for **Measure 12.1** should also contribute to the maintenance of HNV farming systems. However, the area under agreement is a small proportion of the total HNV area - 1.26 million ha in 13 Member States by mid-2017 compared with the predicted area of HNV of 76.9 million ha (EEA 2012 figures). In addition to these measures, information from the case studies also shows that the agro-forestry measure (M8.2) has been used in some Member States to maintain extensive agro-forestry systems (e.g. the montado in PT), however only 515 ha is under agreement for M8.2 at present and therefore its influence on the overall intensity of management of these systems is limited.

HNV farmland is frequently the most marginally productive land and so most vulnerable to abandonment. As highlighted in section 5.3.4.1 above, the analysis carried out by Brady et al (2017) shows that direct payments as a whole are playing a role in maintaining these less economic farming systems with a large decline predicted if direct payments were to be removed. Anecdotal information from the case studies describes the ANC measure as helping to maintain areas of HNV (FR) or to avoid the abandonment of grassland (HU), especially on steep slopes in mountain areas (RO).

The analysis by Brady et al (2017) also showed that the combination of direct payment instruments is keeping nitrogen and phosphorous surpluses and pesticides above the level that they would otherwise be. The study predicted that the removal of all direct payments would lead to a decrease in nitrogen surpluses on average across the EU of 2.4% and of 2.3% for phosphorous surpluses. However, the intensification that was forecast to result as a response to the price effects resulting from the land that would leave production would see surpluses per hectare rise – by 4.5% for nitrogen and by 4.4% for phosphorous. In addition, analysis in Italy on the effects of the EFA and the crop diversification measure (Cortignani and Dono, 2019) modelled that pesticide use would increase in Italy overall since the ban on pesticide use under the EFA measure is offset by the increase in the rice area (taking advantage in the changes in the exemption rules for the crop diversification measure – see above).

Of the measures available to influence forest management (M8 and M15), there are no data at an EU level that show their impacts on forest management intensity. However, the EAFRD includes a requirement that funding for forest investments (for holdings above a certain size) should be accompanied by a forest management plan or equivalent instrument in line with sustainable forest management as defined by the Ministerial Conference on the Protection of Forests in Europe of 1993. In theory, therefore, the forest areas receiving funding from the CAP should be managed according to sustainability criteria.

Information from the case studies shows that M8.5 (support for investments improving the resilience and environmental value of forest ecosystems) is used to bring degraded forests back under extensive management in Croatia and to encourage their management to benefit nature and ecosystem services in Germany and Portugal, which should constrain any intensification. Uptake by mid-2017 for this measure was 483,746 ha in 13 Member States. M15 (forest-environment-climate) is being used in some Member States to maintain forests in a condition that is suitable for protected species (e.g. lynx in PT and birds in SK). 0.16 million ha are under agreement under M15 in 11 Member States.

5.3.4.3 Role of the CAP in influencing geographical distribution of production

This section looks at how the CAP has influenced any changes in the geographical distribution of production between different areas of the EU. Section 5.3.4.1 above has shown how land use has changed since 2014 and the role of the CAP in influencing this. Here a number of specific types of production are examined, with a focus on those that have exhibited significant changes since 2014 and are specifically identified within the CAP for support.

Changes in the geographical distribution of production

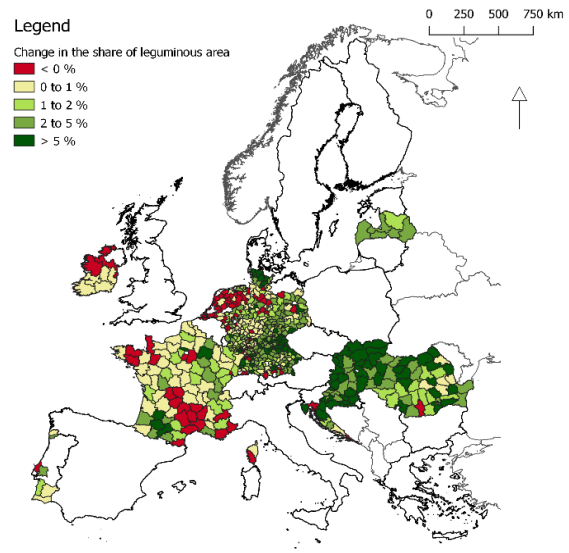
Overall, the production of the main cereal crops at EU level between 2008 and 2017 has fluctuated year on year, but production in 2017 is similar to figures from 2008 (see 5.3.4.1). In 2017, the EU produced 310 million tonnes of cereal grains, an increase of 8 million tonnes on the previous year, despite a reduction in the cultivated area of 1.6 million ha (Eurostat, 2018). The balance between the different cereal crops has also remained fairly stable. As shown in section 5.3.4.1 above, amongst the crops that have exhibited the most significant changes since 2014 and that year are leguminous and protein crops and fallow area. The changes in the geographical distribution of production of these crops are considered below as well as the changes in organic production.

Leguminous crops and soybean: An analysis of FADN data for the case study Member States looking at changes in leguminous crops as a proportion of UAA between 2012/13 and 2015/16 shows increases of more than 5% in a number of NUTS 3 regions in Croatia, Latvia, Slovakia, Hungary, Romania and the Netherlands. In contrast, decreases can be seen in some regions of France, Germany (north) and Ireland (north). Eurostat data[48] show that the area used to cultivate dry pulses (containing field peas, broad and field beans, sweet lupins and other dry pulse and protein crops), increased by 64% between 2014 and 2017 to 2.6 million ha. There have been significant increases in the EU share in Poland and Lithuania and continued increases in Bulgaria, Italy and Romania. Data from 2018 show that total areas of dry pulses have started to decline in Member States like Estonia, France, Lithuania and Spain, although not back down to 2014/2015 levels, however in Bulgaria, Italy and Romania the areas continue to grow. Spain remains the largest producer of dry pulses in the EU, followed by France, Poland, Lithuania, the United Kingdom and Germany. The sharp rise in the area of dry pulses in Poland in 2015 led it to overtake France, although since then the area has declined below that of France again. Lithuania overtook the United Kingdom and Germany in 2016 and has remained in that position since.

For *soybean*, at EU-28 level, the area cultivated has been steadily increasing since 2007, with a marked increase since 2014. Between 2014 and 2018 the area increased by 65% (by 0.37 million ha), bringing the EU area to 0.96 million ha, compared to an increase of only 16% between 2007 and 2013 (0.07 million ha). In 2018, the five main producers of soybean in the EU were Italy (34%), Romania (17%), France (16%), Croatia (8%), Austria (7%) and Hungary (7%). In total, these six Member States represent 90% of soybean area in the EU, all of whom have shown a marked increase in the total area under soybean cultivation since 2014 and as a proportion of arable area.

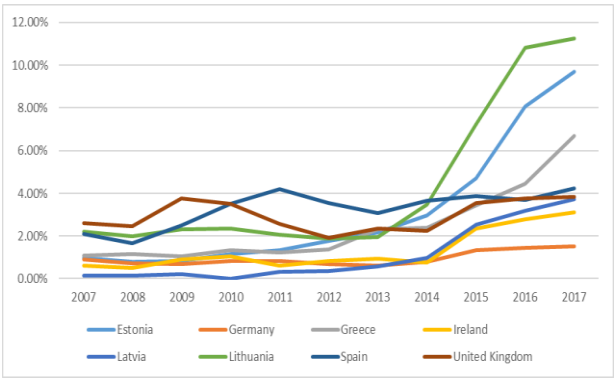
[48] Eurostat apro_cpnh1.

Figure 14: Changes in the proportion of leguminous crop area between 2012/13 and 2015/16 in the case study Member States



Source: FADN data

Figure 15: Change in proportion of arable area under dry pulses in the main producing MS (2007-17)



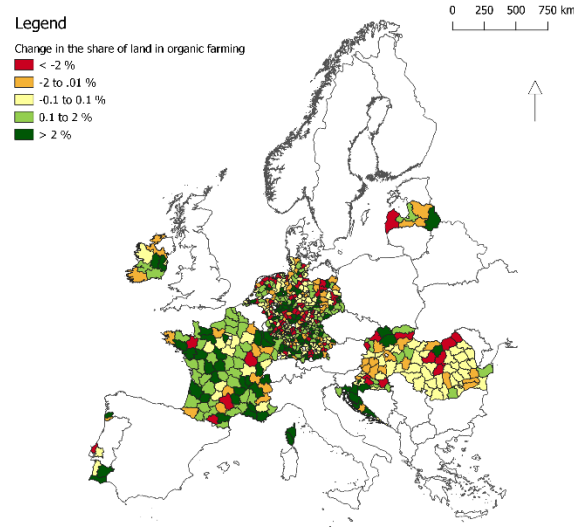
Source : Eurostat – apro_cpnh1

Analysis of FADN data between 2012/13 and 2015/16 at NUTS3 level shows changes in the proportion of fallow area in total UAA. In most areas increases can be seen - greater than 1% in NUTS 3 areas in Slovakia, Hungary, a few southern areas of France and central Germany and increases of up to 1% in many other areas, although there are some decreases in some NUTS 3 areas of Romania, Latvia, Portugal and Croatia. Of the 6.4 million ha of fallow land in the EU in 2016, half of this was in ES, with a further 25% in France, Germany, Finland, Italy and the United Kingdom. However the changes in the area of fallow in these Member States since 2014 has been markedly different with a decline in 27% in Italy, and increases in Finland, France and Spain of only 2%, 4% and 6% respectively, whereas the United Kingdom and Germany have seen increases of 64% and 65% respectively.

Organic farming systems: The area of land either fully converted or under conversion to organic farming has increased since 2012 at EU-28 level from 5.64% UAA to 7.03% UAA in 2017 (+1.4%), covering 12.6 million hectares of agricultural land in the EU-28 in 2017. This is an increase in organic area of 25%. The Member States with the largest proportion of organic land in 2017 are Austria (23.4%), Estonia (19.6%), Sweden (19.2%), Italy (14.9%), Czechia (14.1%) and Lithuania (13.9%). Increases in organic land as a proportion of total UAA are seen in all Member States between 2012-2017, apart from Greece and Poland (both -1%), the United Kingdom (-0.5%) and Romania (-0.17%). Member States with the greatest increases over this time period are: Italy (5.6%); Austria and Estonia (4.7%), Croatia (4%), Sweden (3.4%) and Latvia (3.3%). Other Member States with increases above the EU average are Belgium, Bulgaria, Finland, France, Lithuania, Portugal, and Slovenia.

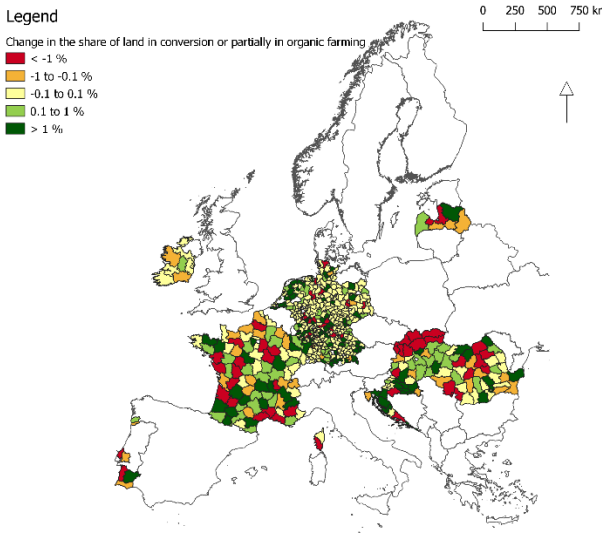
Changes in the proportion of UAA under organic management (Figure 16) and the proportion under conversion (Figure 17) between 2012/13 and 2015/16 using FADN data for the case study Member States reflect the same patterns but show a more varied picture at NUTS 3 level. Small declines in organic area are seen in many parts of Hungary, Romania and Slovakia and there are also declines in the land under conversion in parts of France, Hungary and Romania, although this could be due to these areas having completed their conversion period and now registered as fully organic.

Figure 16: Change in the area of organic farmland as a proportion of UAA between 2012/13 and 2015/16 in the case study Member States



Source: FADN data

Figure 17: Change in the area of land in conversion to organic farming as a proportion of UAA between 2012/13 and 2015/16 in the case study Member States



Source: FADN data

Role of the CAP instruments and measures

In relation to the changes in the geographic distribution of the different crop types, results from the greening evaluation (Alliance Environnement and Thünen-Institut, 2017) concluded the combination of the VCS, EFA and crop diversification measure, had influenced the changes seen in the geographical distribution of dry pulses areas. Market developments are also likely to have played a role, also for the increase in soybean production as the demand for EU-grown animal feed has increased over the period. For soybean production, the main CAP measure to have influenced increases is likely to have been the VCS, with only a small effect exerted by the EFA measure. Analysis for the greening evaluation also looked at increases in soybean area in the five main producing Member States (FR, HR, IT, HU and RO) in 2016 and showed that increases since 2014 were either mostly due to VCS (e.g. RO) or to market developments (e.g. FR and IT). Although all main soybean producers had also made soya eligible for EFA, it concluded that the EFA was not a main factor of the changes observed in the soybean area, although it did contribute to the favourable policy environment that has brought about the changes. There is no reason to think that this conclusion has changed, since that report. In fact, the role of the VCS may have become slightly stronger and the role of the EFA slightly weaker, given the increase in the area of protein crops supported by the VCS since 2017 and the introduction of the pesticide ban on nitrogen fixing crops under the EFA from 2018. This is due to the VCS changes that took effect in 2017. The exception is Austria, which has increased its soya production significantly since 2016 but does not support protein crops under the VCS.

The key CAP measure influencing the geographic distribution of organic farming is the organic farming support measure (M11) which provides support both for conversion to organic and the maintenance of organic farming. For the 2014-2020 period at EU level, support is planned to convert 2.35 million ha to organic, of which 1.4 million ha had received support by 2017[49]. For the maintenance of organic, the combined Member State targets come to 8.8 million ha by 2020 (about 75% of the current organic area), of which 6.4 million ha was under agreement by 2017. The case studies indicate large increases in applications for M11 in Croatia, France, Germany and Ireland since 2014 and indeed both France and Germany have both increased the budget available for M11 since the start of the programming period.

However, it is unclear to what extent M11 support is driving the increase in organic area. It is likely that market drivers play an important role in encouraging these shifts, especially when farm incomes on organic farms without CAP support appear to be higher in general than on non-organic farms (see analysis of FADN data in ESQ 9). In France, for example recent analysis from the French agency for

[49] DG AGRI Indicator dashboard – organic output indicators.

the development and promotion of organic agriculture stated that an increased differential between prices for conventional and organic grains as well as investments in the organic supply chain were drivers of the growth in organic farming in France, alongside CAP support payments (IEG Policy, 2019).

5.3.5 MAIN FINDINGS

Land use patterns, the intensity of land use and the geographical distribution of production are affected by many factors besides the CAP, as a result of which it is difficult to attribute any particular change to the action of CAP instruments or measures alone. Nonetheless, some of the main findings are as follows.

Of the 179 million hectares of Utilised Agricultural Area in 2017, 155 million were in receipt of BPS/SAPS, 149 million were subject to cross-compliance, 139 million were subject to at least one greening obligation and 48 million hectares in receipt of ANC support. Modelling results show that the broader range of direct support, which includes the greening payment, VCS and ANC support as well as BPS/SAPS, plays a role in preventing the abandonment of a proportion of land on which agricultural production is economically marginal.

The greening ESPG measure is designed to prevent the ploughing of environmentally sensitive permanent grassland and so avoid a change of use from grassland farming. 95% of the land designated by Member States is in Natura 2000 areas where designation reinforces existing protections under the Natura Directives. Available data shows only 1% of permanent grassland outside those areas as having been designated, by four of the five Member States who designate outside their Natura 2000 area. The impact of this measure on land use change is therefore almost entirely restricted to the additional protection it provides within Natura 2000 areas for the permanent grassland declared (4.9 million out of a possible 9.54 million hectares in 2018).

Together with BPS/SAPS, the greening payment and ANC measure, VCS has contributed to the maintenance of livestock production, particularly in economically marginal areas, with support provided through VCS to almost half the EU's beef and veal cows and 36.5% of its dairy herd. VCS has also played a role in driving the growth in leguminous crops and soybean since 2014 in the 15 Member States that provide support to the protein crop sectors.

In terms of changes in the area of forest and woodland, the afforestation measure (M8.1) has added 0.26% to the total of forest and other wooded land in the EU - 9% of the 0.47 million hectares planned over the 2014-2020 period. Over two-thirds of this is in the United Kingdom and Spain, with smaller additions to the woodland area in Denmark, Italy, Poland and Portugal.

Several instruments and measures have affected the intensity with which land is managed. The EFA and, to a more limited extent, the crop diversification measure have helped to stem the decline of fallow in many Member States and stimulated increases in others. Extensive arable and grassland systems on 8.9 million hectares (11.6% of the area estimated to be of High Nature Value) are supported by the AECM which has also contributed to the maintenance and creation of landscape features, with 2.24 million hectares of ecological features under agreement by 2017 (field margins, buffer areas, flower strips alongside hedgerows and trees). The AECM is also used to support less intensive management on crop and arable land through reduced inputs (4.9% of such land), soil cover and soil management techniques (2.8%), feed and manure management (1%) and additional crop rotation (beyond what is required by greening) (2%). 7.9% of total UAA in Natura 2000 areas in the EU-28 is also supported through the Natura 2000 agriculture measure (M12.1) in 13 Member States. Organic farming is less intensive than most conventional systems and the organic farming measure contributes to the maintenance of significant areas of land under organic management. However, the agro-forestry measure (M8.2) has had a very limited effect on land use change, with only 515 hectares under agreement, the majority of which is in Spain and France.

Direct payments (including the greening measure), VCS and the ANC measure could in theory have led to intensification of land management if farmers chose to invest their additional income in equipment or inputs to take account of market opportunities which they could not otherwise have afforded to do. There is some evidence in academic literature that this has happened in practice. Modelling results imply however that the intensity of production would increase on land which remained in production if direct payments were to be withdrawn, although the overall nutrient surplus would fall as would overall use of pesticides. No data was available to the study team to indicate whether investments directly supported by the CAP were contributing to intensification.

6 EFFECTIVENESS

6.1 ESQ 4: TO WHAT EXTENT HAVE CAP INSTRUMENTS AND MEASURES INDIVIDUALLY AND TAKEN TOGETHER CONTRIBUTED TO ACHIEVING THE OBJECTIVE OF SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE ACTION WITH A FOCUS ON RESTORATION, PRESERVATION AND ENHANCEMENT OF BIODIVERSITY AND LANDSCAPES (HETEROGENEITY, FEATURES, CORRIDOR EFFECTS)?

In answering this question the evaluator should pay due attention to integrated approaches/integrated projects and collective actions under Rural Development, combination of different measures (including pillar I support schemes and market interventions) and/or specific sub-programmes, as well as coordination/governance aspects, to identify best practices. The answers should be broken down by agricultural practices, region and/or farm type.

6.1.1 UNDERSTANDING OF THE QUESTION

This ESQ assesses the contribution of each of the CAP policy instruments/measures that are considered to have potential direct and/or indirect effects on biodiversity and landscapes (as identified in Table 5) to the CAP's biodiversity-related objectives, both individually and in combination. The CAP measures' contribution to addressing objectives with respect to the habitats and species that are the focus of the Birds and Habitats Directives are examined in ESQ 5.

This study question also seeks to understand what factors have influenced the contribution of each measure to biodiversity objectives. It is important to explore these in order to identify best practices, which can inform revisions to policy design and delivery.

6.1.2 PROCESS AND METHODOLOGICAL APPROACH

The overall approach to answering ESQ 4 primarily relies on inferring the likely impacts of each of the measures on biodiversity and landscapes, using evidence gathered on the key factors that influence biodiversity and landscapes within agriculture and forestry and the influence of the CAP instruments and measures on these factors (drawing on the assessments of their effects and scale in ESQs 1 and 3). This is because direct evidence of the impacts of the measures is generally lacking, incomplete or out of date (as discussed further in the section below). However, where relevant evaluation studies have been carried out of particular measures, or monitoring data exist for relevant taxa, then these are used to examine, to the extent possible, whether or not the inferred impacts are supported by the available observational evidence.

6.1.3 ANALYSIS OF THE CONTRIBUTION OF EACH CAP INSTRUMENT/ MEASURE TO BIODIVERSITY AND LANDSCAPES

6.1.3.1 Introduction and methodology

This section draws together the results of the following two analytical steps that were carried out for each CAP biodiversity focused measure (i.e. as identified in the intervention logic for the measure) and others that have the potential to significantly affect biodiversity and landscapes.

Step 1. Analysis of the potential contribution of each CAP measure to biodiversity and landscapes, based on:

a. An assessment of the potential for the measure to directly or indirectly influence one or more of the key factors affecting agricultural and forest biodiversity and landscapes and the potential strength of that influence – which also draws on the intervention logic table (Table 5).
b. The scale or degree of applicability of the measure, which depends on its take up by each Member State/region, drawing on the results from ESQ 1.

Thus, the strength of influence and scale of effects are two axes that affect the potential impacts of a measure.

Step 2. Review of evidence of actual impacts of each CAP measure on biodiversity and landscapes.

This step set out to verify, and if possible, to quantify, the potential effects of each measure, and to assess their actual impacts. This aspect of the analysis firstly drew on the results of ESQ 3, to ascertain whether each measure resulted in changes in farming systems and practices that in turn affected any

of the key farming and forestry practices that affect biodiversity and landscapes. Such evidence was then used to infer potential impacts. A search was made for evidence of actual impacts of each of the instruments and measures. It is important to note that the CMEF indicators were of little value in this respect. This is because the CMEF impact indicators for biodiversity (e.g. the common farmland bird index) do not report on the impact of the CAP itself. The CMEF result and output indicators relating to biodiversity focus on coverage and scale of activity (e.g. % share of FOWL or UAA under management contracts supporting biodiversity). Therefore, to verify the inferred impacts, and provide additional evidence, the analysis attempted to draw on the wider published information, especially existing EU or national monitoring and evaluation studies of the CAP measures, in particular those that assessed and measured actual biodiversity impacts (e.g. changes in species populations and/or diversity). However, such information was scarce, because the impacts of all Pillar 1 instruments and most RDP measures /sub-measures are not monitored in relation to scheme-specific measurable targets. Also, where RDP measures have been monitored in this way, then the results are often not publically available. Therefore the assessment of impacts relied greatly on scientific studies. However, as published studies of actual biodiversity impacts of RDP measures mostly relate to AECM schemes, particular efforts were also made to identify and obtain relevant available information on the other measures in the case study Member States, but little direct evidence of biodiversity impacts was found as these are not directly monitored by most Member States.

The results of the two steps have been drawn together, integrated and summarised in Table 14 for Pillar 1 measures and Table 15 for Pillar 2. The measures that have biodiversity as an objective in their intervention logic, as well as other measures that are considered to have the potential for significant biodiversity impacts, are described in accompanying text. Where evidence was found, the influence of governance arrangements and collective action is also discussed.

6.1.3.2 Analysis of measures

6.1.3.2.1 Farm Advisory System

Little information is available about the impacts of farm advice on biodiversity. However, according to the Nature Directives Fitness Check Study (Milieu, IEEP and ICF, 2016), the European Commission reported in 2010 that the mandatory inclusion of information on cross-compliance in Farm Advisory Systems (FAS) had raised farmers' awareness of their obligations under the Birds and Habitats Directives. More importantly, there is some evidence that when advisory services have adopted broader biodiversity remits, support for AECM schemes, has helped increase their uptake and effectiveness, as for example reported in the case studies for Latvia and Germany.

6.1.3.2.2 Cross-Compliance: Statutory Management Requirements and Good Agricultural and Environmental Conditions

The requirement for CAP support (with some exceptions) to comply with the basic environmental standards set in the Statutory Management Requirements (SMRs) and Good Agricultural and Environmental Conditions (GAEC) apply to 156 million ha, i.e. 83% of EU UAA (ESQ 3). Of particular direct relevance is the requirement for farmers to comply with the mandatory requirements under the Birds Directive (SMR 2) and the Habitats Directive (SMR 3). However, as these do not have any requirement that goes beyond what is already mandatory, their degree of additionality is uncertain. Furthermore, as discussed in ESQ 1, there is evidence that some Member States are not adequately and/or clearly incorporating the legal requirements of the relevant provisions in the Birds and Habitats Directives into their rules on cross-compliance. Further discussion of the potential impacts of SMRs 2 and 3 on BHD habitats and species is included in ESQ 5.

Of the GAEC standards one is considered to be of direct relevance to biodiversity: GAEC 7, which sets out rules on the retention of landscape features. Since 2013 it also includes a ban on cutting hedges and trees during the bird breeding and rearing season and, as an option, measures for avoiding invasive plant species. Whilst GAEC 7 may therefore have clear biodiversity benefits, these will mainly be for relatively common generalist species. It is also important to bear in mind that Member States have considerable discretion in terms of how they apply GAECs, which results in a great variety in their scope and standards. As indicated in ESQ 1 despite all the landscape elements having well known biodiversity benefits in most circumstances, the Members States examined in the case studies only included a selection (with e.g. hedges, trees, ponds and field margins being omitted by several). Furthermore,

some of their requirements may have little practical impact, such as in the Netherlands, where the only GAEC 7 obligation is to obtain a permit before felling a tree.

Of the other GAEC standards, those concerning the establishment of buffer strips along water courses (1), minimum soil cover (4) and minimum land management reflecting site specific conditions to limit erosion (5) are also likely to have biodiversity benefits to some degree, particularly for aquatic ecosystems and their flora and fauna, as they should reduce water pollution from silty nutrient-rich runoff (Alliance Environnement and Thünen-Institut, 2017). GAEC 6 which seeks to maintain soil organic matter can also be expected to provide benefits for soil fauna, such as earthworms. This in turn may lead to further indirect benefits, such as through the food chain, as earthworms are important food resources for a range of species, including several species of declining farmland bird.

Despite the high probability that cross-compliance is to some degree mitigating the effects of some detrimental farming practices (e.g. boundary management, ploughing, high levels of fertiliser use) it is not possible to assess the actual added value and impacts of the SMRs and GAEC standards on biodiversity. This is in part because there is some evidence that cross-compliance measures are not widely enforced. An NGO report found almost no evidence of penalisation of farmers for habitat clearing in 12 Member States (Birdlife International, 2009). Although this is an old study, more recent information on this could not be found. Kazukauskas, Newman and Sauer (2014) found that fertiliser and pesticide use declined on farms subject to cross-compliance requirements, but there was no significant difference between farms subject to cross-compliance and those that were not, once their dependency on subsidy levels was taken into account. The authors consider that this may be because there is a low probability of being checked and the fine for non-compliance is relatively low.

6.1.3.2.3 Basic Payment Scheme, Single Area Payment Scheme, Small Farmers Scheme and redistributive payment

The effects of BPS/SAPS, SFS, as well as redistributive payments (and ANC payments – see below) are likely to be widespread as farmers are entitled to receive such payments over 86% of UAA (see ESQ 3). Furthermore, the payments may indirectly affect other areas of land that could be converted to UAA that is eligible for CAP payments. As discussed in ESQ 3, within the eligible areas the payments help to maintain farming that would otherwise be economically unviable. CAP support can therefore be expected to help reduce rates of land abandonment, as has for example been found in Estonia and Latvia where CAP support slowed rates of abandonment (Nikodemus et al, 2010; Roose and Sepp, 2010). Areas at greatest risk of abandonment include semi-natural habitats / and other HNV farmland, a large proportion of which is also within the Natura 2000 area (Brady et al, 2009; Keenleyside et al, 2014; Keenleyside and Tucker, 2010). There is some supporting evidence that CAP basic payments have helped to maintain HNV farming systems in Ireland (Howley et al, 2012) and wood pasture habitat in Sweden (Hasund, 2011). However, wider and more general evidence of the degree to which the payments actually help to maintain HNV farmland and biodiverse habitats and associated species is lacking. It is also important to bear in mind that not all abandonment is necessarily detrimental for biodiversity, e.g. if it leads to scrub and forest habitat regeneration at appropriate locations and scales, and does not compromise higher priority conservation objectives (which is most likely within Natura 2000 sites – see ESQ 5). In fact it may help to meet scrubland/forest habitat and associated biodiversity restoration goals in areas with artificially denuded tree cover. Also, some natural habitats such as blanket bogs benefit from the cessation of grazing and others forms of agricultural management (e.g. burning). Furthermore, abandonment may lead to wider environmental benefits (ecosystem services), such as reduced levels of soil erosion, water pollution and higher rates of carbon sequestration, especially if followed by appropriate habitat restoration and management.

The effects of payments might also be expected, in some circumstances, to shield farmers from the requirement that sometimes arises to improve their land and/or intensify farming to make their business economically viable. On the other hand, payments may facilitate agricultural improvements and intensification in cases where financial constraints would otherwise prevent them and the farmer wishes to respond to market pressures and opportunities in this way, even though payment levels are now almost entirely decoupled from production. This is because, as discussed in ESQ 3, direct payments may sometimes provide the means for a farmer to invest in agricultural improvements (e.g. drainage of semi-natural grassland followed by higher stocking rates), which they might not otherwise have happened. Such effects are mostly likely to occur in areas of moderately intensive agriculture (i.e. outside ANC and HNV areas), where increases in productivity are not constrained by natural or other factors (e.g. poor soils, steep land) and there is the potential for modest financial investments to provide worthwhile increases in profitability. However no empirical evidence to confirm this hypothesis was

found during the data collection phase for this study, which finished in April 2019 and it was beyond the scope of this evaluation to carryout detailed research on the issue. Given the scale of influence of direct payments and that agricultural improvements and intensification are the main drivers of biodiversity losses, the potential negative biodiversity impacts resulting from direct payments warrants thorough investigation.

In agricultural areas that are ineligible for CAP direct payments due to presence of high densities of trees or other ineligible vegetation, there may be an incentive to remove trees and other vegetation that disqualifies them from claiming payments, leading to habitat damage and in some cases loss (especially HD habitats). Whether such damage has occurred as a result of this is very difficult to ascertain, and no recent direct evidence of this is known of. However, there is evidence of such an incentive during the previous 2007-2013 period as substantial areas of semi-natural habitats (much of which are HD habitats) were deemed ineligible for direct payments because of the presence of scrub, shrubs and trees (Hart and Baldock, 2010; King, 2010; Poláková et al, 2011).

This problem has been addressed to some extent in the current CAP through a revised and broadened definition of permanent grassland, and a raised limit for the density of trees on eligible land. As discussed in ESQ 1, changes in the definition of permanent grassland at the EU level and by Member States have led to an increase in the eligible area in some, although a decrease in others since 2014. According to the case studies, the increase in eligible area in France and Portugal is expected to have helped maintain HNV farmland. Nevertheless, there is evidence that a few eligibility problems persist in some Member States, for example for wood pastures (related to new rules on the measurement of tree density) which has reduced the areas where payments can be received. This has caused problems in Spain (Ruíz and Beaufoy, 2015) and Romania, leading to the felling of trees, potentially including veteran specimens of high biodiversity value. The extent to which the revisions have reduced damage to semi-natural habitats is uncertain, but the incentive remains, especially in those Member States that have not adopted the broader eligibility criteria.

6.1.3.2.4 Payment for agricultural practices beneficial for the climate and the environment: Crop diversification

Whilst the main objective of the crop diversification measure is to improve soil quality, a number of studies (e.g. Sirami et al, 2019) indicates that diversifying the number of crops that are cultivated may also have some beneficial impacts on biodiversity, particularly soil biodiversity (as it will increase rotational cropping), as well as increasing landscape diversity, with benefits for some species (e.g. farmland birds). These impacts, however, depend on the types of crops grown and when the crops are grown (e.g. spring sown versus autumn sown).

The greening evaluation study (Alliance Environnement and Thünen-Institut, 2017) found that the crop diversification requirement resulted in different crops being cultivated on just 0.8% of the arable area in 10 case study Member States. Given the small area directly affected and the variable effects on cropping amongst the Member States, the overall biodiversity benefits from the crop diversification measure are therefore likely to be minimal. However, the analysis also showed that the measure may have slowed the general trend towards simpler cropping patterns. Furthermore, in some regions significant declines in maize cropping were observed, which is likely to be beneficial, as such crops have a highly impoverished biodiversity, and can lead to high levels of soil erosion and water pollution (Alliance Environnement and Thünen-Institut, 2017). Some more local biodiversity benefits may also have occurred in monoculture dominated landscapes, where there have been increases in fallow, nitrogen fixing forage crops and spring crops, especially where preceded by winter stubbles.

6.1.3.2.5 Payment for agricultural practices beneficial for the climate and the environment: maintenance of permanent grassland

The maintenance of permanent grassland in the landscape can be expected to be generally beneficial for biodiversity, as it is of higher biodiversity value than most arable cropland, especially if it is semi-natural, or at least under relatively extensive management (e.g. low levels of fertiliser use) and not subject to regular ploughing and reseeding. However, the 2017 greening measures evaluation (Alliance Environnement and Thünen-Institut, 2017) concluded that the Pillar 1 greening requirement to maintain the ratio of permanent grassland is unlikely to lead to substantial benefits. This is primarily due to the definition of permanent grassland in the Regulation, which allows the ploughing of grassland provided that it is returned to grass immediately. Therefore, maintaining the ratio alone provides limited biodiversity benefits as it can mask significant losses in some areas. This is particularly the case where the ratio applies to the Member State as a whole, which is in all but four Member States (BE, DE, FR

and UK), thereby allowing large shifts in the distribution of permanent grassland, probably leading to declines in landscape diversity and related detrimental biodiversity impacts. The definition of permanent grassland also allows intensive management practices such as ploughing and reseeding which significantly reduce the biodiversity value of the grassland. Where the ratio is operated regionally and combined with pre-authorisation systems (e.g. in Germany), it has constrained overall permanent grassland losses to some degree (see ESQ 3). However, evidence also comes from Germany that the measure does not necessarily constrain the intensification of grassland management as the proportion of HNV permanent grassland has continued to decline since 2013 (Benzler and Fuchs, 2018; Decken et al, 2017).

The coverage of the permanent grassland ratio is very high as it applied to 42.2 million ha in 2018 (ESQ 1), which equates to 70% of total EU-28 permanent grasslands in 2017. Large areas of eligible permanent grassland are excluded from the ratio since the greening instrument does not apply to organic farms, farms participating in the Small Farmers Scheme or to those qualifying for other exemptions. It is important to bear in mind that in all but four Member States (BE, DE, FR and UK), the ratio applies to the Member State as a whole, which allows large shifts in the distribution of permanent grassland, probably leading to declines in landscape diversity and related detrimental biodiversity impacts.

6.1.3.2.6 Payment for agricultural practices beneficial for the climate and the environment: designation of environmentally sensitive permanent grassland

The designation of environmentally sensitive permanent grassland (ESPG), both within and outside Natura 2000 areas has the potential to provide some high nature conservation benefits as, by definition, this measure targets grasslands of very high biodiversity value. Also, unlike the permanent grassland ratio measure, it requires them not to be ploughed or converted. It does not, however, influence the way in which the ESPG areas are managed (such as with respect to fertiliser and herbicide use).

The 2017 Greening Evaluation study (Alliance Environnement and the Thünen Institute, 2017) found that the potential benefits of the measure were not being fully realised because in many Member States only small proportions of HD grassland and other HD habitats were designated as ESPG within Natura 2000 areas, despite large proportions of these being in unfavourable conservation status, and therefore threatened. This was considered to be in part due to ambiguous wording in the Regulation on the requirement to designate ESPG. In total, some 7.7 million ha was designated (51% of permanent grassland in Natura 2000). This current evaluation study reveals that the designation of ESPG has increased within Natura 2000 sites to 9.54 million ha in 2018 (57.6%), with ten Member States (BG, CZ, EL, IT, HU, NL, RO, SK, FI and SE) designating 100% of their permanent grasslands within their network (see ESQ 1). However, seven have designated less than 25%.

It is important to note that, despite the significant designation of ESPG in the Natura 2000 network, there is some uncertainty over the added value of the ESPG measure, and hence its net impact. This is because protection should already be afforded to the areas of semi-natural grassland within Natura 2000 areas via the provisions of the Nature Directives (in particular Article 6 of the Habitats Directive). However, according to the 2017 Greening evaluation, ESPG designation can add extra protection in practice. For example, in one case study it was highlighted that some farmers did not know that their fields were in Natura 2000 areas and therefore were unaware that the ESPG restrictions applied, leading the paying agency to require reinstatement of ESPG that had been ploughed. Because of this, the evaluation concluded that in some Member States the designation of these areas as ESPG, coupled with the stringent controls associated with the CAP, and advice on which areas are subject to the ESPG requirements via farm advisory services, are likely to have enhanced their protection.

The ESPG measure undoubtedly has the potential to provide greater added protection if ESPG areas are designated outside Natura 2000 sites. Although the greening evaluation considered that a large proportion of semi-natural grassland outside Natura 2000 sites has national protection, there is evidence reviewed in ESQ 3 that the conversion and agricultural improvement of such grasslands is common. This is probably partly due to national protected area legislation often being less strict than under the Habitats Directive Article 6 obligations (Milieu, IEEP and ICF, 2016; Underwood et al, 2014). Thus, ESPG designation outside the Natura 2000 network complements its Natura 2000 coverage and contributes to supporting the overall objectives of the Nature Directives, which apply to the entire distribution of the BHD species habitats – not just within the Natura 2000 network. However, in 2018 this option was only taken up by five Member States (BE, CZ, IT, LV and UK–Wales), of which only Czechia designated a significant amount (ESQ 1, Table 7). The combined area across the five Member States (other than Italy, due to missing data) was 318,790 ha. Thus the measure is not making a significant contribution

to the conservation of BHD habitats and species, and wider biodiversity outside the Natura 2000 network, except in Czechia.

6.1.3.2.7 Payment for agricultural practices beneficial for the climate and the environment: Ecological Focus Areas

The main objective of Ecological Focus Areas (EFAs) is to maintain and increase farmland biodiversity, and scientific evidence shows that some of the EFA options have the potential to provide substantial benefits, despite some studies suggesting that they are not addressing key farmland conservation issues (Pe'er et al, 2017). The EFA element with the greatest potential to provide net biodiversity benefits is land lying fallow, although some national EFA rules associated with its management (e.g. timing of removal) are not always compatible with biodiversity requirements. In particular, early ploughing and/or vegetation cutting is a major threat to nesting birds and their young. Net benefits are also expected from the retention and creation of landscape features (i.e. field margins, hedges, trees, ponds and ditches), buffer strips and from multi-annual nitrogen fixing forage (e.g. alfalfa). Biodiversity effects from agro-forestry and afforestation EFA options may be positive or negative depending on their context (e.g. habitat and landscape they are placed in, location and scale), but their uptake has in any case been very low. The potential biodiversity benefits from the most commonly implemented EFA elements, i.e. other nitrogen fixing crops (such as pulses and soybean) and catch crops, are considered to be generally low and are normally further reduced by typical management practices (e.g. fertiliser use and cutting dates). According to an expert team from across the EU, current EFA options could be substantially improved for pollinators with appropriate management and adopting a landscape scale approach to enhance landscape structure (Cole et al, 2019).

The total area (before applying weighting factors) declared as EFA in 2018 was 9.5 million ha, or 9.0% of EU arable land (ESQ 1). The main types of EFA declared by farmers at EU level were linked to productive areas: catch crops now being the most commonly declared EFA type (covering 6.7% of the eligible arable area), followed by nitrogen-fixing crops (3.2% of eligible arable area). Until recently, nitrogen fixing crops were the predominant EFA type, but their declared area for EFA declined, probably in part as a result of the pesticide ban.

Land lying fallow, which is the most beneficial EFA type for biodiversity, was only declared on 2.8% of eligible arable land in 2018, a decline of 18% since 2015. Despite this low coverage, there is some indication that the measure may have had significant beneficial effects, as the negative trend in EU fallow area over 2007-2014 (resulting in a 31% loss), stabilised or reversed between 2014 and 2016 in 18 out of 28 Member States (see ESQ 3). Importantly, some of largest increases in fallow occurred in Spain, which was one of five Member States where fallow comprised more than 50% of the EFA area, and where declines in threatened birds have been linked to previous declines in fallow. In addition, the EFA measure has contributed to slowing the decline of multi-annual forage legumes, in some Member States, such as Spain where the reappearance of traditionally cultivated legumes has been reported (e.g. alfalfa, vetches, peas and beans). This provides foraging habitat for a wide variety of species, including wild bees and other pollinators, and some EU threatened mammals. However, such crops can also form ecological traps for ground nesting birds if they are subject to cutting in the breeding season (as for example reported in the Slovakia case study).

In contrast, the net effect of the EFA measure on the species associated with landscape features is likely to be very small, given that the features were only declared over 0.2% of eligible arable area and the fact that most are already subject to some degree of protection under national law, or through cross-compliance.

To summarise, the most up-to-date data show that the most commonly declared EFA elements are not those that provide the greatest biodiversity benefit, i.e. in particular fallow land, but also landscape features. Nevertheless, there is some indication that the measure may have helped stabilise, and in some areas increased, the area of fallow land, with potentially substantial biodiversity benefits in some areas, such as Spain and Portugal. The measure may also be helping to maintain some biodiversity-rich crop types, such as multi-year alfalfa, the benefits of which will have been highlighted by the ban on the use of pesticides. . It is uncertain whether or not the biodiversity benefits of EFAs have increased or declined since the 2017 evaluation. The ban on the use of pesticides on fallow land, nitrogen-fixing, catch and cover crop EFAs can be expected to have provided some biodiversity benefits over large areas. But nitrogen-fixing, catch and cover crop EFAs tend to be of low biodiversity value for other reasons, so the increase in their biodiversity may be limited. Furthermore these biodiversity improvements might be more than offset by the decline in total EFA area, and in particular the area of EFA fallow.

6.1.3.2.8 Voluntary coupled support: Support for certain types of animal and crop production to the level necessary to maintain current levels of production

VCS has the potential to provide biodiversity benefits, most obviously if it helps maintain HNV farming systems, either by itself, or complementing AECM schemes (Keenleyside et al, 2014). Whilst there appears to be no direct evidence that this is the case, as set out in ESQ 3, a modelling study does suggest that VCS support helps to maintain livestock production in areas where it would otherwise disappear (Brady et al, 2017).

Evidence of beneficial biodiversity impacts from the current VCS is lacking for most Member States, but the Netherlands case study reveals that the measure is supporting farmers that graze cows or sheep on natural land (e.g. dunes, heaths and salt marshes), which is otherwise ineligible for direct payments, thereby helping to prevent succession and maintain the habitats. More wide ranging evidence of the biodiversity benefits that VCS can provide is included in Keenleyside et al (2014) which lists the following examples of the similar Article 68 measure under the previous CAP period benefiting HNV farming:

- Finland: for cattle farms that pasture their animals on semi-natural and permanent grasslands.
- France: for extensive dairy systems in mountain areas (mountain milk premium), and also for extensive pastoral systems grazing sheep and goats (sheep/goat premium).
- Ireland: used specifically in the Burren area, targeted at farms with species rich dry calcareous grasslands.
- Netherlands: payments for using permanent grasslands that can only be accessed by boat.
- Portugal: for the management of traditional olive groves, and for farmers maintaining a well-functioning traditional irrigation system on HNV irrigated pastures called 'lameiros', which support low-intensity semi-natural grazing systems.
- Spain: for sheep and goat management on HNV areas, including grass and shrub steppes, mosaics of arable/grass/shrub pastures, dehesa, and dryland arable.

Importantly, the Article 68 support in the Burren in Ireland was used in a results-based payment scheme (before it was moved to AECM in 2014-2020 programming) with each farmer's payment depending on the quality of their species-rich grasslands that year, thus rewarding improved habitat management.

As indicated in ESQ 1 the measure is mostly used to support the livestock sector and in particular beef production. Although its coverage is difficult to calculate on an area basis, it is clearly wide as the total headage limit available is sufficient to cover more than half the bovines in Europe. However, whilst Commission data indicate that the coverage of livestock farming systems by VCS is extensive in some Member States, it is not possible to deduce from this information whether or not the measures are supporting HNV farming or livestock systems of lower biodiversity value.

It should also be borne in mind that as payments are linked to production, they may result in increases in stocking rates, which may in turn lead to detrimental biodiversity impacts, such as over-grazing, soil compaction and erosion (with indirect effects on water course and aquatic biodiversity), knock-on effects on species, and direct mortality of ground nesting birds. High stocking densities also can also lead to high concentrations of ammonia which leads to airborne eutrophication of sensitive habitats, a high proportion of which are HD habitats. Similarly, coupled support for crops is likely to encourage increasing levels of fertiliser and pesticide to increase yields, thereby leading to negative biodiversity impacts. Despite the risks that VCS can provide an economic incentive to increase production, which could lead to habitat damage and biodiversity loss, no studies were found that have investigated this issue.

Table 14: Analysis of the impacts of CAP horizontal and Pillar 1 instruments and measures on biodiversity and landscapes

CAP Measures & sub-measures	Potential effects on biodiversity	EU implementation scale and biodiversity targeting	Evidence of actual impacts
Horizontal Regulation (Regulation (EU) No 1306/2013)			
Farm Advisory System (Art. 12-15) and M1 and M2 advice and training (Rural Development Programme)	Uncertain and variable (see text).	Wide-scale and untargeted.	Biodiversity benefits highly likely, but no information found to verify or quantify this.

CAP Measures & sub-measures	Potential effects on biodiversity	EU implementation scale and biodiversity targeting	Evidence of actual impacts
Cross-Compliance: Statutory Management Requirement SMR 2: and SMR 3	Positive: uncertain. SMRs 2 and 3 are expected to reinforce farm-level compliance with national or regional legal restrictions that protect certain habitats and species covered by the Nature directives.	Very wide-scale covering 83% of UAA, and applicable to all Natura 2000 areas, but those under Small Farmers Scheme are exempt, which is likely to include a disproportionality high proportion Natura 2000.	No evidence of impacts.
Cross-Compliance: GAEC 7 Retention of landscape features (Art. 91-95)	Positive: low – moderate (see text).	Very wide-scale covering 83% of UAA. Use and scope of measure variable. IAS option only taken up by 3 Member States.	No evidence of impacts, which are also likely to vary considerably amongst Member States.
Cross-Compliance: SMR 1, GAEC 1 – 6	Positive: uncertain. SMR 1 and the other GAEC standards may have an indirect impact especially through the avoidance of water pollution (SMR 1, GAEC 1, 2, 3) and the protection of soils and carbon stock (GAEC 4, 5 and 6).	Very wide-scale covering 83% of UAA.	No evidence of biodiversity impacts, other than the indirect effects of reductions in fertiliser and pesticide use.
Direct Payments Regulation (Regulation (EU) No 1307/2013)			
Basic direct payments: Basic Payment Scheme & Single Area Payment Scheme (Art. 21-19) & Redistributive payment (Art. 21)	Variable & uncertain (see text).	Wide-scale and untargeted, directly affecting 86% of UAA that is eligible for payments, and indirectly affecting the remaining UAA and other areas of habitat that could be converted to eligible UAA.	Modelling studies suggest moderate-scale significant benefits in terms of supporting HNV farming systems, but insufficient evidence to ascertain whether in some circumstances, payments lead to agricultural improvement with detrimental biodiversity impacts. Insufficient evidence of whether significant detrimental impacts still occur from eligibility criteria incentivising habitat damage and exclusion from AECM.
Payment for agricultural practices beneficial for the climate and the environment: Crop diversification (Art. 44)	Positive: low (see text).	Small-scale and untargeted (c. increase in crop diversity over 0.8% of arable land).	No direct evidence of impacts, but given small scale of observed effects then impacts are generally small; but higher impacts likely in some areas.
Payment for agricultural practices beneficial for the climate and the environment: Maintenance of permanent grassland (Art. 45 (2))	Positive: low (see text).	Wide-scale affecting 70.0% of permanent grassland.	No direct evidence of impacts, and it is difficult to infer actual impacts as the management of the grasslands concerned is uncertain.
Payment for agricultural practices beneficial for the climate and the environment: Designation of environmentally sensitive permanent grassland (ESPG) (Art. 45 (1))	Positive: moderate in Natura 2000 sites (depending on added value of the measure), moderate – high outside Natura 2000 sites (see text).	Wide-scale and targeted to Natura 2000 sites and other areas with HD habitats: in 2018 covering 57% of permanent grassland in Natura 2000 sites, but only 2 % of HD grasslands outside the network.	No direct evidence of impacts and net added value of the measure in Natura 2000 is uncertain. More certain net benefits outside Natura 2000, but coverage is a small % of HD habitat area.
Payment for agricultural practices beneficial for the climate and the environment: Ecological Focus Areas (EFAs) (Art. 46)	Positive: moderate for fallow land, multi-annual nitrogen fixing forage crops and landscape features, but low for other EFAs types (see text).	Wide-scale and untargeted: at least 5% of land required as EFA over 85% of the arable area. In 2018, EFA actually covered 13.1% of arable area (before weighting).	Good evidence of the biodiversity effects of EFA elements, but no studies of actual impacts.
Payment for areas with natural constraints (Art 48)	Variable and uncertain (see M13 measure below).		No evidence of impacts.

CAP Measures & sub-measures	Potential effects on biodiversity	EU implementation scale and biodiversity targeting	Evidence of actual impacts
Voluntary coupled support: Support for certain types of animal and crop production to the level necessary to maintain current levels of production (Art. 52)	Variable & uncertain (see text).	Very widespread in the beef and dairy sectors where total headage limits allow payments for more than half the EU herd.	Some modelling evidence suggests that measure will help maintain HNV. No information available on other possible detrimental impacts.
Small Farmers Scheme (Art. 61-65)	As for BPS/SAPS and redistributive payment above.	See BPS/SAPS and redistributive payment above.	No evidence of impacts.
Crop-specific payment for cotton (Art. 56)	Uncertain, but probably negative.	Only in four Member States.	No evidence of impacts.
Common Market Organisation (Regulation (EU) No 1308/2013)			
Aid in the fruit and vegetables sector (Operational Programmes) (Art. 32-33)	Positive: uncertain. Positive impacts likely if the environmental actions planned in the operational programmes are beneficial to biodiversity (e.g. if they aim to reduce pesticide input and/or introduce wildlife-friendly cropping practices such as flowering field margins).	Limited extent due to budgetary constraint and the fact that biodiversity is one of a number of environmental actions which may be funded.	No evidence of impacts in 2015 evaluation reports.

NB. Measures in bold and italics are those where the intervention logic is focussed on biodiversity. See also the intervention logic Table 5 for full information on potential effects.

Magnitude of effect: Positive or Negative. Low = small and/or occasional effects on one or a few key factors that are unlikely to result in detectable changes. Moderate = effects on several key factors that are likely to result in detectable changes, e.g. reductions in rate of decline, in the area affected. High, effects on most or all key factors that are likely to result in full habitat or species recovery (unless countered by other factors) in the area affected.

6.1.3.2.9 M8 Investments in forest area development and improvement of the viability of forests and M15 Forest-environment payments

As indicated in ESQ 1, M15 and the M8 sub-measure most directly focussed on achieving biodiversity objectives (M8.5) have only been used in a few of the case study Member States, and therefore their EU level impacts cannot be high. Nevertheless, some of the examples of M8.5 and M15 listed in Box 9 have the potential to provide biodiversity benefits in the Member States concerned (e.g. the conversion of plantations to mixed indigenous tree species in Croatia, forest management in Germany and Portugal, and specific measures for threatened bird species in Slovakia).This is shown by the literature on the biodiversity impacts of these types of actions reviewed for this study. In addition, in Hungary, stakeholders interviewed for the forest measures evaluation (Alliance Environnement and EFI, 2017) expect positive environmental impacts, especially through the extension of forest area, and the promotion of low-impact forestry operations, but effects are difficult to monitor and may still need years to take effect.

In Slovakia, the payments for bird territory protection provide financial support for the protection of 14,000 ha of breeding habitats. Furthermore, monitoring of the impacts of a similar measure (Measure 225), over the previous 2007-2013 period, found that the abundance of forest species of birds within the scheme areas was relatively stable or fluctuating trend, whilst it decreased overall at a national level.

However, with the absence of monitoring data and evaluation studies it is not possible to draw conclusions on their actual effects. Moreover, in any case their overall impacts are likely to be low, as the area of uptake of M8.5 for biodiversity (i.e. Priority 4) is only 483,746 ha and the uptake of M15 is 162,868 ha (Table 10), which equates to 0.3% and 0.1% of EU forest area (FOWL) respectively.

6.1.3.2.10 M10 Agri-environment-climate: M10.1 - Payment for agri-environment-climate commitments

Although the agri-environment climate measure (AECM) has multiple objectives, it is the measure that provides the greatest potential for supporting maintaining, enhancing and restoring biodiversity and landscapes on agricultural land. This is largely due to the fact that the measure is mandatory across

the EU combined with the requirement for a minimum proportion of the EAFRD budget to be allocated to environmental measures more generally. The potential scale of its application is critical to ensuring that its impact can go beyond local improvements to levels that can maintain and, where necessary, restore the area and condition of biodiverse habitats (i.e. HD habitats and HNV) and their species populations. The flexibility of the measure also allows Member States to introduce AECM schemes that can meet their specific biodiversity needs and priorities by targeting and tailoring management options according to their bio-physical, climatic, environmental and agronomic circumstances.

Whilst the AECM measure undoubtedly has the potential to provide significant biodiversity benefits, assessment of its actual impacts has been severely hampered in this evaluation by a lack of monitoring of their performance with quantified results and impact indicators. Although Member States are required under the CMEF to report on the 'area under successful management' the meaning of 'successful management' is not defined and therefore does not provide a robust or consistent measure of the schemes' results. Furthermore, the indicators are not reported according to sub-measure. However, a large number of scientific studies have been carried out of AECM schemes, including a number of meta-analyses (Batáry et al, 2011; Scheper et al, 2013; Tuck et al, 2014), most recently in 2015 by Batáry et al (2015), which examined 103 suitable studies from the EU, Norway and Switzerland. Most of these studies cover previous programming periods, as several years are normally needed to measure impacts and publish the results. Nevertheless, there are some examples of positive biodiversity impacts from the current programming period shown in the literature for this study. Although most of the evidence comes from the previous reporting period it remains highly relevant as it is the type of intervention that is of key importance (and therefore the subject of the studies) and these have not changed significantly over recent programming periods.

The scientific studies provide strong evidence that most of the interventions included in AECM schemes have the potential to provide significant biodiversity benefits for one or more taxa groups. The options that have been shown to be effective in relation to delivering biodiversity objectives in grasslands include the maintenance of permanent pasture and other semi-natural habitats, modifying cutting regimes, ensuring appropriate grazing regimes and hedgerow management. The benefits associated with agri-environment interventions in intensive croplands are found mainly in instances where a combination of management options provide key ecological resources for vulnerable species, in particular breeding habitat and year-round food resources, as these tend to be reduced by agricultural intensification and specialisation. The main requirement for most of the declining species associated with such habitats (especially birds but also butterflies and pollinating insects), is options that provide in-field resources, such as fallow patches or fields, over-wintered stubbles, crop diversity and crops with reduced pesticides (Butler, Vickery and Norris, 2007). However, some species also benefit from field edge management measures, such as the planting of field margins with seed-rich or nectar-rich plants, or reductions in the use of pesticides in field headlands. As indicated in ESQ 1 Member States are offering a wide range of sub measures that address many of these requirements.

Although the practical management interventions included in AECM schemes may have beneficial effects, it is necessary to consider whether or not they have been effective overall when actually implemented as part of a scheme. Evidence indicates that the effects of interventions are sometimes more variable when they are part of AECM schemes, and thus subject to additional influencing factors, such as variations in implementation and spatial targeting. For example, many AECM schemes aim to maintain semi-natural grasslands and support the continuation of HNV farming practices, such as hay-making and extensive livestock grazing, wood pastures, etc. (Dicks et al, 2013; Poláková et al, 2011). However, the success of such schemes is also often dependent on Pillar 1 direct payments also being available. Whereas the AECM payment will cover the additional costs and income foregone associated with the specific agricultural management carried out for biodiversity, direct payments help ensure the basic viability of farms with these habitats in remote, often economically lagging areas (Poláková et al, 2011).

Although it is not possible to quantify the effectiveness of some of these HNV focused AECM schemes, the very high importance of semi-natural habitats and HNV practices is clear (see section 2.2).The role of HNV practices is evident particularly with regard to maintaining landscape heterogeneity, which creates suitable conditions for a wide range of species. However, some schemes that aim to maintain semi-natural, or other HNV habitats, can have limited benefits (and efficiency) if they are not well targeted (e.g. through mapping or the use of other eligibility criteria). It should also be borne in mind that schemes that aim to maintain certain HNV practices (such as low intensity grazing) may not be as beneficial as they appear when compared to the counterfactual situation, as some of these practices can be expected to continue to some extent anyway.

AECM schemes tend to provide two levels of biodiversity management, particularly in croplands, which have distinct and important roles (see examples in ESQ 1). The first involves the use of generic horizontal options, to encourage a large proportion of farmers to undertake a basic level of beneficial biodiversity management (sometimes referred to as broad and shallow AECM schemes, or entry-level schemes). These, for example, aim to maintain unfarmed features such as hedges etc., put in place buffer strips, and crop margins, and retain some stubbles over winter. The effectiveness of these schemes is variable, and often constrained by low uptake, especially of in-field options. The main effect of basic and generic AECM schemes have tended to benefit populations of widespread and common farmland species, such as farmland birds in the United Kingdom (Baker et al, 2012).

The second type of AECM can provide management options with a higher degree of thematic and geographical targeting and tailoring that aim to enhance locally specific habitats and species. Some of these schemes have proved to be highly beneficial in bringing back locally extinct specialist species or stopping their decline, although successes vary according to location and have been achieved more for some taxa, such as birds (Dicks et al, 2013; Newton, 2017; Wilson, Evans and Grice, 2009). Due to the high per unit costs of the practical measures that are undertaken (and often higher support costs), they are often carried out on over smaller areas than broad and shallow schemes, and are therefore best suited to scarce habitats and species that can be targeted.

In cases where AECM schemes have not had their expected effects within their area of influence this may be due to the mix of management interventions not addressing the ecological requirements of the targeted species or habitats. In other cases it may be due to inadequate implementation, the delayed response of species to the biophysical effects of schemes, or due to non-linear effects of schemes on species population sizes or species composition (Filippi-Codaccioni et al, 2010; Tscharntke et al, 2005).

Where effective AECM schemes have not achieved wider scale impacts, leading to measurable population changes, this is normally due to the limited scale of application of the scheme or particular interventions when there is a choice. Evidence shows that the scale at which beneficial management is carried out is a critical factor, especially for widespread species (Walker et al, 2018). Furthermore, the impacts of interventions, such as reductions in pesticide use, in restricted areas are often constrained by landscape effects and habitat fragmentation, which reduces their effectiveness (Batáry et al, 2011; Concepción, Díaz and Baquero, 2008). Therefore, to be effective in such circumstances schemes often need to cover a substantial proportion of the farmed landscape (the size of which will be objective and context-specific) or be focussed on specific areas of high importance to gain concentrated impacts, or targeted to locations where particular species are known to occur (Perkins et al, 2011). As a result, less success has been achieved for AECM within intensively farmed habitats that have relied primarily on in-field options, as these tend to be less attractive to farmers than field edge management that impinges less on core farming operations.

Whilst there is clear evidence that well designed AECM schemes interventions can provide beneficial effects (e.g. locally increased numbers or survival rates), few studies have ascertained whether their implementation has been at sufficient scale and in appropriate locations (which often need to be identified and then to be targeted), to result in wide-scale population impacts. Such overall impacts are very difficult to study as large-scale monitoring and/or trials are required. Nevertheless, a study in England found evidence that a higher level scheme was reducing the rate of decline in a suite of farmland birds, but this was insufficient to halt declines nationally, in part due to low uptake of key in-field options (Baker et al, 2012).

A later study considered the proportion of the farmland bird populations that make up the United Kingdom Government's Farmland Bird Indicator (Government of the United Kingdom, 2018) that would need to have AECM coverage under the High Level Stewardship (HLS) coverage to halt their decline (Walker et al, 2018). Based on the ongoing declines of the species in the wider farmed countryside of 2.3–4.1% per annum, the authors estimated that 26–33% of the High Level Stewardship coverage would be required to offset the decline. This is the only estimate of the required coverage of an AECM scheme to halt farmland bird populations declines found in this evaluation study, and it is therefore difficult to judge if it is applicable to other Member States in Europe. However, as many EU Member States have observed similar rates of declines in farmland birds, as a result of similar pressures to those in England, it seems likely that the necessary levels of coverage to halt declines will be similar.

To summarise, given the great variety of different types of AECM schemes and their range of objectives, together with the lack of consistent and detailed Member State reporting data on the results and impacts, it is difficult to draw overall conclusions on their effectiveness and actual impacts. Nevertheless, the evidence strongly suggests that most AECM scheme interventions that are based on robust science and are well designed and properly implemented in the right place (i.e. spatially targeted

where necessary), provide benefits for their target habitats and species. However their overall impacts, depend on their implementation at sufficient scale, and in many cases this appears to be constrained as a result of inadequate budgets and/or insufficient take-up by farmers.

More specifically, analysis of the evidence suggests that:

- AECM schemes that maintain semi-natural habitats, especially HD habitats, and their associated species address the most important biodiversity habitats and therefore provide a priority and reliable means of supporting existing biodiversity - however their impacts in relation to the counterfactual are uncertain.
- AECM schemes in improved agricultural habitats are most effective where the intervention provides a high contrast in simplified, rather than complex, farming landscape, such as by providing a resource that is lacking (e.g. flower-rich habitat in uniform landscapes lacking such resources).
- Higher level AECM schemes are generally more reliably effective than horizontal broad and shallow AECM schemes, and also can address the requirements of specialist habitats and species of higher biodiversity conservation importance.
- AECM schemes are more effective in increasing species richness, when they are interventions in non-productive or marginal areas (e.g. hedgerows) rather than productive area (in-field interventions). However, species richness is not necessarily the best indicator of conservation importance, and the increasing species richness is often due to increases in generalist species rather than specialist agricultural species, which tend to be more threatened.
- AECM schemes focussing on non-productive areas also tend to have higher overall impacts because farmers prefer such options as they normally have less impact on their farming systems and practices.
- AECM schemes sometimes fail because the interventions are placed in the wrong place (e.g. where the target species are absent, or where the intervention is not required or is inappropriate). Targeting is therefore often required to ensure their effectiveness, and in many cases greatly increases their efficiency.
- AECM schemes impacts are sometimes constrained by landscape factors, such as habitat fragmentation and the dominance of the landscape by agriculturally improved and intensively managed crops; in which high levels of AECM uptake (coverage) may be needed and/or targeting.
- Whilst most well designed and implemented AECM schemes are effective in leading to positive biodiversity effects in the intervention area, there is less evidence that these lead to sustained population levels impacts in the local area, and especially at larger scales. In most cases this is probably due to inadequate implementation (e.g. due to inadequate budget allocation and/or farmer uptake).

The area planned to come under AECM agreements over 2014-2020 is 30.6 million ha, which is 17.1% of EU UAA. Based on this, and the above analysis and the ESQ 1 examination of the type of AECM schemes, whilst the measure is affecting a significant portion of EU farmland (especially semi-natural habitats / HNV farmland) it is likely to be having a wide variety of impacts in the EU Member States. This is firstly because there is a range of schemes being implemented with varying objectives, scope and design, including broad and shallow schemes with basic environmental provisions and higher-level schemes requiring more ambitious habitat and species management actions. A number of the schemes include horizontal interventions that have been demonstrated to be effective, e.g. maintenance of semi-natural habitats, creation of wildflower strips or fallow, as well as including more tailored and targeted higher level schemes for specific species. However, conclusions cannot be drawn on their actual impacts, as these depend on the adequacy of their uptake and proper implementation, and information on this and biodiversity monitoring data are not available. It is also relevant to note that, as shown in ESQ 1 Table 13, only 2.1% of arable farmland is influenced by uptake of AECM schemes creating or maintaining ecological features (e.g. field margins, buffer areas, flower strips, hedges, trees) and only 5.1% has measures to reduce fertiliser and pesticide use. Based on the research findings cited above, it is likely that the uptake area would have to be significantly larger to have a more significant impact on biodiversity trends on arable farmland.

6.1.3.2.11 M11 Organic conversion and maintenance

Organic farms tend to differ from conventional farms in a number of ways that are beneficial for biodiversity, including having more rotations, higher crop diversity, the absence of pesticide use, and higher densities and quality of non-farmed habitats (e.g. hedgerows and ditches). Moreover, a large number of studies, and several meta-reviews, have found that these typical organic farming characteristics lead to them having higher levels of biodiversity than conventional farms. A 2005 review of European studies comparing environmental impacts of organic and conventional farming identified a wide range of taxa, including arable plants, invertebrates, birds and mammals that benefit from organic management (Hole et al, 2005). Several more recent meta-analyses have come to similar conclusions that organic farming generally leads to an increase in species richness and abundance in most taxa (Smith et al, 2011; Tuck et al, 2014; Tuomisto et al, 2012; Winqvist, Ahnström and Bengtsson, 2012). However, the species that benefit tend to be common species, and the effects are often species specific and trait or context dependent. In particular, it has been observed that landscape factors can affect the extent to which organic farming provides biodiversity benefits, with it being highest in intensively farmed regions, as measured by the dominance of arable fields (Tuck et al, 2014).

Although the evidence does point towards significant beneficial impacts for most taxa, especially common species, there is still some uncertainty over the cause of these results, and whether it is due to the organic farming practices *per se* and/or the more general characteristics of organic farms (e.g. their tendency to be structurally more diverse and in more diverse landscapes). A global literature review by McKenzie and Whittingham (2009) investigated this by quantifying the impacts of five main differences between farming systems (pesticides, fertilisers, non-crop habitat, habitat heterogeneity, spring sowing) on farmland birds, and concluded that greater populations of farmland birds are primarily associated with the lack of pesticide use on organic farms. The later study by Hole et al (2015) considered that the observed benefits from organic management for arable flora, invertebrates, birds and mammals, were principally through reduced or no use of chemical pesticides and inorganic fertilisers; sympathetic management of non-cropped habitats; and mixed farming systems.

According to the information in ESQ 1 there is considerable variation across Member States in the area of farmland planned to be converted and maintained according to the requirements under the organic farming regulation. This varies from less than 1% in three Member States (BG, MT, RO) to more than 10% in eight (CZ, DK, EE, IT, CY, AT, FI, SE), with most in Cyprus, just over 25%. It is therefore evident that the actual impacts on biodiversity will also vary accordingly. As the biodiversity effects per unit area under organic farming have not been quantified, it is not possible to estimate an overall impact based on the scaled up coverage. However, it seems unlikely that significant landscape level and population impacts would often occur with the organic coverage levels in most Member States (although farm-level benefits would be expected). This is because typical general organic management benefits for biodiversity are likely to be normally less per unit area than those that result from specifically designed higher-level AECM schemes, where the coverage required to reverse declines in farmland birds is estimated to be in excess of 30% (based on Walker et al, 2018). In other words, if 30% coverage is required for AECM to have population level impacts then greater coverage would be required for organic farming. Nevertheless, this is a crude assessment and evidence that organic farming can have measurable population level effects comes from a study of the impacts of CAP measures on bird populations in Finland, where 16% of UAA is under organic management (ESQ 1). This found that an increase in organic livestock farms did lead to population increases (Santangeli et al, 2019). However, as the actual impacts of the measures have not been quantified through any evaluations in any other Member States, or on any other taxa, it is not possible to draw more general conclusions from the available evidence.

6.1.3.2.12 M12 Natura 2000 and Water Framework Directive payments:

Payments under measure M12 aim to compensate farmers and foresters for costs imposed on them by respecting mandatory rules resulting from relevant legislation or management plans already in place. Therefore, although they could be viewed as restoring incomes rather than leading to environmental benefits, it is important to note that agreements on the rules and plans with the affected parties may depend on such payments being available. In other words, benefits arise from the M12 measures as a result of the rules and management plans being more environmentally ambitious than they otherwise would.

Whilst no studies were found that directly evaluated the effects and impacts of the M12 measures, there is high certainty that the measures provide biodiversity benefits where properly implemented. This is firstly because, by definition, they apply only to Natura 2000 sites (which are all of particularly

high biodiversity value), and, secondly, the interventions that are compensated for have been identified by the nature authorities to be necessary to achieve the conservation objectives of the site.

6.1.3.2.13 M13 Areas of Natural or other Constraint (ANC)

Although ANC payments are generally not associated with any specific management requirements, as with direct payments (discussed in section 6.1.3.2.3 above), the main potential benefit of the measure is its support for HNV farming. This is especially likely in the case of ANC payments as there are high levels of overlap between ANC and HNV areas, as well as Natura 2000 sites. Although supporting evidence is lacking, it is expected that the measure reduces the rate of abandonment of such farmland, which would normally be detrimental for biodiversity within Natura 2000 sites and most HNV areas, although (as discussed under direct payments) in some circumstances abandonment is not damaging for biodiversity and can even be beneficial. On the other hand, as for direct payments, ANC payments may lead to some negative impacts if the payments help farmers to carry out agricultural improvements. But given the constraints on farming, this risk can be expected to be lower than in other areas receiving direct payments.

It is important to note that the potential biodiversity benefits of the measure are reduced by the CAP payment eligibility criteria relating to the definition of permanent grassland. Evidence of the likely impacts of this come from the Croatia case study, where 90% of the farmers who are registered for CAP payments are claiming the ANC payment. However, out of 607,000 ha of utilised permanent grassland, only one third is inscribed in LPIS and thus receiving CAP support. Most of the grassland outside the CAP is either abandoned or farmed at a (semi)-subsistence level by elderly farmers, and thus at high risk of abandonment, and most of this is high biodiversity value karst grassland rich in rare species.

Table 15: Analysis of the impacts of EAFRD - Pillar 2 instruments and measures on biodiversity and landscapes

See also the intervention logic table Table 5 for full information on potential effects.

CAP Measures & sub-measures	Potential effects on biodiversity	EU implementation scale and biodiversity targeting	Evidence of actual impacts
M1 Knowledge transfer and information actions	Uncertain. Some positive impact of training and other actions is possible where funding is prioritised under Focus Area 4A, but this will depend on the overall focus and target groups of the action.	Wide-scale horizontal measure.	No information. It is difficult to show whether increased farmer awareness leads to changes in management that benefit biodiversity.
M2 Advisory services, farm management and farm relief services	Uncertain. As for M1. Use of these measures to support compulsory training of beneficiaries of M10.1 and M15 could lead to improved management for biodiversity.	Variable and uncertain.	No information, as M1.
M3 Quality schemes for agricultural products and foodstuffs	Low & variable. It may support the marketing of quality products from HNV farmland including Natura 2000, thereby indirectly supporting their economic viability.	Low & variable.	No information.
M4 Physical investments (in particular *M4.4 Non-productive investments*)	Variable. Investments may help maintain the economic viability of HNV farmland, and could have other positive impacts, if e.g. they reduce pollution. Negative impacts might arise where actions increase the intensity of farm production.	Variable.	No information.
M5 Restoring agricultural production and introduction of appropriate preventive actions	Variable. May have positive impacts e.g. by increasing wildlife habitats within agricultural areas, or negative impacts for example by reducing periodic flooding of wet grassland.	Variable / low.	No information but impacts likely to be localised to damaged areas.
M7 Basic services	Variable. M7 may have negative impacts if measures focus on infrastructure developments. Positive impacts are expected from M7.1 support for Natura 20000 management plans, and M7.6 for maintenance and restoration of rural landscapes and HNV sites, including Natura 2000 and other protected areas, and for environmental awareness.	Low.	No information but impacts likely to be localised.
M8 Forest measures ***M15 Forest environment climate***	Positive: moderate – high, depending on scheme (see text).	Low, as only used in a few Member States, and M8.5	Very little information available on actual impacts.

CAP Measures & sub-measures	Potential effects on biodiversity	EU implementation scale and biodiversity targeting	Evidence of actual impacts
		covers 0.3% and M15 only cover 0.1% of EU forest area	
M10 Agri-environment-climate: M10.1 - Payment for agri-environment-climate commitments	Positive: moderate – high, depending on scheme (see text).	Variable, but at least moderate scale coverage: 17.1% of UAA. Uptake of scheme options is often inadequate.	Numerous studies show that well designed and implemented schemes increase biodiversity locally. High level schemes tend to me more effective than horizontal schemes. Population level impacts are less certain.
M10 Agri-environment-climate: support for conservation and sustainable use of genetic resources	Positive: uncertain. Has the potential to help slow the decline of the populations of rare breeds and varieties. Positive impact is expected where indigenous breeds of plant or livestock species are supported, especially where these are associated with management of HNV farmland.	Low.	Little information available, but the German RDPs for 2014-2020 indicate that schemes for livestock breeds are having very varied success. In Austria, the RDP funding for Murboden cattle breed is regarded as a key element of success.
M11 Organic farming	Positive: variable (see text)	Moderate-scale: 5.9% of UAA to be converted or maintained in 2018	Numerous studies have demonstrated impacts for a wider range of species, mostly common farmland species
M12 Natura 2000 and WFD: M12.1 - agricultural areas	Positive: moderate – high (see text).	Small-scale: but targeted to Natura 2000, with planned coverage of 8.6% of their permanent grassland	No studies found, but high certainty of benefits where applied as focussed on Natura 2000 requirements
M12 Natura 2000 and WFD: M12.2 – Natura 2000 forest areas	Positive: moderate – high (see text).	Very small-scale: but targeted to Natura 2000 with planned coverage of 0.9% of their forest area	As above.
M12 Natura 2000 and WFD: M12.3 - river basin management plans	Indirect positive impacts can be expected from the reduction in water pollution from implementation of river basin management plans.	Not assessed in this study.	Not assessed in this study.
M13 Areas with natural constraints	Variable: uncertain (see text).	Wide-scale applied to 29.5% of UAA, with a high proportion overlapping with HNV and Natura 2000	Some weak evidence that helps maintain HNV.
M16 Cooperation: *M16.5 - Support for joint action*	Positive: uncertain. Positive impacts can be expected from joint approaches to environmental projects or practices, depending on their focus. Farmers' cooperation to collectively enrol to AECM schemes can for example increase the landscape-scale benefits on habitats and species.	Uncertain.	No information.
M19 support for LEADER local development (CLLD)	Positive: uncertain. Beneficial impacts possible from LEADER/CLLD funded projects, e.g. if they focus on habitat management or through increased visitor awareness about local biodiversity. LEADER was not used as a significant funding source for Natura 2000 in the previous programming period.	Low / variable.	No information.

NB. Measures in bold and italics are those where the intervention logic is focussed on biodiversity (see Table 5)
Magnitude of effect: Positive or Negative. Low = small and/or occasional effects on one or a few key factors that are unlikely to result in detectable changes. Moderate = effects on several key factors that are likely to result in detectable changes, e.g. reductions in rate of decline, in the area affected. High, effects on most or all key factors that are likely to result in full habitat or species recovery (unless countered by other factors) in the area affected.

6.1.3.3 Influence of governance arrangements and collective action

Governance arrangements can influence the availability and take up of CAP measures and so their potential effectiveness. As shown above, conversions to organic farming can be particularly beneficial when they result in an unfragmented, organically farmed landscape. This had led Latvian local government bodies to ask for a regionalised approach to the measure in order to generate landscape-scale effects, although this suggestion was not taken up. In Baden Württemberg the right to initiate participation in the most highly specialised and targeted AECM measures was placed with the nature conservation authorities. Only farmers approached by these authorities were eligible to participate.

Some examples of collective approaches were found. A group of farmers in Groningen, Netherlands took advice from an Institute with experience of agroecology for the implementation of a M10.1 scheme, as a result of which they replaced their annually-sown field margins with perennial ones. They reported benefits to water quality, weed control and species abundance. Also in the Netherlands, a group of farmers using high value, partly tenanted land near Amsterdam learned that the black-tailed godwit enjoys greater breeding success if it is able to use the same breeding sites year after year. The farmers rearranged the way they collectively managed their land to ensure that the same, carefully selected sites were always available. This was followed by a rapid increase in breeding success. A by-product of this success for the farmers was that they were able to start marketing the milk they produced as nature-friendly. The Netherlands government will only provide M10 support to collective groups rather than individual farmers.

Elsewhere, in France the agri-environment-climate support is in some areas only made available to special purpose bodies which regroup farmers in an area. This was done to prioritise and distribute agri-environment-climate funding towards key priorities, including biodiversity.

6.1.4 ANALYSIS OF THE COMBINED CONTRIBUTION OF THE CAP MEASURES TO BIODIVERSITY AND LANDSCAPES

6.1.4.1 Introduction and methodology

This analysis draws on two information sources. Firstly, the results of the analysis of the contributions of each CAP measure carried out in the preceding section are examined, together with their combined effects on agriculture and forestry as assessed in ESQ 3 and an initial assessment of their combined impacts on each of the main farming and forest systems and their associated species is developed. This analysis considers the contribution to the broad objective of halting biodiversity loss, and therefore covers all broad types of agricultural habitats and forest. More detailed analysis of the contribution to BHD habitats and species is provided in ESQ 5. Due to information gaps (i.e. a lack of evidence from outside north-western Europe) it is not possible to break the assessment down by region. Also, as insufficient monitoring data are available on the actual impacts of the individual measures it is clearly not possible to provide quantitative assessments of the likely combined impacts. Instead expert judgement is used to summarise the likely impacts in descriptive and semi-quantitative terms. Where information allows, attention is given to considering the effects of integrated approaches / projects, collective actions and the combinations of measures that have been used in Member States (primarily drawing on the results of the case studies).

Secondly, an assessment is made of the extent to which the findings on the overall impacts of the CAP measures on the biodiversity groups are consistent with observed biodiversity trends, as reviewed in the literature. In this respect particular attention is given to the key EU biodiversity indicators, including the CMEF, SEBI and SFM indicators. Where possible, comparisons are made in trends in indicator values up to 2012 (i.e. to the end of the previous CAP programming period) and since. However, most of the key EU indicators referred to above are not annually updated, but in accordance with reporting cycles (e.g. every six-years). Therefore, in practice the analysis has mainly drawn on the common bird and grassland butterfly indicators. Analysis of the BHD habitat and species status indicators is provided in ESQ 5.

6.1.4.2 Analysis of the combined measures

6.1.4.2.1 Agricultural habitats and species

As discussed in section 2.2.1, semi-natural grasslands and similar habitats are by far the most important agricultural habitats for biodiversity, both in general terms (e.g. species richness) and for BHD habitats and species (discussed further under the ESQ 5). Therefore, to make the most effective contribution to general biodiversity goals it is necessary to ensure that the key factors affecting biodiversity in these habitats are addressed by the CAP instruments and measures, and that they are implemented over a high proportion of the habitat. The analysis of the individual measures described above, indicates that several measures do have the potential to contribute to the conservation and restoration of these habitats, in particular:

- Cross-compliance SMR 2 and SMR 3: bolsters basic protection measures of the Nature Directives;

- GAEC, in particular GAEC 7: mitigates potentially harmful farming actions – but flexibility given to Member States in choices and standards results in variable and uncertain impacts;
- CAP direct payments, VCS and ANC payments: reducing rates of abandonment (but see discussion on possible negative impacts);
- Pillar 1 permanent grassland ratio: reducing net loss of permanent grassland (but with no protection from ploughing or other damage);
- Designation of ESPG: protection of threatened high biodiversity grasslands, though currently implementation beyond Natura 2000 only occurs in five Member States;
- AECM schemes: payments for required habitat management / restoration actions and species conservation;
- Natura 2000 payments: payments for required habitat management / restoration actions and species conservation in Natura 2000 sites – but little used in most Member States.

Information on the combined coverage of semi-natural habitats by these measures could not be found, but it is likely to be high as BPS/SAPS cover 86.5% of UAA and cross-compliance requirements relate to 83.5% of UAA, and a high proportion of ANC (27% of UAA) relates to semi-natural habitats. The area of ESPG designation is currently 57.6% of permanent grasslands in Natura 2000, and most of this will be semi-natural habitat, as all HD grassland habitats are semi-natural, and most wetlands and carbon rich soils will be as well. However, little ESPG has been designated to date outside the Natura 2000 network, so its potential to substantially complement Natura 2000 protection measures and contribute to general biodiversity conservation outside the network is not realised. Of most importance to biodiversity is AECM coverage of semi-natural habitats, as the schemes are the most effective means of conserving and restoring the habitats. Over the 2014-2020 period, AECM coverage is expected to be about 17.1% of UAA, a high proportion of which is likely to be in semi-natural habitats. Coverage through Natura 2000 payments complements AECM and focusses on HD habitats and species that are of very high biodiversity importance, but the measure is little used by Member States. Organic farming also has biodiversity benefits, but these tend to be marginal on semi-natural habitats (as they are not subject to the key damaging activities that are reduced under organic systems, e.g. prohibition of most pesticides).

Despite the high coverage of semi-natural habitats by these measures, their combined impacts on the habitats (and more agriculturally improved habitats) are very difficult to assess. This is mainly because there are many uncertainties over the impacts of the individual measures, and therefore these uncertainties are compounded when considering the combined impacts of the measures. In this respect, the main uncertainties relate to the degree to which the direct payments and ANC measure actually prevents abandonment (where this would also be damaging for biodiversity), or facilitates agricultural improvements (which are almost always damaging to biodiversity).

Evidence that the combined CAP measures over the previous programming period have not halted the decline of biodiversity on farmland comes from two key biodiversity indicators (as discussed in section 2.3): grassland butterflies (which declined by 34% between 1990 and 2015 in the EU) and common farmland bird populations (which declined steadily by 32% between 1990 and 2015). Both of these indicators show ongoing declines over recent years. There are also significant ongoing declines in other taxa, including arable weeds, bees and other pollinators and soil fauna.

Although it is likely that a range of pressures have given rise to the observed ongoing declines in biodiversity in EU farmland, there is wide ranging strong evidence (reviewed in the literature for this study) that many of the declines are due to agricultural pressures. Furthermore, a recent study of bird populations has found evidence that recent farmland bird population declines in Czechia may have been caused by increases in agricultural intensity that were in part driven by EU accession in 2004, and in particular the CAP. This is based on an analysis of farmland bird population trends, and forest bird trends as a comparison, in relation to changes in farming intensity before and after accession. The results showed that accession to the EU was associated with a marked increase in agricultural intensity, as well as substantial declines in farmland bird populations, whilst forest species did not decline. The farmland bird declines were independent of the species selected, time lag after accession and other factors that could affect the bird populations other than agricultural intensity. Furthermore, the study found that agricultural intensity in a given year was negatively related to farmland bird abundance in the subsequent year indicating a mechanistic link between them. Based on this evidence, the authors conclude that 'entering EU's Common Agricultural Policy caused significant deterioration of farmland biodiversity', and also that the greening measures in the Member State were unable to prevent the decline.

Although the farmland bird study in Czechia relates to past increases in biodiversity pressures and possible CAP effects, evidence from ESQ 3 suggests key pressures continue to increase in some regions despite the current CAP measures. This seems to be particularly the case in the newer Member States, and some southern regions, where there is most scope for agricultural improvements and consequently farmland biodiversity currently remains high. For example, in a number of the case study Member States regions there have been significant losses of permanent grasslands and increases in fertiliser use (see **Figure 9** in ESQ 3) and plant protection products (see Figure 10 in ESQ 3) Such trends are also reflected in the HNV risk indicator, which shows high levels of risk in the Baltic States, the former East Germany, Hungary, Bulgaria and southern Iberia (see in ESQ 3).

To summarise, whilst it can be said with some certainty that some of the CAP instruments and measures listed above are making significant contributions to the conservation of semi-natural habitats, and probably to a lesser extent their restoration, it is not possible to reliably estimate their net combined impact, even in semi-quantitative terms. Nor is it possible to say with certainty that the net beneficial impacts generally outweigh the possible detrimental impacts of direct payments. However, net benefits from CAP measures are most likely in situations where coherent and synergistic ANC payments, AECM schemes and other complementary RDP measures are in place and underpinned by strong environmental protection (i.e. Natura 2000, supported by cross-compliance and ESPG designations). In the wider farmland environment, which is predominantly intensively managed, the CAP measures appear to be less effective, cover a smaller proportion of the land and tend to maintain or improve non-productive components of the farmland mainly benefiting generalist species. Biodiversity monitoring evidence indicates that the combined effects of the CAP are insufficient to counteract the pressures on biodiversity from agriculture in semi-natural habitats and more intensively managed farmland.

6.1.4.2.2 Forest habitats and species

A large body of academic literature demonstrates the biodiversity benefits of the types of forest management actions funded through the forest measures, for example retention of dead wood and mature and veteran trees, restoration of natural forest hydrology and diversification of the tree species composition. Therefore, it is expected that well-designed and implemented forest interventions should provide high biodiversity benefits where they are implemented, although there is very little evidence of this. However, the use of the forest measures M15 (which is of most relevance to biodiversity) by Member States has been very low (0.8% of FOWL) (ESQ 1). For example, the Austria case study of the forest measures evaluation (Alliance Environnement and EFI, 2017) concluded that although the RDP offers a number of highly relevant biodiversity targeted forest measures, there is a severe shortcoming in the uptake, and investments are needed in trust creation, knowledge sharing, and information dissemination to increase forest owners' uptake of the measures. Therefore, despite their potentially high effectiveness, it can be predicted that the forest measures' overall impacts are very low; although important locally significant benefits may occur particularly where the measures are targeted to BHD forest habitats and species in Natura 2000 sites.

6.1.5 MAIN FINDINGS

Assessing the contribution of CAP instruments and measures to biodiversity and landscapes, both individually and in combination is not straightforward. This is due to a number of uncertainties, including the potential effects of some measures (in particular the indirect effects of direct payments) and the actual impacts, which depend on the scale of their coverage and their proper implementation.

The effectiveness of biodiversity measures and their supporting actions is directly related to the degree to which semi-natural grassland or semi-natural features on other farmland are successfully targeted, rather than to any specific farm type, although some semi-natural grassland requires support from grazing livestock. Semi-natural features may be present in all types of farmland including that which is intensively farmed.

The case studies did not find evidence that an integrated approach, combining funding from CAP and other sources, had been widely used. One two of the ten case studies described the use of such an approach, with a highly integrated approach in DE (BW) and Latvia using LIFE and cohesion funding opportunistically to support implementation of its AECM, and planning to use cohesion funding to pay for a grassland survey for the same purpose.

Looking at the effects of individual measures, the evidence available has shown that the most effective measure is the AECM (M10), where it is used to put in place schemes that are focused on biodiversity requirements, especially higher-level schemes that are tailored to biodiversity needs. Schemes that are focused on semi-natural habitats have the potentially highest biodiversity impacts where they are effective in maintaining habitat, but their added value is uncertain in some cases (as the proportion of the habitats that would be degraded without the measure is uncertain). There is a wide range of evidence that shows well designed and implemented schemes can lead to wide-scale population level impacts where they are applied at sufficient scale. However, the impacts of some schemes are constrained by limited budgets and farmer uptake.

The M12 Natura 2000 measure has a potential to deliver similar or complementary biodiversity benefits to those provided by AECM by compensating for the costs to farmers of rules that are tailored to the requirements of the habitats and species within Natura 2000 sites. But in practice this measure has had little impact as it has so far been infrequently used by Member States especially in forest habitats.

There is good evidence that organic farming generally provides biodiversity benefits, particularly where it occurs in more intensively farmed landscapes (although its benefits are often constrained by landscape fragmentation). However, as organic farming does not address high biodiversity conservation priorities as it does not occur on semi-natural habitats, or affect them, its benefits primarily relate to relatively common and generalist species.

M13 ANC payments are likely to contribute to the maintenance of HNV farming systems (and semi-natural habitats in Natura 2000 sites), particularly as there is a high level of overlap between the areas. VCS could also incentivise high stocking rates which may be damaging unless limited through appropriate payment conditions. Evidence of the actual effects of the ANC and other direct payments on farming systems and practices and their impacts on biodiversity is lacking, and therefore it is not possible to draw reliable conclusions on them.

The cross-compliance requirements should provide the baseline level for the protection of biodiversity and landscapes, with SMRs 2 and 3 having the greatest potential benefits if they ensure the requirements of the Birds and Habitats Directives are met. Of the GAEC requirements, GAEC 7 to protect landscape features of importance to biodiversity is of most relevance. However, this study found little evidence of the influence of cross compliance requirements on farmers' behaviour and practices, and no direct evidence of their actual impacts on biodiversity.

Of the Pillar 1 greening measures, ESPG is the most important for addressing biodiversity objectives, as it supports the protection of HD grassland habitats (as well as other wetlands and carbon rich soils which are also often of high biodiversity value). Although its added value within Natura 2000 sites is uncertain, it probably bolsters protection in the face of evidence of ongoing losses of permanent grassland within the network. It also has the potential to protect ESPG outside the Natura 2000 network, where rates of ESPG loss are especially high, thereby complementing the protection afforded by the Nature Directives, however this is not realised due to very low levels of ESPG designation outside Natura 2000 sites.

In addition, certain EFA elements, particularly fallow land, multiannual-fodder crops (e.g. alfalfa) and landscape features (e.g. hedgerows, trees and ponds) are known to provide biodiversity benefits within arable landscapes. However, the potential benefits of the EFA measure are not fully realised as the most commonly declared EFA elements (i.e. catch crops, and nitrogen fixing crops), have low biodiversity benefits for most farmland species, other than soil fauna, although they can reduce water pollution with benefits for aquatic ecosystems and biodiversity.

Establishing the contribution made by the CAP's instruments and measures to addressing biodiversity objectives in forest areas is difficult since information on the biodiversity impacts of the forest measures (M8 and M15) and the forest elements of the EFA is lacking as they do not appear to be adequately monitored. However, as they are infrequently used by Member States, and in the case of the RDP measures, only targeted to very high biodiversity areas in a very few cases in the case study Member States, it is likely that they are having low overall impacts, although impacts may be locally more significant.

The case studies found examples of other CAP instruments and measures reviewed (i.e. M1, M2, M4, M7, M16) being used to strengthen the effectiveness of other proven effective measures, as well as examples where such support was necessary but lacking. These included compulsory training courses and/or advice for farmers taking up AECM or organic farming support, and the use of support for non-productive investments to complement these measures, although the overall impact on biodiversity of such combinations cannot be quantified.

Whilst it can be said with some certainty that some of the CAP instruments and measures are making significant contributions to the conservation of biodiversity and landscapes, especially in HNV farming areas and other semi-natural habitats, it is not possible to reliably estimate their net combined impact. Their combined impacts will also vary depending on Member State choices in terms of the use of instruments and measures, especially their scale of application, targeting and design. Best practice is discussed in ESQ 8, net benefits from CAP measures are most likely to have occurred where coherent and synergistic ANC payments, targeted AECM schemes and other complementary RDP measures are in place and implemented at sufficient scale, and underpinned by strong environmental protection (i.e. Natura 2000, supported by cross-compliance and ESPG designations). However, there is strong monitoring evidence of ongoing declines in many taxa in semi-natural habitats and especially in more intensively managed farmland and forests across the EU as a whole, and in all of the case study Member States. This does not indicate that the CAP is the cause of the declines, but it does reveal that the CAP instruments and measures are not being used in a way that is sufficient to counteract the pressures on biodiversity from agriculture and forestry.

6.2 ESQ 5: To what extent have CAP instruments and measures contributed to maintain and improve the conservation status of species and habitats of the Community interest, landscape diversity and connectivity of natural areas, and to increase, contain or alleviate the identified pressures from agriculture and forestry on biodiversity?

6.2.1 Understanding of the question

This ESQ examines the extent to which the CAP has contributed to maintaining and improving the conservation status of species and habitats of Community interest, landscape diversity and connectivity of natural areas. It also involves an analysis of the impacts of the measures on pressures affecting biodiversity and landscapes. Compared to ESQ 4 it focuses more particularly on threatened biodiversity in the EU and on the efforts made to maintain and improve their conservation status. However, ESQ 5 differs from ESQ 4 in that it:

- **Focuses on the species and habitats that are threatened in the EU**. These include species and habitats of Community interest, which are habitats listed in Annex I and species listed in Annexes II and/or IV or V of the Habitats Directive (referred to here as **HD habitats** and **HD species**). In addition bird species listed in Annex I of the Birds Directive are included (i.e. **BD birds**). These are referred to as a group as **BHD habitats and species**.
- **Assesses the degree to which the CAP measures increase, contain or alleviate the identified pressures from agriculture and forestry on biodiversity**. Although such pressures are identified to some extent in ESQ 4, these are further documented and analysed here in respect of the BHD habitats and species.

6.2.2 Process and methodological approach

As for ESQ 4, the first step draws on the literature and data review to establish which BHD habitats and species are most characteristic of agricultural habitats and forests. The focus is on those that the EEA has identified as being predominantly associated with croplands, grasslands and heathland and shrubs (which are grazed) and forests[50] .The second step then draws on the summary of the key agriculture and forestry practices affecting biodiversity and landscapes, but with a particular focus on BHD habitats and species. In addition, an analysis of the key pressures affecting BHD habitats and species is carried out using the detailed assessments of pressures that Member States have provided in accordance with Birds Directive Article 12 and Habitats Directive Article 17 reporting. At the time of this assessment, the most recent available data on pressures were for 2008-2012 for BD birds and 2007-2012 for HD habitats and HD species. Although the data cannot therefore be used to examine whether or not the current CAP measures have reduced pressures, they do provide an indication of the most important recent agriculture and forestry related pressures.

The information from these two steps is then used, together with the ESQ 4 assessments of the potential general biodiversity impacts of each CAP measure and their scale of application (especially in Natura 2000 sites), to provide an estimation of their impacts on BHD habitats and species. This highlights the main differences between the impacts of the measures on biodiversity in general and BHD habitats and species. This is then followed by an estimation of the combined impacts of the CAP measures on the broad types of BHD agricultural and forest habitats and species. This is informed by an analysis of draft Member State monitoring data on the status and trends of BHD habitats and species for the period for 2013-2018, as summarised in section 2.3.

6.2.3 The contribution of each CAP instrument/measure to BHD habitats and species

The Article 12 and 17 pressure data for 2007/8-2012 indicate that a high proportion of both BHD habitats and species are subject to medium and high levels of pressures resulting from a range of agricultural and forestry activities. The most frequently reported pressures for agricultural species and habitats relate to the modification of cultivation practices, and grazing, which is a particularly common pressure affecting plants and invertebrates. The mowing and cutting of grassland is also a frequently listed pressure for arthropods, and to a lesser extent plants and birds. However, it is important to note that at the time Member States used this pressure category to report pressures from both the effects

[50] Available at https://www.eea.europa.eu/data-and-maps/data/linkages-of-species-and-habitat

of cutting and grazing and its abandonment - which therefore makes the results difficult to interpret. Another fairly frequently reported threat relates to the use of pesticides etc., with amphibians and mammals being most affected. In general, the pressures affecting the different types of HD habitats show similar patterns to those for the BHD species. The analysis of pressures affecting forest BHD habitats and species indicates that the most frequent threats arise from the management and use of forests and plantations. However, this does include a very wide range of possible activities, so interpretation of this information is difficult. More information on such pressures is provided in the Forest Measures Evaluation Report (Alliance Environnement and EFI, 2017), and is summarised earlier in section 2.2.

On the basis of the pressure analysis, literature and data review and the results of ESQ 4, an assessment of the potential contribution of the most relevant measures to BHD habitats and species in agricultural and forest areas is made in Table 16 and further discussed below. Some examples of the successful use of AECM schemes are provided in Box 16 as such schemes are generally of most importance for agricultural BHD habitats and species (as well as the Natura 2000 measure, but this is not widely used and examples could not be found). All HD habitats are either natural or semi-natural habitats, including those that are subject to agricultural or forest management. Nearly all HD species are also dependent on semi-natural habitats, as are most BD species, although a number use semi-improved / improved grasslands (and some grazing wildfowl prefer intensive grasslands) or low intensity arable land. Therefore the CAP measures that address semi-natural habitats are by far the most important for conserving BHD habitats and species. Consequently, AECM schemes have the greatest potential for benefiting agricultural BHD habitats and species, and there is good evidence of successful schemes that have made significant contributions to their conservation and/or restoration. To some extent this is similar to the situation for biodiversity in general (discussed in ESQ 4), but AECM have greater relative importance. The Natura measure clearly also has the potential for making key contributions to the conservation of BHD habitats and species, as this is its sole purpose. However, as indicated in ESQ 4, it has not been significantly used by most Member States. This is partly because the measure can only be used to fund site-specific interventions that have been identified in site management plans, or similar, and the development of these has been slow (Milieu, IEEP and ICF, 2016). Another measure that has been used to support the identification and implementation of necessary conservation measures in Natura 2000 sites is M7.1. According to ESQ 1 (Table 8), 10 Member States have used this to fund Natura 2000 management plan development and updating, as well as Natura 2000 management actions.

A European Commission 'Drivers of Success' study has examined the factors that have led to the successful implementation of the Nature Directives and improvements in the conservation status of BHD habitats and species (Tucker et al, 2019). This included consideration of the role of the CAP measures, and in particular AECM schemes, in leading to such improvements, and identified a number of cases where AECM schemes had played a key in restoring habitats or species populations (Box 16). Despite the important contribution of AECM schemes to the conservation and restoration of BHD habitats and species, the study also found that these successes were often dependent on additional key supporting actions. In particular, the AECM schemes often followed-up and attempted to scale-up EU funded LIFE projects, which researched, identified and trialled the necessary interventions for the targeted habitats and species. Furthermore, to be successful, the schemes were usually dependent on important supportive work in terms of identifying and engaging key stakeholders (e.g. farmers, NGOs, RDP management authorities, nature conservation authorities, advisers and local communities) as well as providing significant advice to scheme participants. This was, for example, particularly important in the conservation of the Great Bustard, in the Castro Verde SPA (Box 16). Such stakeholder engagement, is dependent on adequate funding and institutional capacity being available, and therefore often relies on LIFE Projects and/or other CAP supporting measures, as well as often voluntary inputs by NGOs and scientists.

The Drivers of Success study also found evidence of two particular problems with using AECM schemes to conserve BHD habitats and species. Firstly, because many AECM schemes need to be backed up with significant support for participants, this creates a major challenge with scaling-up such demanding conservation interventions, because the required support may be constrained by funding and capacity limitations. Secondly, expanding conservation interventions to the wider environment is expensive, and AECM budgets are often insufficient to cover areas beyond the Natura 2000 network, or other targeted areas. As a result more funding and targeting of schemes to species and habitats is required to increase the scale and effectiveness of agri-environment schemes sufficiently to achieve landscape and population level improvements (Arponen et al, 2013; Broyer, Curtet and Chazal, 2014; Kleijn et al,

2006; O'Brien and Wilson, 2011; Poláková et al, 2011; Whittingham, 2007).This problem is greatly exacerbated where agricultural development programmes are taking place (such as irrigation schemes), sometimes supported by EU funds, that provide opportunities for landowners to adopt more intensive systems that substantially increase the profitability of their farms. Evidence from case studies in the Drivers of Success study, and numerous other LIFE projects (Brauner, Korbetis and Latruberce, 2017) shows that, where financial incentives are seen as low, AECM schemes are often not taken up, no matter how good the relations with the farming community.

Another finding of the Drivers of Success Study, is that the role of AECM schemes in improving the status of BHD habitats and species was sometimes less than might be expected. This is probably due to a number of factors, in addition to funding limitations (as described above). It is probably in part due to the fact that most AECM schemes aim to maintain, or slightly improve, habitats of existing high biodiversity value, rather than carrying out substantial restoration measures (which is often a lower priority). CAP eligibility and Member State rules have also been found in the recent past to be a significant barrier to farmers receiving basic payments and participating in AECM schemes in some low intensity agricultural systems, such as those that traditionally comprise a mixture of pasture with trees and scrub (King, 2010). Evidence of this problem was found in the Corncrake case study (Box 16), as only a small part (less than 15%) of the AECM support was available for grassland management in Natura 2000 because:

- Most of the AECM funds were not targeted at habitat management in Natura 2000 areas or outside of them;
- The funds were not available for restoration of many areas with semi-natural habitats that were still capable of natural restoration (e.g. overgrown but still species-rich semi-natural grasslands); and
- Fens and heaths traditionally managed as pastures or meadows were not eligible for support.

As discussed in ESQ 1 some changes to the CAP rules have addressed such eligibility issues, but it remains unclear if any unintended constraints on AECM participation remain.

Box 16: Examples of the use of AECM schemes from previous funding periods that have led to improvements in the condition of HD habitats and/or population increases in BHD species

Restoration of boreal Baltic coastal meadows in Finland, achieved through targeted actions in Natura 2000 sites, including the reinstatement of grazing on several hundred hectares funded through the RDP agri-environment scheme (with attractive payment rates for the more valuable areas of habitat) and the non-productive investment measure, combined with significant national funding and targeted LIFE and Interreg funded projects.
Restoration of the Annex I Priority habitat Nordic alvar and precambrian calcareous flatrocks (6280) in Estonia, financed through LIFE projects, the EU Regional Development Fund and Cohesion Fund 2007-2013, and national funds in the environmental programme. As the habitat was considered ineligible for receipt of CAP Pillar 1 basic payments, maintenance of the required farming was supported through the Pillar 2 the RDP agri-environment measure, which in 2007-2013 introduced an option for grazing or mowing of semi-natural habitats (including alvars).
Restoration of semi-natural dry grasslands and scrubland facies on calcareous substrates (6210) in Poland, through five LIFE projects since 2008 and funding for management measures from the agri-environment programme 2007-2013, which contained a package of schemes designed for semi-natural habitats and similar options within Natura 2000 sites for the protection of endangered bird species and natural habitats in Natura 2000 areas. These supported appropriate grazing levels, the use of no fertiliser, and in justified cases mowing.
Conservation of the Corncrake (*Crex crex*) in Latvia, funded through four LIFE Nature programme action grants and the RDP agri-environment measure for the 'maintenance of biodiversity in grassland', which supported the extensive grazing and mowing necessary to maintain the species' habitat.
Conservation of the Great Bustard (*Otis tarda*) in Castro Verde SPA, Portugal, which was subject to zonal planning through the Portuguese RDP, and most recently through the use of an 'Integrated Territorial Intervention'. The local focus enabled the agri-environmental scheme to be designed with specific measures to protect birds. The main element was the maintenance of dry cereal-fallow crop rotations as these provide the preferred habitat of Great Bustard and other steppic birds, and, restricting the timing of mechanised agricultural activities on the fields to protect nests and juveniles.

Source: adapted from Tucker et al (2019).

Cross-compliance SMRs 1 and 2 should also make a significant contribution to the conservation of BHD habitats and species as their purpose is to protect them from damaging agricultural and forestry practices, through the incorporation of relevant articles of the Nature Directives into each Member States' cross-compliance requirements (see ESQ 1). However, no information could be found on the

impact of these SMRs, as discussed in ESQ 1. Therefore, whilst the SMRs are likely to be having positive impacts, the extent to which they are achieving their objectives is currently uncertain.

The ESPG measure is also of particular importance to BHD habitats and species, as it focuses on semi-natural grasslands, as well as wetlands and other carbon rich habitats. However, as previously discussed in ESQ 4, whilst the measure prohibits the ploughing or conversion of areas that are designated as ESPG and declared as such by the farmers concerned, it does not prevent other forms of agricultural improvements that have detrimental impacts on biodiversity, such as the application of fertiliser. Where necessary this would require the use of other measures such as AECM or Natura 2000 payments (M12). The actual impacts of the ESPG measure are also currently limited by the relatively low designation of ESPG in Natura 2000 sites in some Member States, and minimal designation outside the network in nearly all Member States.

The remaining CAP measures that may have significant impacts on semi-natural habitats are the support under BPS, SAPS, SFS and redistributive payments, VCS and ANC payments. As discussed in ESQ 4 these may have a variety of impacts depending on the circumstances, potentially being positive if they help maintain HNV farming systems and associated biodiversity beneficial practices. However, the effects of eligibility restrictions and possible indirect incentivisation of agricultural improvement and intensification may also lead to significant habitat damage and biodiversity losses. Whilst it might be expected that biodiversity threats from intensification may be lower in Natura 2000 areas and other areas supporting BHD habitats and species (because many sites are difficult to farm, being on poor soils, steep ground or remote etc.), there appears to be no information on whether this is the case.

In arable farmland the EFA measure has the potential make a significant contribution to the conservation of some BHD species, but not HD habitats as none occur. Such benefits are only likely in areas of low intensity arable agriculture (such as the dry cereal lands of Spain, and parts of southern or eastern Europe on poor soils etc.) and will mainly come from maintaining / increasing fallow and, where they are grown, extensively managed multi-annual forage legume nitrogen-fixing crops such as alfalfa (Underwood and Tucker, 2016). The maintenance of landscape habitat features may also be beneficial for some BHD species in some areas, such as large mature trees in areas that still have large threatened raptors, e.g. Eastern Imperial Eagle (*Aquila heliaca*) and Greater Spotted Eagle (*Aquila clanga*). The retention of ponds and ditches in areas supporting HD amphibians would also be potentially beneficial, but in practice very few are declared as an EFA so such benefits are likely to be very low.

The forest measures have the ability to support a range of forestry practices that could contribute to improvements in the condition of HD forest habitats and BHD species (see ESQ 1). However, as discussed in ESQ 4, these have been little used by Member States. Furthermore, despite a search for information on the effects of the measures in the literature and Member State case studies, no cases could be found where the impacts of forest measures on BHD habitats and species was monitored and published. This may in part be due to the relatively scarce use of the measure for the conservation of BHD species. As a result, it is not possible to draw reliable conclusions on the effects of the forest measures where they are implemented.

Table 16: Analysis of the impacts of the most relevant CAP Pillar 1 and horizontal instruments and measures on BHD habitats and species in agricultural and forest areas

CAP Measures & sub-measures	Key pressures tackled	Implementation scale and Natura 2000 (N2k) coverage	HD agri-habitats	BHD agri - species
Horizontal Regulation (Regulation (EU) No 1306/2013)				
Farm Advisory System (Art. 12-15) & also Pillar 2 M1 Knowledge transfer and M2 Advisory services	Uncertain and varied, but could reduce grassland conversion, overuse of fertilisers and pesticides.	Wide-scale and untargeted.	Positive: Uncertain	Positive: Uncertain
Cross-Compliance: SMR 2: and SMR 3	Potentially all pressures that affect the ecological requirements of BHD habitats and species or may cause deterioration of SACs.	Wide-scale applicable to 83% of UAA where relevant.	Positive: uncertain	Positive: uncertain
Cross-Compliance: GAEC 7 Retention of landscape features	Loss of hedgerows, trees etc.	Wide-scale applicable to 83% of UAA where relevant.	Positive: low	Positive: low / moderate

CAP Measures & sub-measures	Key pressures tackled	Implementation scale and Natura 2000 (N2k) coverage	HD agri-habitats	BHD agri - species
Direct Payments Regulation (Regulation (EU) No 1307/2013)				
Basic direct payments: Basic Payment Scheme & Single Area Payment Scheme & Redistributive payment	Abandonment and under grazing etc.; and may be a disincentive for agricultural improvements in some cases, or may aid it in others.	Wide-scale and untargeted, directly affecting 90% of UAA but a significant proportion in N2k likely to be ineligible.	Positive: Moderate - / uncertain.	Positive: Moderate - / uncertain.
P1 Greening: Crop diversification	Reductions in landscape-scale habitat diversity.	Small-scale (c. increase in crop diversity over 0.8% of arable land). Very low proportion in N2k.	Nil (no habitats affected).	Positive: very low (few species affected).
P1 Greening: Maintenance of permanent grassland	Net loss of grassland habitats, and reductions in landscape-scale diversity – but no direct mitigation of intensification pressure.	Wide-scale and untargeted, covering 70% of permanent grassland, but excluding semi-natural habitats etc. that are not eligible for CAP support.	Positive: low.	Positive: low.
P1 Greening: Designation of environmentally sensitive permanent grassland (ESPG)	Loss and ploughing of grasslands of high biodiversity value, but not increases in fertiliser use etc. Additionality uncertain in N2k area.	Wide-scale and targeted to N2k and other areas with HD habitats: in 2018 covering 57% of permanent grassland in Natura 2000, but only 2% of HD grasslands outside the network.	Positive: moderate in Natura 2000, low outside due to very low coverage.	Positive: moderate in Natura 2000, low outside due to very low coverage.
P1 Greening: Ecological Focus Areas (EFAs)	Pressures in arable farmland, e.g. loss of boundary features, crop specialisation, loss of stubbles and fallow, high fertiliser and pesticide use, drainage and irrigation; also water pollution.	Wide-scale and untargeted: EFAs covering 9% of arable area in 2018. Small proportion in Natura 2000 except extensive cereal habitats (e.g. Iberia).	Positive: low as no habitats directly affected.	Positive: low in most areas, but locally high, e.g. in ES and PT.
Payment for areas with natural constraints	See ANC.	Very low under P1.	Positive: but very low.	Positive: but very low.
VCS	Abandonment and under grazing etc.; but coupled payments may lead to agricultural improvements and intensification.	Moderate scale and untargeted, but a high proportion of budget on beef sector, so Natura 2000 overlap may be high.	Uncertain – probably mixed effects.	Uncertain – probably mixed effects.
Rural Development Regulation (Regulation (EU) No 1305/2013)				
M4 Physical investments	Abandonment, and potentially others as M4.4 is sometimes used instead of or to support AECM. But can also lead to agricultural intensification.	Variable.	Variable.	Variable.
M7 Basic services	Potentially wide-ranging, but could add to pressures.	Low.	Positive or negative: low.	Positive or negative: low.
M8 Investments in forest area development and improvements of the viability of forests	Appropriate afforestation may help overcome fragmentation, and forest management measures may improve habitat quality – but may be detrimental depending on scheme objectives.	Low.	Positive or negative: low.	Positive or negative: low.

CAP Measures & sub-measures	Key pressures tackled	Implementation scale and Natura 2000 (N2k) coverage	HD agri-habitats	BHD agri - species
M10 Agri-environment-climate: M10.1 - Payment for agri-environment-climate commitments	Abandonment, and potentially all pressures associated with agricultural improvements and intensification.	Moderate: 17.1% of UAA, with a high proportion in N2k or affecting BHD habitats and species. But uptake is variable and often too low to have wider benefits.	Positive: mod – high depending on coverage.	Positive: mod – high depending on coverage.
M11 Organic farming	Fertiliser and pesticide use, and reduced crop rotations / diversity.	Moderate-scale: 5.9% of UAA to be converted or maintained in 2018.	Nil: no habitats affected.	Positive: low (few species affected).
M12 Natura 2000 and WFD: M12.1 - agricultural areas	All key pressures in the N2k site concerned.	Small-scale: but targeted to Natura 2000, with planned coverage of 8.6% of their permanent grassland.	Positive: low (mod in N2k).	Positive: low (mod in N2k).
M12 Natura 2000 and WFD: M12.2 – Natura 2000 forest areas	All key pressures in the N2k site concerned.	Very small-scale: but targeted to Natura 2000, with planned coverage of 0.9% of their forest area	Positive: very low.	Positive: very low.
M13 Areas with natural constraints	Abandonment and under grazing etc.	Wide-scale applied to 29.5% of UAA, with high proportion overlapping with HNV and Natura 2000	Positive: wide-scale.	Positive: wide-scale.
M15 Forest environmental and climate services and forest conservation	Improve habitat quality if appropriately carried out.	Very low: only 0.8% of FOWL.	Positive – very low.	Positive – very low.
M16 Cooperation: M16.5 - Support for joint action	Potentially wide-ranging.	Variable and uncertain.	Positive – variable.	Positive – variable.

Note: Measures in bold and italics are those where the intervention logic is focussed on biodiversity. Measures that are not listed here have similar low impacts on BHD habitats and species as biodiversity in general, as summarised in ESQ 3 Table 14 and Table 15-

6.2.4 THE CONTRIBUTION OF COMBINED CAP MEASURES TO BHD HABITATS AND SPECIES

The analysis in ESQ 4 and above, indicates that where appropriately applied and in the right circumstances CAP measures can make significant contributions to the conservation of BHD habitats and species, especially when combined, and judiciously linked to other measures (e.g. following LIFE projects). Furthermore, there are examples such as in Box 16, where such measures can be sufficient to result in increases in BHD habitat quality and/or species populations at regional scales, and sometimes national scales. However, such evidence is patchy, and therefore, as was the case regarding biodiversity in general, it is very difficult to draw conclusions on the overall combined effects of the CAP measures on BHD habitats and species. Many of the reasons for this are the same as those discussed in ESQ 4.

Of particular importance to BHD habitats and species, is the degree to which the CAP measures are able to provide their ecological requirements. This is because, most of these habitats and species are specialists and have narrow tolerances to environmental change. Therefore, while measures such as ANC, ESPG, VCS and general AECM schemes may be fairly effective at maintaining HNV systems, they may not necessarily provide the particular conditions required by BHD habitats and species. Also, because they tend to be rarer, they are also more susceptible to habitat fragmentation and other landscape level effects. Consequently scheme design and targeting is of utmost importance in delivering conservation benefits for BHD species. Thus, the effective conservation of these habitats and species in agricultural and forest ecosystems is likely to primarily depend upon AECM, Natura payments, forest measures or other RDP funded schemes with similar tailored designs.

The other critical factor is the adequacy of coverage of the areas with BHD habitats and species with the appropriate required CAP measures. As discussed in ESQ 4, whilst there is good evidence that well-designed schemes can increase the populations of many species within the area affected by the scheme,

many have failed to provide wider landscape scale population level impacts due to inadequate coverage, which is often linked to insufficient budgets and/or uptake (as further discussed in ESQ 8). At the moment, the estimated coverage of UAA of 17.1% by AECM is significant, but evidence indicates that even with this level of coverage, population level increases are not occurring except in a few cases. This is, of course, the result of a wide range of factors. The coverage of forest measures is very low, and clearly insufficient to result in measurable benefits for most BHD habitats and species. Furthermore, it is apparent that many AECM schemes have rather broad objectives and are not sufficiently targeted to Natura 2000 sites, and other areas containing BHD habitats and species.

In conclusion, whilst there are documented cases of the combined impacts of the CAP being sufficient to maintain and in some cases even increase BHD habitats and species, such cases appear to be relatively scarce. Indeed, the status and trends of biodiversity in agricultural and forestry habitats reviewed in section 2.3 indicates the measures are not able to halt biodiversity losses in general. There is evidence that this is also the case with BHD habitats and species. An analysis for this study of the status and trends in BHD habitats and species over 2013-2018, indicates that a significantly higher proportion of agricultural habitats have an unfavourable conservation status and declining trends than other non-forest terrestrial habitats. A similar, but less significant pattern, is also seen with forest habitats and species. Thus, whilst the CAP measures cannot be expected to address all biodiversity pressures affecting BHD habitats and species, it is clear that they, and other nature conservation instruments, are currently insufficient in terms of coverage and/or effectiveness to halt their ongoing declines.

6.2.5 MAIN FINDINGS

The contribution of individual CAP instruments and measures to maintaining and improving the conservation status of BHD species and habitats, increasing landscape diversity and connectivity and addressing the pressures from agriculture and forestry on biodiversity is similar to that established in ESQ 4.

However, as all HD habitats are natural or semi-natural and most BHD species are dependent on such habitats, measures that focus on these types of habitats are of particularly high importance. Therefore, whilst AECM, the Natura 2000 measure and forest measures have the greatest potential to support general biodiversity, this is even more so the case with respect to BHD habitats and species. Some Member States have accordingly focussed their RDP measures on these habitats and species, and especially in Natura 2000 sites, as revealed in some case study Member States (e.g. IE, FR CVdL, PT and SK). However, due to limited budgets for AECM and sometimes low uptake by farmers (see ESQs 1, 2 and 8), the scale of their implementation has often been insufficient to meet their potential. Furthermore, the use of the Natura 2000 measure has been very limited, especially in forests, and therefore its impact so far has been low.

Other measures that have the potential to make important contributions to the conservation and restoration of BHD habitats and species in semi-natural habitats include the Pillar 1 ESPG greening measure. But its actual impact is also constrained by relatively low designation of ESPG in Natura 2000 sites in some Member States and minimal ESPG designation outside the network in nearly all Member States.

Direct payments, the ANC measure and VCS may also help to maintain the HNV farming systems that provide the necessary conditions for many BHD habitats and species. However, as discussed in ESQs 1 and 4, the extent to which this occurs is uncertain. As farming in Natura 2000 sites and HD habitats is often constrained by natural factors, then the risks of abandonment are probably greater than intensification. In such circumstances, the overall benefits of the ANC and other instruments/measures may be positive, but there is insufficient evidence available to confirm this.

Of the remaining CAP measures, the only other one that is likely to be significantly beneficial for BHD species is the Pillar 1 greening EFA measure (HD habitats being absent in arable farmland). Although there is little direct evidence of the impacts of the measure on BHD species, it is known that fallow land and/or low intensity multiannual nitrogen-fixing forage crops in low intensity arable farmland are favoured habitats for such species, which can be provided as EFAs. Measures to protect landscape features, such as trees and ponds may also benefit some species, in terms of providing habitats and ecological corridors, although this is likely to benefit a relatively small proportion of BHD species, as most require more specialised habitats than provided by such farmland features. Instead ecological connectivity for BHD species is likely to be more effectively increased by increasing the size and quality of existing areas of suitable habitat.

While some other instruments and measures have the potential to benefit BHD habitats and species, such as the forest measures, this is currently limited by very low levels of use by Member States and/or uptake.

6.3 ESQ 6: TO WHAT EXTENT HAVE CAP INSTRUMENTS AND MEASURES ADDRESSED THE IMPACT OF BIODIVERSITY ON AGRICULTURE AND FORESTRY (E.G. MEASURES SUPPORTING COEXISTENCE BETWEEN SHEEP GRAZING AND WOLVES, CROP CULTIVATION AND GEESE, POLLINATORS AND FRUIT/VEGETABLE PRODUCTION PRACTICES)?

6.3.1 UNDERSTANDING OF THE QUESTION

Biodiversity co-exists with agriculture and forestry in a dynamic relationship in which many wild species are adapting to relatively rapid changes in land management and land use which affect the availability and location of food, shelter and breeding sites. The adaptive responses in behaviour, food sources and population dynamics of these species shift the equilibrium between biodiversity and productive land use in ways that can have positive or negative effects on the management of crops and livestock. The way in which land managers respond to these threats or opportunities will in turn have a beneficial or damaging impact on the wild species concerned.

6.3.2 PROCESS AND METHODOLOGICAL APPROACH

The interactions between wild biodiversity and agricultural production systems are extremely numerous, often complex and dynamic. This section focusses on four current co-existence issues that are of particular concern - either because changes in species' populations and range are having an increasing negative impact on production or there are opportunities to reverse the decline of wild species that have a positive impact on crop production. Where the co-existence is a threat to production from large mammals preying on livestock or large bird species feeding on arable or grass crops, the focus is on EU species protected under the Habitats and Birds Directives[51]. Where co-existence offers opportunities to harness the potential of wild pollinators and of biological control agents that prey on crop pests the focus is wider, on the provision of suitable habitats within the agricultural landscape and on adaptive crop management. The analysis presented here is based on evidence drawn from literature and the detailed case studies in ten Member States.

6.3.3 ANALYSIS

6.3.3.1 EU protected large carnivores that prey on livestock

Large carnivores have been expanding their populations in Europe during recent decades, after centuries of decline caused by human pressure (Chapron et al, 2014). The most significant carnivore damage to livestock farming originates from four species: Grey wolf (*Canis lupus*), Brown bear (*Ursus arctos*); Eurasian lynx (*Lynx lynx*) and Wolverine (*Gulo gulo*) (Linnell and Cretois, 2018). All native large carnivores are legally protected by the EU Habitats Directive and other legislation, but many of their populations remain in unfavourable conservation status. Most livestock damage is associated with attacks on sheep and goats, with wolves responsible for over 90% of compensation cases, although bears can cause significant local damage to a variety of farm livestock, crops, beehives, orchards and buildings. Damage by Eurasian Lynx and Wolverine is largely limited to semi-domesticated reindeer herds in northern Finland and Sweden. Twelve Member States have over half of their sheep numbers in proximity to a Wolf population (BG, EE, EL, HR, LV, LT, PL, RO, SI, SK, FI and SE) and in eight of these (BE, EE, EL, HR, RO, SI, SK, FI) also to a Brown Bear population (Linnell and Cretois, 2018). Six Member States (BE, DK, IE, most of FR, NL and UK) are largely or entirely unaffected by large carnivore predation, as is lowland agriculture (except in northern FI and SE). By far the greatest losses to livestock occur in husbandry systems where sheep graze freely in forest and mountain habitats, and particularly regions where the available natural prey species are low (e.g. in parts of the Iberian peninsula, EL and

[51] Excluding mammal species that are not protected by the EU Habitats Directive, such as wild boar (*Sus scrofa*), badger (*Meles meles*) or wild deer, and EU protected species found to have more localised or less significant negative impacts, e.g., Rooks (*Corvus frugilegus*), Eurasian beaver (*Castor fiber*) and Great cormorants (*Phalacrocorax carbo*).

IT where deer populations have been eradicated). Such husbandry is generally found in regions where large carnivores were regionally extinct, sometimes for centuries, such as in the French Alps. Where large carnivores never disappeared, such as the Carpathian regions of Bulgaria and Romania, husbandry methods have remained more precautionary, with shepherds, guard dogs, night enclosures and the use of fladry[52].

Several factors contributing to negative attitudes to co-existence (and possibly carnivore losses from illegal killings), are reported in the literature including: reluctance to introduce guard dogs because of costs, and the risk of conflicts with hunters, walkers and mountain bikers and their dogs; claims from farmers that only a small fraction of sheep losses are compensated (because it is difficult to document the source of the loss just by examining the carcase); and claims that the presence of large carnivores causes stress and affects livestock behaviour so that their body condition is reduced. Negative attitudes to carnivores are also strongly influenced by the wider external factors driving abandonment of extensive and small scale livestock grazing in remote and marginal areas of the EU (Linnell and Cretois, 2018).

There is extensive and well-documented experience of interventions to reduce livestock predation by large carnivores (Hovardas et al, 2017; Linnell and Cretois, 2018; Marsden et al, 2016), but very few well designed field experiments that have tested their effectiveness[53]. Recent reviews in the EU context conclude that there is substantial evidence for the effectiveness of the key prevention methods of surveillance by shepherds, livestock guard dogs, and fencing at night (Linnell and Cretois, 2018). Factors enabling effective use of these interventions include: guard dogs that are integrated within a herding system using shepherds and herd dogs; technical support for building and maintaining electric fences; monitoring predation to improve targeting; and large carnivore management plans.

There is no evidence that compensation payments *per se* stimulate changes in husbandry practices or increase tolerance of carnivores (Linnell and Cretois, 2018). However, evidence from Germany (Saxony) showed that making compensation payments only to livestock owners who were already using preventive methods reduced the number of sheep and goats killed over an eight-year period during which wolf numbers increased significantly (Reinhardt et al, 2012).

6.3.3.2 Grazing birds that damage crops

The most significant impact on agricultural production from EU-protected large bird species is caused by several geese species and, to a lesser extent, cranes. The majority of western European geese populations have increased dramatically in Europe since 1960s, and many of these populations show unchecked, exponential increases since systematic counting began[54]. Changes in land use from natural vegetation to agriculture have benefitted geese populations, as well as stricter legal protection and improved water quality. Grazing damage by geese occurs when flocks overwinter or have a migration stage in agricultural wetlands, coastal wetlands or lakes, from where they forage in the surrounding agricultural landscape. Production losses vary between years, crop types, areas and seasons, but geese populations show a high degree of site fidelity, so landscapes with a history of use by large grazing birds have the highest risk of crop damage. For the hunting community, geese represent a renewable recreational resource, and they are an attraction for the birdwatching community and other visitors so can be locally a source of tourism/visitor income. Hotspots of geese presence in the EU are mainly low-lying areas across the western-European flyway, such as those in Belgium, Denmark, Germany, France, Netherlands, Sweden and United Kingdom. Cranes (resident or on migration) also damage arable and vegetable crops in parts of southern and central Europe, and more locally other species are reported as a problem, for example the European bee-eater (*Merops apiaster*) for honey-producers in Croatia.

All wild bird populations in the EU are protected against deliberate killing or disturbance and destruction of eggs or nesting sites[55], therefore farmers are restricted to non-lethal methods to protect their crops. Tested responses to geese grazing include scaring, providing sacrificial feed crops or designated areas without scaring, and compensation. However, the ever growing increase in goose population sizes means that some deterrent methods are becoming less effective, and there is an increasing need for deterrent methods that work at the landscape scale and require collaboration between farmers (Stroud,

[52] Line of rope mounted along the top of a fence (often temporary), from which are suspended strips of fabric or coloured flags that will flap in a breeze, intended to deter wolves from crossing the fence-line.

[53] Using a randomised case-control study design or non-randomised case-control study design.

[54] Of 17 populations with known longer-term trends in western Europe (covering eight species), 14 are currently showing significant exponential increases and only three are declining (Fox and Madsen, 2017).

[55] except the species that may be hunted under the Birds Directive outside the pre-nuptial migration period and the reproduction period

Madsen and Fox, 2017). This has led to increasing interest in adaptive management with selective harvesting co-ordinated at flyway level combined with go/no go areas coordinated at the regional and national level. The European Goose Management Platform aims to harmonise and prioritise management, monitoring and conservation efforts, share best practice and exchange experiences and information, including on effective ways to support geese management through the CAP. Since June 2017 the platform has an Agricultural Task Force (AEWA, 2019).

6.3.3.3 Arable weed conservation

An expert consultation across Europe found that arable weed diversity has significantly decreased, driven by increased fertiliser and herbicide use as well as changes in field size, management of field margins and landscape complexity (Storkey et al, 2012). This includes EU protected species. Some specialists adapted to individual crops, such as flax (*Linum usitatissimum*), are among the most threatened across Europe because of the reduction in area of the crops on which they rely. The increased use of agri-chemicals, especially in central and north-western Europe, has selected against a larger group of species adapted to habitats with intermediate fertility (i.e. species with relatively short stature and therefore low competitive ability and/or a large seed and therefore lower fecundity).

6.3.3.4 Wild pollinators

Wild pollinators include bumblebees, solitary bees, hoverflies, other flies, butterflies, moths, and some other insects. Pollinators are essential to achieving production of certain crops, and contribute to increased yield and/or quality in a series of other crops. Key pollinator-dependent crops in Europe are: oilseed rape, field beans, peas, soybeans, other legumes; strawberries and other berry crops; orchard fruits except seedless citrus fruits; and tomatoes, cucumbers, squashes and peppers.

Wild pollinators are also a focus of EU biodiversity conservation policy because of the marked decline in their populations in recent decades[56] and because of their essential role in maintaining the diversity of wild flowering plants. The EU Pollinators Initiative 2018-2020 has the overall objective of promoting wild pollinator populations in the EU. The largest economic loss linked to lack of pollination is in high-value crops such as vegetables grown in the open or under half cover, and many intensive vegetable and fruit producers therefore use introduced pollinators (honeybees, bumblebees or solitary bees). However, the largest losses in terms of reduced production potential are in large scale field crops which would have higher yields or better quality if wild pollinators were more abundant and/or more diverse (oilseed rape, field beans and peas, other legumes).

A wide range of habitat improvement measures in the wider countryside, such as flower strips and hedgerows, have been demonstrated in the literature to be able to boost agricultural production. The value to pollinators of the protection and management (without pesticide use) of semi-natural grasslands, heathlands, woodland edges, scrub and fallow is well documented (Buhk et al, 2018; Dainese et al, 2016; Holzschuh, Dudenhöffer and Tscharntke, 2012; Rollin et al, 2019; Scheper et al, 2015), and also the importance of complexity and diversity of pollinator-friendly land cover within the farmed landscape. In arable and permanent crops, the use of integrated pest management and reducing the intensity of pesticide applications are of benefit, as well as the maintenance of semi-natural vegetation in field margins (Balmer et al, 2014; Boetzl et al, 2019; Bosem Baillod et al, 2017; Holland et al, 2017; Woodcock et al, 2016).

6.3.3.5 Wild biological control agents

Naturally occurring biological control agents (also known as conservation biological control) are mainly insects and other invertebrates which prey on or parasitise crop pests and can thus reduce damage to crops. They include parasitic wasps and predatory wasps, ants, bugs, flies and dragonflies, hoverfly larvae, beetles (carabids, ladybirds and others), centipedes, nematodes, and many other invertebrates. Additionally birds, bats, small mammals and other animals can act as control agents if present in sufficient abundance on farmland. Biological control agents are likely to have significantly decreased in abundance and diversity on intensive farmland. They are killed by broad-spectrum insecticide applications, and their populations are diminished in intensive crops that lack weeds and field edge habitats to provide food, shelter and overwinter habitat during the time when the crop is not available. A German study showed a 75% loss in insect biomass in the last 25 years through declines in mid-summer abundance of large flying insects including many biological control agents (Hallmann et al,

[56] For example, as documented in Bommarco et al (2011), Dupont, Damgaard and Simonsen (2011) and Powney et al (2019).

2017). Other studies have shown that the decline and loss of field edge habitats with diverse and flower-rich vegetation has had a large impact on natural biological control agent populations (Rusch et al, 2016), and pollination services and biological pest control can act synergistically (Sutter and Albrecht, 2016). Most conventional farmers still manage their crops with a high level of chemical inputs (Andert, Bürger and Gerowitt, 2016; EIP-AGRI Focus Group, 2016; Hossard et al, 2017; Jørgensen, Kudsk and Ørum, 2019; Lechenet et al, 2017; Nave, Jacquet and Jeuffroy, 2013), but there are few examples of best practice management measures developed for biological control agents directly related to production (EIP-AGRI Focus Group, 2016). In order to reduce pressures from pests, farmers are having to make continual adjustments to their pest control methods. By reducing or eliminating the need to use chemical pesticides on crops, biological control agents can contribute to implementing Member States' national action plans under the EU Sustainable Use of Pesticides Directive, and also to other environmental objectives.

Table 17: Summary of agricultural threats and opportunities from key EU species/taxa, and range of possible land management response

Key EU species or group	EU Member States with populations	Farming system(s) affected	Nature of the threat or opportunity	Range of possible responses from land managers
Grey Wolf (*Canis lupus*)	20 Member States; BG, CZ, DE, EE, EL, ES, FR, HR, IT, LV, LT, HU, AT, PL, PT, RO, SI, SK, SE	Free ranging flocks/herds grazing in open pastures or woodland.	Livestock predation – mainly sheep and goats but also calves, colts. Reindeer in FI and SE. May also prey on species which can be agricultural pests such as boar.	*Defensive:* illegal killing or licensed hunting: abandonment of semi-natural pastures. *Adaptive:* shepherding with guard dogs, fencing, night shelters, scaring; national or regional carnivore management plans.
Brown Bear (*Ursus arctos*)	15 Member States: BG, EE, EL, ES, FR, IT, LV, AT, PL, RO, SE, SK, SE	Wide range of systems including outdoor livestock, beehives, field crops, grassland, orchards and vineyards.	Predation of livestock and other domestic animals - sheep, goats, cattle, horses, pigs, donkeys, deer rabbits, chickens, beehives, dogs. In searching for other food sources, damage to field crops, grassland and silage bags, orchards, feed stores, buildings and fences.	
Eurasian Lynx (*Lynx lynx*)	17 Member states BG, CZ, DE, EE, HR, IT, LV, LT, HU, AT, PL, SI, SK, FI, SE	Free ranging sheep flocks grazing in open pastures, also reindeer in FI and SE.	Livestock predation.	
Iberian Lynx (*Lynx pardinus*)	ES, PT	Sheep attacks cause most economic losses, although poultry attacks are more frequent (Garrote et al, 2013).	Livestock predation.	
Wolverine (*Gulo gulo*)	FI, SE	Free ranging reindeer herds.	Livestock predation.	
Greylag Goose (*Anser anser*) and Barnacle Goose (*Branta leucopsis*) Red-breasted Goose (Branta ruficollis)	Greylag goose widespread, mainly in BE, DK, DE, HU, NL, AT, FI, SE, UK Barnacle Goose winters in DE, IE, NL, UK	Grass and arable crops (winter cereals, field beans, oilseed rape, root crops).	Grazing/trampling of different crops throughout year.	*Defensive:* licensed hunting; growing unpalatable crops. *Adaptive:* scaring, sacrificial crops, non-disturbance grazing areas, scaring elsewhere.
Crane (*Grus grus)*		Arable crops (winter cereals, oilseed rape, maize, sunflower) and vegetable crops.	Feeding on crops.	
Arable weeds	Mainly in south-eastern Europe, in traditional, extensively managed arable	Arable, mixed.	Decline in extensively managed, low input arable cropping.	*Defensive:* Herbicide use on crops and field margins. *Adaptive:* conservation arable crops/margins (no herbicides).

	crops in HNV mosaic landscapes.			
Wild pollinators	All Member States	Arable crops (except cereals, rice and soya); fruit, legume and some vegetable crops.	Use of broad spectrum pesticides. Lack of habitat suitable for feeding, breeding and over-wintering, near to target crops.	*Adaptive:* field margins, hedgerows, flower-rich strips, species-rich grassland, heathland and scrub and woodland edges managed without pesticides.
Wild biological control agents	All Member States	Arable and fruit crops.		

Source: Own compilation based on Bautista et al (2019), and references cited in the text

6.3.3.6 Potential for CAP measures to support co-existence

Opportunities to use CAP measures to support species' co-existence with agriculture are generally specific to certain species, localities and farming systems. Co-existence with large carnivores mainly affects extensive livestock grazing on open pastures, while co-existence with geese and cranes is an issue on arable and intensively managed grassland. Opportunities to support arable weed species of conservation importance are limited to areas where these species survive – mainly in south-eastern Europe. The most relevant CAP measures are therefore those which can be tailored and targeted in detail and applied selectively – agri-environment-climate (M10.1), environmental investment (M4.4) and co-operation and innovation under M16.5, the latter particularly for co-ordinated co-existence responses at landscape scale. Implementation of these may be more effective as part of tailored packages of support for adaptive management by the affected farming communities, especially where co-existence is a new problem. Such packages would including knowledge transfer, training and advice on co-existence techniques (M1 and M2), and be supported by VCS for specific HNV livestock systems and, in Natura 2000 areas, by M12. Opportunities to provide habitats for wild pollinators and biological control agents apply widely (especially in areas with non-cereal crops) and there is potential to use the targeted CAP measures listed above, and also to design eligibility rules for direct payment EFA greening requirements in a way that supports habitats of invertebrate species (e.g. melliferous fallow, buffer strips without PPP, hedges, semi-natural grassland and heathland). Also relevant, particularly for large carnivore and geese territories, are the EAFRD measures supporting marketing of local products (M3), studies, plans and investment in HNV areas (M7.1 and M7.6) and tourism (M7.5).

6.3.3.7 Overall contribution of CAP measures to support coexistence

Large carnivores: the wolf is present in eight[57] of the ten case studies, a long-established presence in some but elsewhere only in low numbers although often, in the words of one case study, seen as 'an emblematic species'. The chief livestock prey is sheep in extensive pasture systems, and support for co-existence is mainly through compensation and investment in preventative measures (guard dogs, sheep folds, electric fencing). Bear populations are well established in the south-eastern case studies, where they cause damage to both livestock and crops (e.g. maize), but in Latvia are present in very low numbers, presenting a problem only for a few bee-keepers. No issues with lynx predation were reported from the two case studies where these species occur. Where CAP support is available this is mainly through M4.4 or 4.1, for preventive actions (although these are supported by State-aid in some Member States); compensation for livestock damage is not eligible for CAP support and is entirely supported by State-aid (see Table 18 and Box 17).

Table 18: Large Carnivores - CAP and non-CAP support for co-existence in 2014-2020[58]

Co-existence actions funded by RDP measures in 2014-2020	Co-existence actions funded by State aid or other sources
Investment in agricultural holdings M4.1 Fences and other investments (IT, PT, SE); bear-proof night corrals (ES-Aragon); Acoustic deterrents and video surveillance (IT).	**Compensation for livestock damage** (in most Member States with resident populations). **Donations** of dogs and electric fences (HR). **Funding** for herd protection, dogs and training (DE-BW); pilot preventative measures in locations where wolf territory is confirmed (NL). **'Results-based' conservation performance payments** for the number of successfully breeding wolverines (replacing compensation payments for reindeer calves killed) (SE).
Non-productive investments M4.4 Sheep dogs (HR), livestock guard dogs (IT); predator control fences (IT, HR, FI, LT); livestock housing (HR); electrified fences against bears (EL); protection for beehives (ES-Asturias); acoustic deterrents and video surveillance (IT).	
Village renewal M7.6 Assistance to adaptation of livestock grazing patterns in areas with wolf populations (FR).	
Agri-environment M10.1 Traditional alpine grazing in summer (BG); livestock maintenance payment (ES-Rioja, with dog requirement, SI); maintaining livestock guard dogs (PT).	
Sources: own compilation using data from Marsden et al (2016), Persson, Rauset and Chapron (2015), Pohja-Mykrä and Kurki (2014), Hovardas et al (2017) and case study reports	

Box 17: Examples of co-existence with wild carnivores

In **Croatia** a national programme for wolf protection that provides sheepdogs and electric fences has been very successful, and the lessons learned were applied to the design of wolf co-existence measures in the current RDP. The most important of these is the purchase of sheepdogs, electric fences and livestock housing, funded under M4.4. In addition, the M10 measure for HNV grassland and the M13 payment in areas of natural constraint, combined with income support payments from Pillar 1 is expected to be attractive enough for farmers to continue extensive livestock production on species-rich semi-natural pastures, with a reduced risk of losses from wolf predation.

In **Portugal**, co-existence with the Iberian wolf is supported by the provision of guard dogs under M10 and of protective fencing under M4.1, backed up by State-aid compensation for losses sustained when preventative measures are in place. From 2018 targeted support has been available under M15.1, in specific agricultural and agroforestry landscapes, to maintain and improve the conservation status of habitats of the Iberian lynx. In

[57] All except Ireland (long extinct) and France (not present in the case study region of Centre Val de Loire).
[58] Does not include all the RDPs in Spain.

Latvia, investment support under M4 is used to support lighting of livestock buildings to discourage wolves, and beekeepers are compensated under State-aid for bear damage to beehives.

In Germany (Baden-Württemberg), wolves appear to have gained visibility, although no wolf packs have yet established territories. Wolf prevention areas have been designated since 2018, with a State-aid funded programme that covers 90% of the cost of materials for flock/herd protection and provides €1,950/year for training shepherds and their guard dogs.

In Slovakia, where State-aid compensation for livestock damage by wolves costs about €300,000-450,000 per year, new management plans for large carnivores have been prepared and approved, in cooperation with all relevant stakeholders and expert advisers. In the **Netherlands**, where the wolf was first seen in 2016, a wolf territory was established in the Province of Gelderland by early 2019 and the twelve provinces have agreed a joint wolf management plan to fund compensation for losses throughout the Member State and preventive measures where wolf territory is confirmed. Estimates, based on wolf populations and damage in other EU Member States, suggest that by 2023 annual administrative costs for compensation management will rise to around to €650,000 (BIJ12, 2019b). Similar estimations for growth in compensation and preventive payments have not been made.

In **France,** farm cheeses from the Haut Béarn are marketed with labels showing a bear's footprint to add value to the produce of the shepherds whose flocks coexist with the bears (Hovardas et al, 2017). In the **Italian Alps,** the promotional advertising value of the bear is estimated to be much greater than the amount spent on compensation for damage (Tattoni, Grilli and Ciolli, 2017).

Source: case studies and other sources (cited)

Geese and cranes: grazing of grassland and arable crops by migratory or resident geese (including several species of conservation importance) and cranes is a long-established issue in five of the case study Member States, and a growing problem in the Netherlands where numbers have increased significantly. Support measures reported by case studies are State-aid compensation and bird-scaring in Latvia, and 'go' areas with sacrificial crops and 'no go' areas with licensed hunting in the Netherlands. The Romania case study comments that avoidance action by farmers (replacing autumn cereals with other crops less attractive to wintering geese) threatens the survival of threatened species, a problem being addressed by a specific M10.1 measure (see Box 18).

Box 18: Examples of co-existence with geese and cranes

In **Romania** an M10 measure is targeted at 926,000 ha of arable land (19% of the SPAs) in 126 designated local authority areas in south-east Romania, which are important feeding areas for the red breasted goose (*Branta ruficollis*). The support package attempts to balance the needs of both farmers and grazing geese, with requirements to establish an autumn-sown crop of cereal or oilseed rape, and to grow at least two crops of spring-sown maize during the 5 year commitment period. When harvesting the maize 5-10% of the crop must be left unharvested; in the years when no maize is grown the farmer must provide 100 kg of maize grain/ha in at least one feeding point per plot. Bird scaring is prohibited during the winter feeding period for the geese.

The Netherlands has attracted an increasing number of wintering geese since the 1970s, rising to well over two million geese today. This is mostly due to changing migratory patterns, with increasing numbers of geese preferring to stay for longer periods and some remaining all-year round to breed (Sovon, 2019). Nine of the twelve provincial governments provide payments to farmers who have land in designated geese resting and foraging areas, where geese cannot be deterred or culled. The costs of these measures rose to €38 million in 2018, and although payments through the RDP have been suggested and discussed in the past, these have so far not been programmed (BIJ12, 2019a).

In **Latvia** damage by cranes and swans mainly affects arable crops (e.g. winter wheat, field beans), with State-aid compensation of around €157,600 paid in 2017 (on condition that farmers take damage-prevention measures such as visual or acoustic bird scaring). It is reported that farmers' implementation of greening requirements created additional problems with damage created by geese grazing, because grassland which migratory birds have commonly used for feeding and resting has been sown with nitrogen-fixing crops (mainly field beans).

Source: case studies

Arable weeds of conservation importance were noted in only two case studies, with no specific support measures. *Wild pollinators*, particularly bees, were supported by specific measures in half the case studies and others commented on the scope for improving the detailed design of EFA requirements (e.g. buffer strips and fallow). A recent expert consensus process across the EU concluded that the current EFA management options do not achieve high scores for pollinator friendliness and in particular fail to deliver late season forage (Cole et al, 2019). Field margins provide relatively good forage throughout the season in Southern and Eastern Europe, but do not provide early-season forage in Northern and Western Europe. The authors have compiled advice on how to manage EFA options to improve their value for pollinators (Cole et al, 2019).

None of the case studies describes targeted support for *wild biological control agents*, although it was noted that measures to support wild pollinators are likely also to improve the availability of habitats for this group of species.

6.3.3.8 Enabling and limiting factors

In the case of large carnivore populations that are long-established, co-existence often means re-instating prevention measures that are well understood and formerly a routine part of extensive sheep systems (e.g. shepherding, using sheepfolds and guard dogs at night). In these cases farmer information and training, often provided by regional agencies such as national park authorities is an important enabling factor, backed up by investment support for trained sheep dogs, and electric fencing. The availability of compensation is important not just in economic terms but also as a recognition of the problem.

Local socio-economic factors play a significant part in the feasibility and acceptance of co-existence measures, and a key factor in many of the examples (especially for carnivores but also for wild pollinators) is the process of developing and implementing a national or regional strategy, with the active involvement of all stakeholders – environmental and agricultural authorities, hunters, and farmers. These national initiatives are increasingly backed up by pan-European networks. Following increasing human-wildlife conflicts in the 1990s, various stakeholders, with support from the European Commission, joined forces to work towards a more common, science-based and inclusive approach to large carnivore conservation, policy and management in the EU.[59] This culminated in the 2014 launch of the EU Platform on Co-existence between People and Large Carnivores (European Commission, 2019). The EU platform has provided an important coordination role, including in the effective use of CAP support for co-existence, and increasingly addresses regional challenges too.

Limiting factors identified in the case studies relate mainly to the lack of widespread interventions to support habitat management for wild pollinators and biological control agents, although there are some examples of highly targeted interventions, but not at sufficient scale to make an EU-wide impact.

6.3.4 MAIN FINDINGS

A wide range of CAP instruments and measures have significant potential to support improved co-existence management within the farming systems affected and also to raise awareness among rural communities of the conservation value and potential economic benefits of wild mammals and birds and of agricultural landscapes that are rich in habitats to support beneficial invertebrates.

Where CAP instruments and measures are used to support co-existence with large carnivores and geese the focus is on targeted investment in damage prevention and on agri-environment-climate support for associated extensive, low-input management systems (HNV pastoral systems and sacrificial arable crops respectively), often in innovative ways and sometimes linked to reducing compensation for damage (which is not funded by the CAP). In some cases state aid is also used for preventive measures, rather than CAP funding. However the opportunity has not been taken to use a much wider range of CAP instruments and measures alongside the environmental investment and management support in the specific areas and farming systems where co-existence is a problem, for example to provide specialist advisory services, Natura 2000 management plans and compensation payments, local co-operation initiatives and landscape scale approaches to implementation, and support for marketing local products and developing eco-tourism associated with co-existence efforts.

Member States' CAP support for wild pollinator habitats is mostly through targeted agri-environment-climate schemes to maintain existing semi-natural habitats and landscape features and to create new habitats, and through the new melliferous fallow option for EFAs, but implementation by Member States and uptake by farmers is insufficient to meet the challenge of supporting recovery of the wild populations. No evidence was found of targeted CAP support for wild biological control agents, but the provision of habitats for wild pollinators is also likely to benefit this group of species.

An increasingly important role in co-existence with large carnivores, geese and pollinators is being played by recently established EU level, national and regional networks to support effective practical co-operation, often bringing stakeholders, farmers and experts together to develop and implement management plans including at a landscape scale and share best practice.

[59] Most notably the Large Carnivore Initiative for Europe, initiated by WWF in 1995 and since 2010 officially recognised as Specialist Group within the Species Survival Commission of the International Union for the Conservation of Nature (IUCN), https://www.lcie.org/

6.4 ESQ 7: To what extent are the biodiversity priorities for the implementation of CAP instruments and measures by Member States in line with and giving effect to biodiversity strategies at national and regional levels?

6.4.1 Understanding of the question

ESQ 7 asks about alignment (relevance) and whether the priorities set out in biodiversity strategies are given effect through CAP implementation. This is assessed by comparing the priorities set by each Member State in their national and regional biodiversity strategies with the implementation choices made in relation to the CAP. For this analysis the Prioritised Action Frameworks (PAFs) and National Biodiversity Strategies and their Action Plans (NBSAPs) are taken to be the definitive statement of a Member State's biodiversity strategies, even though the latter are prepared in response to the CBD and are not official an EU planning tool.

6.4.2 Process and methodological approach

The method to answer this ESQ is based on the following steps:

Step 1: Identification of the agriculture and forestry-related objectives listed under the national and regional biodiversity strategies in the case study Member States, based on an analysis of the PAFs and NBSAPs in the case study Member States.

Step 2: Analysis of the extent to which those objectives had been taken into account in Member States' CAP implementation choices. Under this step the CAP implementation choices in the case study Member States were compared with the biodiversity priorities identified under step 1. A series of qualitative judgments were made about the extent to which case study Member States have addressed the agriculture and forestry-related biodiversity priorities when implementing the CAP.
In addition, a complementary analysis was carried out on the extent to which there was effective cooperation between Member State officials responsible for biodiversity and agriculture officials, when CAP decisions were taken. This analysis is based on findings under ESQ 2.

6.4.3 Analysis

6.4.3.1 Key agriculture and forestry-related priorities outlined in National Biodiversity Strategies and Prioritised Action Frameworks

Of the NBSAPs in the case study Member States, only six (DE, FR, HU, LV, RO and SK) covered the full period up to 2020 but all ten are included in this analysis. The Netherland's Vision for Nature (Ministerie van Economische Zaken, 2014) and Natural Capital Agenda (Government of the Netherlands, 2013) are taken to be its NBSAP. These documents set out biodiversity priorities only in general terms.

In contrast, in its PAF, each case study Member State (except HR[60] and HU[61]) identified specific priorities for agriculture and forestry habitats and species, with other agriculture and forestry actions set out in cross-cutting priority areas. Of the Member States which implement their RDPs on a regional basis, the German PAF assigns biodiversity priorities to each region whereas the French PAF remains organised at national level (see Box 19).

An overview of the most common biodiversity priorities identified in the case study Member States for agriculture and forestry is set out in Box 19.

Box 19: Examples of common priorities identified for agriculture and forestry in selected case study Member States

Protection and maintenance of permanent pasture and grassland habitats: For example, in Ireland the PAF prioritises the protection of farmed upland habitats and species, wet and dry grasslands and BHD species. In Germany the PAF identifies wildlife-friendly production methods, restoration of habitats, extensive livestock farming and protection of grassland as priorities. Target species are mapped separately. In Latvia the

[60] As a new Member State Croatia was exempt from the need to prepare a PAF for the 2014-2020 period.
[61] Hungary's priority actions for agriculture and forestry habitats and species are largely grouped under nature conservation management priorities.

PAF prioritises the restoration and management of grassland, heath and scrub habitats including the management of the hydrological regime with target species and habitats also identified.

Protection and maintenance of forest habitats and species: For example, the Romanian PAF identifies the control of deforestation and burnings, the maintenance of deadwood in forests and the promotion of private forest management as a new business opportunity without affecting biodiversity as priority areas. In Portugal the PAF priorities include the promotion of the natural regeneration of species and native forest stands and support mechanisms to restore native species severely affected by forest fires. In Ireland forestry measures for species listed in the Habitats and Birds Directives are prioritised as well as deer management in Natura 2000 sites.

Development and implementation of the Natura 2000 network on farm and forestland: For example, the French PAF identifies forests, prairies, grasslands and heaths as priority areas. However, no target species are identified in the document. In Hungary the PAF highlights the priority and non-priority habitat types and species. In the Slovakian PAF compensation for management requirements on farmland and forestland is prioritised as well as consultations with stakeholders, management planning and other organisational activities.

Tackling invasive species: For example, the Latvian PAF priorities the control of invasive alien species in semi-natural habitats with a specific emphasis on floodplain grassland. In the Portuguese PAF, preventative measures and the control of existing alien species are prioritised. The Hungarian PAF, specifies controlling/eradicating invasive alien species with mechanical and chemical methods.

Source: case studies

6.4.3.2 Comparing the biodiversity priorities to the actual CAP choices

While a range of CAP measures and instruments have a direct or indirect effect on biodiversity, the RDPs are the only part of the CAP where Member States are required to set out and justify their biodiversity, habitats and landscape needs for the agriculture and forestry sectors based on a needs assessment and SWOT analysis. There is a high degree of alignment between each of the case study Member States' NBSAP and PAF priorities and the strategic objectives (needs) for which actions have been programmed to Priority 4A in RDPs. This corresponds with previous assessments of the consistency of CAP implementation choices with relevant national and regional plans for environmental protection. For example, the synthesis of the *ex-ante* evaluations of rural development programmes 2014-2020 found that the majority of Member States' Strategic Environmental Assessments (SEA) were in line with national and regional environmental planning tools such as the PAFs. In addition many of the Member States' biodiversity priorities are operationalised in the RDPs.

Only France and Ireland (forest management), Ireland and Latvia (genetic diversity) and the Netherlands (promoting uptake of more sustainable (i.e. low input) farming practices) have NBSAP/PAF priorities which are not also identified as strategic needs by the RDP.

However, the identification of well aligned biodiversity needs in RDPs does not necessarily flow through into decisions about measure choice and design, as shown in Table 19. The second column contains an assessment of the CAP measures which, using expert judgment, are considered to represent those most likely to be used to achieve a given priority. The table shows where Member States have or have not implemented the range of CAP measures which might be expected to be appropriate to address a specific biodiversity priority. Baden-Württemberg (Germany), Centre-Val de Loire (France) and Ireland have done little to address forest management (despite Baden-Württemberg identifying it as a need in its RDP.

Four Member States – Hungary, Ireland, Latvia and the Netherlands – are not using RDP measures to develop their Natura 2000 agriculture networks despite having a strategic priority to do so. Ireland and Portugal are not using either M7.1 or M12.2 to pursue their strategic priority of developing their Natura 2000 forest networks. Ireland and Latvia have not fully mapped HNV farmland. Only four of the nine Member States for whom tackling invasive species is a priority are using the CAP to pursue it. Ireland, Portugal and Romania do not address the restoration of peatlands and wetlands through the CAP, despite it being highlighted as a priority.

Table 19: Fit between Member States' strategic priorities for biodiversity and the CAP measures they are using

Priority identified in NBSAP or PAF	CAP measures	DE (BW)	FR (CVdL)	HR	HU	IE	LV	NL	PT	RO	SK
Protection and maintenance of pasture and grassland habitats and species	Ruminant VCS with stocking density limits; ANC; AECM support for grazing, cutting and mowing	X	X	X	X	X	X	X	X	X	X
Protection and maintenance of forest habitats and species	Agroforestry, afforestation and forest environment measures	X	X	X	X	X	X		X	X	X
Development and maintenance of the Natura 2000 network (agriculture)	Use of M7.1 and M12.1	X	X	X	X	X	X	X	X		X
Development and maintenance of the Natura 2000 network (forestry)	Use of M7.1 and M12.2	X	X		X	X	X		X		X
Protection and maintenance of high nature value farmland	Adequate HNV map plus targeted CAP measures	X	X		X	X	X		X	X	X
Minimisation of negative external impacts of agriculture on biodiversity (e.g. input reduction)	M11, AECM low input options	X	X	X		X		X	X		X
Tackling invasive species	GAEC 7 option, AECM, M4.4	X	X	X	X	X	X	X	X	X	
Preserving and managing plant and genetic resources	VCS, M10.2		X	X	X	X			X	X	
Restoration and maintenance of peatlands and wetlands	M4.4, AECM options	X				X	X	X	X	X	
Farmland birds	AECM	X	X		X	X			X	X	X

Source: National Biodiversity Strategies and Actions; Prioritised Action Frameworks for Natura 2000; Rural Development Programmes

Key: Green – uses most/all CAP measures relevant to priority. Red – uses few/none. White: Priority not identified in the case study NBSAP or PAF.

Looking specifically at the different case study Member States and regions:

- The **Baden-Württemberg** (DE) RDP SWOT analysis and needs assessment takes into account some of the biodiversity priorities set out in the Germany NBSAP, the regional action plan and the PAF (where specific regional priority actions are identified). This includes, for example, the need to protect grassland habitats and species, preservation and promotion of forestry biodiversity and the promotion of nature-friendly methods of land management. The actual CAP choices also address some these priorities, for example, the maintenance of permanent grasslands through various management actions for extensive and hay meadows (M10.1), the conservation of forest biodiversity including relevant infrastructure (M12.2) and minimising the negative external impact of agriculture on biodiversity by reducing or removing chemical inputs (M10.1 and M11). Consideration is given to relevant regional biodiversity priorities;
- The **Centre Val de Loire** (FR) RDP SWOT analysis and needs assessment takes into account some of the biodiversity priorities set out in the French NBSAP, the regional action plan and the PAF. This includes, for example, the need to support biodiversity friendly farming, the management of Natura 2000 areas, and the development of organic farming. However, the strategic priority of improved forest management is not included in the RDP and measures are not programmed other than for agroforestry. The other CAP choices also address a number of these priorities, for

example, the maintenance of permanent grassland through support for permanent grasslands and extensive livestock (M10.1) and minimising the negative external impact of agriculture on biodiversity by reducing or removing chemical inputs (M10.1 and M11). The Natura 2000 network is also supported through the RDP for both agriculture (M7.6 and M10.1) and forestry (M7.1). Consideration is given to relevant regional biodiversity priorities. Overall, CAP implementation in Centre Val de Loire takes account of most but not all strategic biodiversity priorities;

- The **Croatian** RDP SWOT analysis and needs assessment takes into account the NBSAP priorities such as addressing the disappearance of biodiversity rich grasslands, and degradation of forest stands, the preservation of plant and animal genetic resources. The actual CAP choices also address a number of these priorities, for example, the conversion of degraded forest stands (M8.5). The maintenance of permanent grasslands is addressed through support for HNV permanent grasslands (M10.1) and the protection of endangered breeds is supported (M10.1). Overall, there is a good fit between HR's deployment of CAP measures and its strategic priorities for biodiversity;
- The **Hungarian** RDP SWOT analysis and needs assessment takes into account the biodiversity priorities set out in the NBSAP and the PAF. This includes, for example, the need to protect endangered plant and animal genetic resources, the impact of intensive farming on the Natura 2000 network and the preservation of forests particularly in protected areas. The actual CAP choices also address a number of these priorities, for example, through the use of VCS for ruminants (although without conditions on livestock density), ANC, maintenance of HNV farmland (M10.1), support to plant and animal genetic resources for agriculture (M10.2) and forests (M8.5). Natura 2000 contracts are available to support both agriculture (M12.1) and forestry (M12.2) but funding through M7.1 is not offered. There is no measure to tackle the priority of invasive species. Overall, therefore, HU's deployment of CAP measures addresses most but not all of its strategic priorities for biodiversity;
- The **Irish** RDP SWOT analysis and needs assessment takes into account some of the biodiversity priorities set out in the Irish NBSAP and the PAF. This includes, for example, the need to develop designations and mapping for HNV farmland, support specific farmland habitats and address under- and over-grazing of grassland. However there are gaps relating to the management of forest habitats (not in the RDP at all), the development and maintenance of the Natura 2000 network, and the restoration of peatlands and wetlands. Overall, Ireland's deployment of its CAP resources does not give full effect to its strategic biodiversity priorities. This does not mean, however, that they are not addressed through other means;
- The **Latvian** RDP SWOT analysis and needs assessment takes into account the biodiversity priorities set out in the NBSAP and the PAF. This includes, for example, the management of grassland habitats, the protection and maintenance of HNV farmland and the preservation of forest biodiversity. However it does not address the need to develop Latvia's Natura 2000 network. The actual CAP choices also address a number of these priorities, for example, measures to support the maintenance of permanent grassland habitats (M10.1), woodland creation to support biologically diverse stands instead of monoculture. Overall, however Latvia's deployment of the CAP does not fully address all of the biodiversity priorities under the NBSAP and PAF;
- The **Dutch** RDP SWOT analysis and needs assessment takes into account the biodiversity priorities set out in the NBSAP and the PAF. The actual CAP choices also address a number of these priorities, for example, notably the use of targeted VCS to achieve objectives for grassland habitats. At the same time despite Natura 2000 agriculture sites having been identified as a priority of the national planning tools, no specific RDP measure is used directly to target them and the measures to support the development and operation of sites are not offered. Overall, the Dutch CAP implementation does not fully address all of the biodiversity priorities under the PAF or its equivalent NBSAP documents;
- The **Portuguese** RDP SWOT analysis and needs assessment takes into account the biodiversity priorities set out in the NBSAP and the PAF. The actual CAP choices also address a number of the priorities, for example, measures to support integrated production (M10.1) and organic farming (M11). However support is not offered for the development and management of Portugal's Natura 2000 forest network, which is a priority. Overall, Portugal's implementation of the CAP addresses most but not all of the biodiversity priorities under the NBSAP or the PAF;
- The **Romanian** RDP SWOT analysis and needs assessment takes into account the biodiversity priorities set out in the NBSAP and the PAF. This includes, for example, the need to protect and maintain HNV farmland areas and to support the preservation of animal and plant genetic resources. The actual CAP choices also address a number of the priorities, for example, measures to support protection and maintenance of HNV grasslands (M10.1) and support for endangered

animal breeds (M10.1). At the same time despite Romania having very few Natura 2000 sites, increasing them has not been identified as a priority at national level and support is not offered for their development or management. Romania is also not using the CAP to tackle its strategic priority of invasive species. Overall, Romania is using the CAP to tackle most but not all of its identified strategic biodiversity priorities;

- The **Slovakian** RDP SWOT analysis and needs assessment takes into account the biodiversity priorities set out in the NBSAP and the PAF. This includes for example, the maintenance and improvement of HNV farmland areas and management of Natura 2000 sites. The actual CAP choices also address these priorities, for example, support for semi-natural and natural grassland largely in HNV areas (M10.1) and schemes to support the management of Natura 2000 sites on farm and forest land (M12.1 and M.12.2). Overall the Slovakian RDP addresses all of the biodiversity priorities under the NBSAP or the PAF.

6.4.3.3 Cooperation between Member State officials responsible for biodiversity, agriculture and forestry

ESQ 2 shows that in the majority of the case study Member States, the Ministry for Environment (or equivalent) is responsible for environmental policy and planning. In two case study Member States (the Netherlands and Hungary), the same Ministry is responsible for environment and agriculture. Whereas the preparation of the NBSAPs and PAFs for Natura 2000 is typically coordinated by the Ministry for Environment, the Ministry for Agriculture is responsible for the design and implementation of CAP instruments and measures related to biodiversity. In all of the case studies, the Ministries for Environment (or relevant departments where it is the same Ministry) were always consulted during the CAP implementation process, but to varying extents. For example, in Croatia, the Ministry for Environment played an active role in supporting the Ministry of Agriculture in the design of M10 agri-environmental schemes, SMRs, and GAEC. In Ireland the National Parks and Wildlife Service was actively involved in the design of conservation measures including the relevant amendments to the Irish Rural Development Programme. However, final decisions about measure choices and design in the case study Member States were taken by the Ministry for Agriculture. Evidence from the case studies in Latvia and France shows that both the Ministry for Environment and the Nature Conservation Agency considered that they had only had a minor role or had been only involved late in the policy design process. In Romania, conservation measures were not programmed because of disagreement between the Ministries for Agriculture and for Environment over issues around a perceived risk of double finding between cross-compliance requirements and conservation management plans.

6.4.4 MAIN FINDINGS

At strategic level there is in general relatively good alignment between the priorities identified by case study Member States in their NBSAPs and PAFs and those reflected in the SWOT analyses and needs assessments in their RDPs. Only a few examples were found where Member States had identified national biodiversity priorities in their NBSAPs and PAFs which were not also explicitly recognised as needs in their RDPs - in France and Ireland (forest management), Ireland and Latvia (genetic diversity) and the Netherlands (low input farming).

The alignment between how Member States use their CAP horizontal and Pillar 1 instruments and Pillar 2 measures to address these priorities is more mixed. For example:

- Four of the nine Member States identifying the development of their Natura 2000 farmland networks as a priority were not using the Natura 2000 measure (M12) or M7.1 to develop Natura 2000 management plans for that purpose;
- Three of the nine Member States which identified the protection and maintenance of forest habitats and species as a priority were not using CAP forest measures;
- Three of the six Member States identifying peatland and wetland restoration as a priority were not using CAP measures for this purpose; and
- Five out of the nine Member States with a strategic priority to tackle invasive alien species were not using the CAP to address this priority.

In contrast, all case study Member States and regions used a wide array of CAP instruments and measures to protect and maintain grassland habitats and species, to protect farmland birds, to preserve and mange plant and animal genetic resources as well as to minimise the external impact of agriculture on biodiversity (for example by reducing chemical inputs). For example, in relation to support provided

to address priorities for grassland habitat and species, VCS, the ANC and the AECM measures are offered widely.

6.5 ESQ 8: WHICH SUCCESSFUL APPROACHES CONCERNING THE IMPLEMENTATION OF THE CAP INSTRUMENTS AND MEASURES ON BIODIVERSITY, LANDSCAPES, INCLUDING PROTECTED HABITATS (INCLUDING THOSE WITH POSITIVE EFFECT ON ECONOMIC VIABILITY AND WIDER RURAL DEVELOPMENT OBJECTIVES) CAN BE IDENTIFIED AND WHAT ARE CRITICAL FACTORS FOR THE SUCCESS?

6.5.1 UNDERSTANDING OF THE QUESTION

This question seeks to identify the elements that make the implementation of biodiversity-relevant CAP instruments and measures successful in contributing to achieving the objective of sustainable management of natural resources and climate action, with a focus on restoration, preservation and enhancement of biodiversity and landscapes. Successful approaches and critical factors of success can be identified at both at Member State level, and at the level of beneficiaries, through the implementation choices they make. Special attention is paid to innovative aspects of scheme design or delivery, including landscape scale, protected habitats and co-beneficial effects on economic viability.

6.5.2 PROCESS AND METHODOLOGICAL APPROACH

First examples are identified where CAP funding has supported biodiversity outcomes and associated rural vitality benefits in particularly effective ways, drawing on literature and the case studies. Second, the most important success factors are identified and a summary of best practices are set out concerning the implementation of the CAP instruments, illustrated by examples.

6.5.3 SUCCESSFUL APPROACHES

The following examples focus on approaches where implementation of CAP measures has been shown to have an impact on biodiversity, landscape and rural development objectives. Many of these are centred on AECM (M10.1) but also illustrate the use of CAP measures in combination with each other and with other EU Funds, the active participation of stakeholders, targeted advice, and the importance of specialist advice and facilitation.

Box 20: Examples of successful approaches

Landscape scale approach to reducing nutrient loads on Natura 2000 sites (Denmark)

Denmark has reported improvements in the conservation status of the Green Gomphid dragonfly (*Ophiogomphus cecilia)* as a result of a combination of broad conservation measures. These include the protection of key habitats within the Natura 2000 network, restoring/improving water quality and hydrological regimes in large river systems, reducing nutrient loads, restoring key habitats, and re-introducing species where needed to restored areas. These measures have been financed in part by LIFE, EAFRD and ESF funds. Of particular importance were the DKK 86 million EAFRD funds from 2012-13 which supported hydrological improvements across Danish Natura 2000 sites, including restoration of their natural hydrology and reductions in nutrient loads. More than 80% of the Denmark's terrestrial area is within a river catchment area of an aquatic Natura 2000 site. All measures taken to reduce nutrient loads thus support the improvement of the conservation status of numerous aquatic habitats and species including the Green Gomphid (Tucker et al, 2019).

Restoring management in threatened coastal meadows (Finland and Estonia)

A group of priority habitats found around the coastlines of the Baltic Sea that have been grazed since prehistoric times are now in an unfavourable status due primarily to abandonment of traditional low intensity grazing[62]. In Finland, the RDP (M10.1 and 4.4) combined with significant national funding and targeted LIFE and Interreg funded projects, has supported the restoration and reinstatement of grazing on several hundred hectares of coastal meadows. Key success factors include attractive payment rates for the more valuable areas of habitat, gains in knowledge of efficient reed cutting and utilisation strategies, and actions that improve cattle farmers' access to sufficiently large areas of land for grazing.

In Estonia in 2012 less than 30% of the 9,800 ha of the alvar grasslands were managed appropriately, although most of them were in Natura 2000 sites, but a large scale restoration success has been achieved primarily through a LIFE project and State Forest Management Centre land management agreements. On-going

[62] Boreal Baltic coastal meadows (1630) in Finland and Nordic alvar and Precambrian calcareous flatrocks (6280) in Estonia.

implementation is aimed at the Estonian Nature Conservation Development Plan target of at least 7,500 ha of Nordic alvar grassland to be under annual grazing by 2020, with funding already allocated in the Operational Programme for Cohesion Policy Funds, the RDP and national funds to 2020. Key factors of success were the efficient and fast large-scale mechanical restoration technique, the improved communication of the local people with the state organisation and with each other (which has facilitated restoration and grazing arrangements), availability of targeted M10.1 support[63], and the project team's efforts to enable local livestock owners to sign restoration agreements and M10.1 contracts.

Restoration of semi-natural dry grasslands and Natura 2000 scrubland habitat[64] (Poland).

Poland reported an improving trend for the 2007 to 2012 period of the estimated 30 km^2 of Calcareous *Festuco-Brometalia* grasslands and scrubland habitat, due to restoration of several hundred hectares of the grassland, mainly organised by NGOs working with regional park managers and environmental authorities, funded by LIFE and State-aid. This has been helped since 2014 by the uptake on a much larger proportion of the habitat area of M10.1 contracts for extensive grazing (Tucker et al, 2019).

Habitat restoration for endangered butterflies (Luxembourg)

The Eislek LIFE project (2012 to 2017) aimed to restore suitable grassland and wetland habitats in eleven Natura 2000 sites to support nationally endangered butterfly species such as the Violet Copper (*Lycaena helle*). Actions taken under the project included the clearance of shrubs and trees, restoration of meadows, measures to support the mowing and grazing of grasslands (e.g. modified machinery and fencing) and the development of Natura 2000 management plans for key sites. Consultations were also held with farmers and management measures extended for grassland habitats through the development of M10.1 contracts. Overall, the project successfully restored 60.75 ha of land suitable for the butterfly, with additional benefits for other local species (Tucker et al, 2019).

Result-based agri-environment pilot schemes for habitat quality

Result-based M10.1 schemes are characterised by the annual payments to farmers being directly linked to the quality of the biodiversity on their farms (rather than to compliance with detailed management requirements as in other M10.1 schemes). Result-based payments are linked to a scoring system specifically designed to assess the chosen biodiversity target in the local conditions and circumstances. Higher biodiversity scores are directly reflected in higher payments/ha, thus providing an inbuilt incentive to improve biodiversity management. Results-based schemes are self-targeting and environmentally efficient, simply because the biodiversity target must be present in order to receive payment. Seven EU-funded pilot projects on different types of habitat[65] in four Member States during 2014-18 have shown that it is possible to develop robust scoring systems capable of distinguishing between grasslands and cropland of varying quality, as the basis for paying directly for higher ecological value[66]. In Ireland the experience of farmers implementing the results-based pilots was very positive and they generally indicated they would enter a results-based M10.1 scheme if it was available. As with comparable, well-designed management-based M10.1 schemes, the results-based pilots were supported by farmer (and advisor/inspector) training, advice on optimal delivery and tailored farm plans, plus appropriate scheme monitoring and evaluation. (Own compilation based on cited sources)

Reversing the decline of endangered birds (Latvia, Portugal and France)

The Corncrake (*Crex crex*) population in Latvia has increased in size between 2007 and 2012 largely as a result of four LIFE projects and agri-environment measures that have restored the bird's original habitats, particularly wet grasslands, in agricultural landscapes within its core areas. This involved the removal of bushes and trees from abandoned and overgrown grasslands, which are then maintained by grazing or hay cutting to avoid re-growth. Success factors include LIFE+ projects that actively involved public stakeholders and had regular meetings with the press, public authorities, unions, and other associations. Restored areas were reconnected to form continuous areas of open grassland habitat favoured by the Corncrake (Tucker et al, 2019).

In Portugal, agri-environment programmes and LIFE projects have reversed the decline of the Great bustard (*Otis tarda*) by increasing the area of land in dry cereal-fallow cycles (its primary habitat) in Castro Verde and Vale do Guadiana SPAs, which hold over 80% of the national population. Key drivers of the success have been LIFE projects involving both conservation organisations and farming associations in the design and promotion of the M10.1 measures. Now the main concern around the future of the species in Portugal is the situation in other SPAs where legal protection through the denial of permits for harmful agricultural development is important, but results in hostility towards nature conservation. (Case study)

In France remaining populations of the endangered Little bustard *(Tetrax tetrax*) are found in the cereal plains of west-central France, where the migratory population crashed to just 300 individuals in 2008. A reintroduction programme funded by LIFE and dedicated M10.1 schemes has been very successful, for example in Vienne,

[63] As the habitat was considered ineligible for receipt of CAP Pillar 1 basic payments, maintenance of farming was supported through the Pillar 2 the RDP agri-environment measure, which in 2007-2013 introduced an option for grazing or mowing of semi-natural habitats (including alvars).

[64] Scrubland facies on calcareous substrates (6210).

[65] Of these five were on HNV or Natura 2000 grasslands, one on permanent cropland and one on arable land.

[66] Byrne et al (2018); Fundatia Adept (forthcoming)

where between 2011 and 2017 population numbers rose in line with the increasing area under M10.1 contracts. (Case study)
Adding value to HNV farming systems (Romania) A local NGO aims to create a cheese value chain in the Saxon Villages area of Transylvania, using local milk produced by the grass-fed cows owned by family farmers in the region. The Târnava Mare landscape is one of the richest remaining farmed landscapes in Europe in terms of biodiversity. The cows grazing on these species-rich semi-natural pastures in a 'naturally organic' farming system produce a high quality milk which can be demonstrated, by analysis, to be especially rich in healthy and tasty compounds and elements. This project aims to allow the farming communities (around 5,000 families) to develop an entrepreneurial vision, differentiating their products from industrial quality commodity products, while avoiding the niche 'trap' that can restrict volume of sales and innovation in production (Fundatia ADEPT, 2019). (Own compilation based on cited sources)
Visitors celebrate farmers' biodiversity achievements (Ireland) The Burren Winterage Weekend, organised by a local landscape conservation NGO, brings visitors to this remote rural area to participate in the annual transhumance of beef cattle to their winter grazing (Burren Programme, 2019; Burrenbeotrust, 2019) as part of a unique pastoral farming system supporting Natura 2000 species and habitats. This way of farming had almost disappeared until the Burren Conservation Programme provided innovative advice and financial support through results-based agri-environment and environmental investment contracts, which has improved both the conservation status of habitats and the economic situation of the farmers. Initially funded by LIFE, then by Pillar 1 CAP coupled support under Article 68, in the 2014-20 programming period support for Burren biodiversity management is provided by RDP funds under M10 and M4.4. (Own compilation based on cited sources)
HNV Advisory system (Hungary) The advisory system set up by the state nature conservation organisation uses advisors employed by the national park directorates which are regional bodies of the RDP managing authority, creating a direct link from farming practices to programme planning. Advisors provide up-to-date information for farmers and act as an external expert during the on-the-spot controls by the paying agency. NGO assistance in preparing information and training materials and running training courses (funded by other sources, including LIFE) is important to this service. (Case study)
Biodiversity and landscape advice (Germany) Following a two-year pilot project in 2015 Baden-Württemberg introduced a whole farm biodiversity advisory service funded by the RDP, to promote landscape conservation, Natura 2000 management plan implementation and uptake of nature conservation measures on intensive farms. A farmer can take advantage of a fully funded advisory session (full day on the farm, with all measures illustrated in a simple action plan) without obligation. This is seen as a good way of attracting farmers who otherwise would not seek such advice. (Case study)

6.5.4 FACTORS CONTRIBUTING TO SUCCESSFUL IMPLEMENTATION

6.5.4.1 Design and implementation factors

Science-led design and testing: The examples above and the literature show the importance of identifying the critical factors affecting biodiversity and landscapes that need to be addressed by CAP measures, then designing, testing and refining the best approach (e.g. using LIFE, pilot projects, innovation projects under M16) before implementing schemes more widely. This applies particularly to M10.1, M12, M4.4 and M16 co-operation projects, and the need to use scientific data and expertise in designing new schemes (as shown in many of the examples above, also in Evans, Armstrong-Brown and Grice (2002)).

Packages of targeted CAP measures: Several of the case studies note the importance of a combination of income support and targeted environmental land management payments to maintain and improve the conservation status of protected habitats and species, particularly those associated with HNV farming and traditional mosaic landscapes. For example, prevention of abandonment or intensification at farm and/or landscape level and the restoration of endangered habitats and species requires both income support payments (from Pillar 1 and also ANC and Natura 2000 compensation under Pillar 2) and well-designed targeted support for habitat management under M10 and M4.4.

On farm advice on design and implementation: Many of the examples above show that successful biodiversity outcomes often require specialist, targeted advice and knowledge exchange at a level beyond that which the FAS normally provides, both to ensure that farmers understand the biodiversity benefits of their activities and to help them apply 'the right management in the right place' to achieve these. It is important that the advisers providing this support can demonstrate their credibility through a detailed understanding of both the farming system and biodiversity management.

Level of biodiversity ambition: higher level M10 schemes are generally more effective than horizontal broad and shallow schemes, are a reliable means of supporting existing biodiversity, and can address the requirements of specialist habitats and species of higher biodiversity. Case studies noted as a success factor the availability of a range of detailed sub-measures, each with clear and specific biodiversity objectives (in contrast to a limited number of 'one size fits all' measures).

Measuring biological impacts during the course of a scheme, and using the data to improve implementation is of value not only in improving effectiveness of a scheme but also in other ways, as illustrated by the result-based payment examples above and the French case study, where an evaluation of the impact of M10 schemes on species diversity helped to raise farmer awareness and identify issues where advisory actions could be focused.

6.5.4.2 Social and economic factors

The majority of the literature reviewed found that the *economic situation of the farm* plays an important role in farmers' willingness to adopt an AES and that many farmers are motivated by the level of the financial incentive available to participate in environmentally focussed schemes, including AECM.

Farmer social variables affect the uptake of agri-environment schemes, including previous experience of environmental management (McCracken et al, 2015) the future of the business, and also the relationship with neighbouring farmers and their opinions on environmentally friendly practices (Defrancesco et al, 2008). In the Netherlands, where M10.1 is targeted at agriculture-dependent habitats used by species protected by the Natura Directives and delivered entirely by environmental co-operatives of land managers, the facilitation undertaken by the co-operatives is positively related to farmers' willingness to participate in collective contracts (van Dijk et al, 2015).

There are numerous examples (but a scarcity of literature assessing both the rural development and biodiversity impact) of *CAP schemes being used in an attempt to leverage additional business income on the farm or more widely.* These include collective processing and marketing at sub-regional scale of small volumes of biodiversity-friendly produce from individual farms and achieving PDO/PGI status for products of HNV systems (e.g. Iberico ham, many types of cheese produced from cattle grazing summer pastures in the Alps); or where biodiversity management is the basis for secondary enterprises of eco-tourism or educational facilities (e.g. forest schools).

6.5.4.3 Contextual factors

Overcoming competition from market forces was a frequently mentioned barrier to farmers' uptake of biodiversity management payments, especially those targeted at more intensive farming systems, and seems to be a key factor limiting sufficient scale and density of interventions on the ground. This appears to be linked both to overall budget levels, especially for M10, but also possibly to caution on the part of managing authorities to use the full scope of the payment calculation to compensate for opportunity costs and transaction costs.[67]

6.5.4.4 Governance and funding factors

One of the striking features about most of the successful examples above is that nearly all of them draw on *other sources of funding from outside the CAP at* some stage (including State aid, LIFE, and other ESIF) and secure the active involvement of farmers and other key environmental and agricultural stakeholders throughout scheme implementation, not just at the consultation stage. The active role of biodiversity and landscape NGOs or associations is also a contributory factor in many successful approaches, particularly in providing technical data and expertise, training and advice.

6.5.4.5 Scale, longevity and continuity of implementation

Literature shows that, while most well designed and implemented AECM schemes lead to positive biodiversity effects within the intervention area, achieving sustained positive impacts on population levels locally or at larger scales is more difficult. This is particularly important where impacts are

[67] A study of selected entry-level agri-environment schemes from ten 2007-13 RDPs in seven Member States found that in some cases payment rates were set at considerably less than the net cost of the management required, and in most cases transaction costs were not added (Keenleyside et al, 2012).

constrained by landscape factors, such as habitat fragmentation and the dominance of agriculturally improved land and intensively managed crops. Many of the examples above, and evidence from the case studies show that the scale of successful implementation within a target area and the lessons learnt from earlier iterations of a scheme both contribute to success. An international review of best practice found that security of long term conservation benefits depends on ensuring the effective ongoing delivery of conservation management activities, securing the long term use of land for conservation purposes and ensuring the financial sustainability of conservation management over time (Rayment et al (2014) cited by Tucker et al (2019)).

6.5.5 MAIN FINDINGS

A range of successful approaches to delivering biodiversity outcomes via the CAP instruments and measures have been identified. An analysis of these has shown that there are a number of factors that are particularly important for the success of biodiversity and landscape interventions under the CAP. Of key importance are factors relating to scheme design and implementation. This includes:

- Ensuring that biodiversity and landscape objectives are identified and that these are clear, specific and targeted;
- Putting in place science-led approaches to designing, testing, revising and then implementing schemes to achieve those objectives – using other EU funds, such as LIFE where appropriate, but also the CAP cooperation measure (M16) which can be used to pilot innovative approaches;
- Developing packages of CAP instruments and measures that can be used in a coherent and targeted way at farm and landscape level;
- Ensuring that the eligibility criteria enable all land requiring biodiversity management to receive the necessary support. In the case of HNV farmland this should include eligibility for appropriate support to secure the economic viability and integrity of the low-intensity farming system which underpins the beneficial management practices;
- Making sure that schemes are supported by training and on-farm advisory and facilitation support that recognises and develops farmers' knowledge and skills in biodiversity management; and
- Ensuring that mechanisms are in place to monitor the biodiversity impacts of schemes and using the information to improve scheme design and implementation.

The analysis also highlighted the value of targeted advice and knowledge exchange by using expertise, data and other resources from a range of organisations and individuals, such as government, farmers, researchers and specialist NGOs, throughout the design, implementation and evaluation stages of a scheme. Finally, the availability of sufficient levels and security of funding was identified as an important factor, both at programme level (including from sources outside the CAP) to deliver the scale and quality of implementation required to achieve specific biodiversity objectives in the long-term, as well as at scheme level to secure the 'critical mass' of uptake required, with payment rates set at levels that encourage high-quality biodiversity management.

7 EFFICIENCY

7.1 ESQ 9: REGARDING CAP INSTRUMENTS AND MEASURES: TO WHAT EXTENT HAVE THE CAP INSTRUMENTS AND MEASURES AS IMPLEMENTED BY THE MEMBER STATES GENERATED THE BEST POSSIBLE RESULTS TOWARDS THE OBJECTIVE OF SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE ACTION WITH A FOCUS ON RESTORING, PRESERVING AND ENHANCING BIODIVERSITY AND THE STATE OF LANDSCAPES WITH ITS AVAILABLE BUDGET?

In answering ESQs 9 and 10 the contractor shall draw attention to the mix applied between incentive support measures and regulatory instruments and measures, and their efficiency in achieving the objectives related to biodiversity and landscapes.

7.1.1 UNDERSTANDING OF THE QUESTION

Efficiency is analysed by examining whether opportunities exist to improve the ratio of costs to benefits. Costs include those imposed by legal provisions as well as expenditure from the CAP budget. The efficiency with which incentive support measures and regulatory instruments are combined must be considered.

Only the efficiency with which biodiversity and landscape objectives are achieved is considered. This is done for measures which have such objectives as their intervention logic, with a focus on those with the highest costs. Measure M13 is also included because Member States have programmed 96% of their spending on it to Priority 4. The efficiency with which it has been used to secure biodiversity and landscape objectives is therefore considered below, even though biodiversity is not the principle objective of this measure.

Measures are analysed singly, followed by an assessment of the balance between the use of regulatory and budgetary means. The interactions between measures are discussed in ESQ 11.

7.1.2 PROCESS AND METHODOLOGICAL APPROACH

The three RDP measures which between them account for over 87% of RDP spending programmed to Priority 4 (M10, M11, M13) were analysed as follows:

- FADN data for the case study Member States was used to assess the extent to which M13 spending has been targeted towards extensive grazing undertaken on farms with low underlying profitability.
- Uptake data and interview results from the case studies were used to form a view of the adequacy of payment rates for the AECM (M10) and whether better results might have been achieved, for example through better targeting or design.
- The efficiency of the organic farming measure (M11) was assessed by using the FADN data to compare the average profitability (excluding CAP payments) of organic and conventional farms in order to make an assessment of the value for money of current payments to organic farmers.

Measure M12 – which accounts for only 1.2% of RDP spend - is discussed below in the context of M13. In addition, efficiency gains reported in the case studies for other spending measures are described.

The efficiency of the greening ESPG and EFA instruments was then assessed. In the case of ESPG this was done using literature to examine the extent to which a ban on ploughing has been applied to all grasslands of biodiversity value needing such protection, without restricting other land. For the EFA, information from ESQ 10's analysis of changes in administrative costs was brought together with an analysis of the extent to which the EFA options declared by farmers are those with the greatest benefits to biodiversity and landscape.

Finally the efficiency of the mix of regulatory measures and payments was assessed using theoretical reasoning and expert judgement.

7.1.3 ANALYSIS

7.1.3.1 Measure M13 - support to areas under natural constraint

The mechanism through which M13 expenditure can lead to biodiversity benefits is the provision of financial support to farm businesses which would otherwise not remain viable, some of which are consequently enabled to manage land in ways which are more beneficial to biodiversity than would be the case if land were abandoned. FADN analysis shows that farms in areas where M13 support is available are, on average, less profitable than farms outside those areas in 8 out of 10 of the case studies. In seven of those Member States the profitability gap is at least 52%, whilst in the Netherlands it is 16%. In Croatia and Romania average profitability is between 6% and 10% higher in the ANC area. Profitability is measured as Gross Value Added (GVA) excluding all CAP payments, divided by the labour employed which is measured in Annual Work Units (AWU).

Even though M13 spending appears to be well targeted towards less viable farms in eight of the Member States, this does not prove that it is supporting benefits to biodiversity in an efficient manner, because it is also necessary to consider whether biodiversity benefits are being obtained. Small sample sizes do not allow an analysis of the extent to which expenditure supports farms in Natura 2000 areas, which would be a way of investigating biodiversity. As a proxy the proportion of UAA inside ANC areas which consists of land suitable for extensive grazing was compared with that in other areas. Because, as ESQ 5 has established, natural succession following abandonment can sometimes have greater benefits than continued grazing, this proxy overstates the extent to which ANC expenditure has secured biodiversity benefits.

Table 20 shows that meadow and rough grazing land make up a higher proportion of UAA within the ANC area than outside it in all 10 case study Member States, and in most cases much higher. To the extent that extensive grazing land is a valid proxy for biodiversity, this indicates a degree of targeting towards biodiversity objectives. However, M13 is in principle available to all farms within the ANC area and few of the case study Member States have availed themselves of the possibility to attach conditions – such as minimum and maximum stocking densities or differential rates of payment for different farming systems – which could result in resources being focussed on farming systems of greater benefit to biodiversity. The following section therefore considers the potential which greater use by Member States of measure M12, which can support more closely targeted biodiversity rules, might offer to secure similar or greater benefits to biodiversity more efficiently.

Table 20: % of UAA inside and outside ANC area which is meadow or rough grazing, 2016

		Meadow%	Rough Grazing%	Meadow and Rough Grazing as% UAA
DE	Inside ANC	38.6%	0.0%	38.6%
DE	Outside ANC	16.5%	0.0%	16.5%
IE	inside	86.7%	10.7%	97.4%
IE	outside	70.5%	1.4%	71.9%
FR	inside	36.4%	5.2%	41.6%
FR	outside	12.8%	0.2%	13.0%
HR	inside	9.2%	19.1%	28.3%
HR	outside	10.5%	3.4%	13.9%
LV	inside	0.7%	16.5%	17.2%
LV	outside	2.0%	0	2.0%
HU	inside	14.2%	42.7%	56.9%
HU	outside	4.9%	5.5%	10.4%
NL	inside	81.7%	0	81.7%
NL	outside	37.3%	1.1%	38.4%
PT	inside	29.8%	10.8%	40.6%
PT	outside	4.6%	3.5%	8.1%
RO	inside	21.2%	8.9%	30.1%
RO	outside	10.9%	1.1%	12.0%
SK	inside	27.9%	12.0%	39.9%
SK	outside	4.8%	2.8%	7.6%

Source: own analysis of FADN data

7.1.3.2 Measure M10 – Agri-environment-climate payments

None of the case study Member States had conducted a systematic analysis of the cost effectiveness with which they used measure M10. A Croatian official told the case study interviewer that 'cost effectiveness is not a consideration' since the budget Croatia had programmed was currently underspent. The case studies found little evidence that Member States had tried to improve efficiency

by limiting payment rates. Latvia, however, had reduced its payment rate for the management of grassland not assessed as being important habitat to just 55% of estimated income foregone. The effect had been to incentivise the uptake of habitat assessments by farmers wanting to keep receiving the higher payments. Slovakia had set payment rates for its livestock genetic measure at 72% of income foregone/extra cost for cattle and 79% for goats compared to 100% for sheep and horses. Uuptake figures are not disaggregated between different types of livestock and so do not show whether the reduced rates had any influence on uptake.

The difficulties of valuing benefits to biodiversity and landscapes make it difficult to test whether efficiency is being achieved in practice. Five Member States (DE-BW, CVdL, HR, RO, SK) had offered M10 options which achieved extremely low if not zero uptake, and participants frequently offered the view that payment rates were unattractive because they only cover "losses" and cost incurred partially. Financial reasons for low uptake were in such cases clear, but since efficiency is the optimum ratio of costs to benefits it cannot be concluded from low uptake that raising payment rates would have improved efficiency.

Better targeting of measure M10 has a clear benefit. The extent to which case study Member States had targeted their M10 programmes towards biodiversity objectives varied widely. As reported in ESQ 1 Ireland has a three tier system for prioritising under which four of the five priority targets (farmland habitats, farmland bird species, rare breeds and commonage) are driven by biodiversity considerations whereas Latvia has four sub-measures each of which is targeted at protecting or improving biodiversity of different types. Hungary has some highly targeted schemes such as the two schemes to support habitats for Great Bustard and Red-footed falcon for which target maps have been drawn so as to support existing populations without funding mutually incompatible management regimes in the same areas. M10 in Baden-Württemberg operates on a two tier system with highly targeted State-aided schemes available only in certain locations, whilst other "light green" schemes are available to all farmers. The latter type of scheme includes a capping mechanism to ensure that all farms can participate even if its budgetary constraint is reached – the opposite of targeting!

The cost-effectiveness and so efficiency of M10 payments is improved where benefits can be obtained at least cost to the farmer. The only example found by the case studies was a Croatian scheme to protect the breeding sites of grassland species from mowing, where it was felt that better scientific knowledge might enable the period of mowing restrictions to be reduced. The absence of other examples may reflect the fact that most M10 scheme options have existed in a similar form since before 2014.

7.1.3.3 Measure 11 - Organic farming

The efficiency of the organic farming measure M11 can be improved by increasing its biodiversity benefits and/or by reducing the cost of securing them. However Member States are not obliged by the Rural Development regulation to apply selection criteria[68] (which could be used to target assistance to farms which need it) or to require performance in excess of meeting the requirements of organic certification[69] (which would be a way of improving benefits).

The organic support measure is predicated on the assumption that converting to and maintaining organic farming will reduce farm profitability at least in the medium term. Once farms have converted, evidence from FADN shows that in six of the case study Member States (FR, HR, HU, IE, NL, RO) the underlying profitability – as measured by value added per annual work unit – of organic farms has been on average higher – and in some cases much higher – than that of conventional farms. However the profitability figures are averages across all organic and conventional farms in the FADN sample, and the profitability of individual farms within each category is variable.

Farms in the process of conversion to organic – when profitability is extremely likely to dip from its previous level due to a combination of reduced yields and inability to command any price premium available to organic produce until certification is complete – are classified as conventional farms by FADN. The average profitability figures therefore show the average difference between converted organic farms and other farms, with the latter category including a small proportion of farms in the

[68] Article 49(2) of Regulation (EU) No 1305/2013 excludes organic farming support from the list of measures for which Member States have to set selection criteria.

[69] Article 29(1) of the same regulation lists the maintenance of organic practices as defined in Regulation (EC) No 834/2007 and being an active farmer within the meaning of Regulation (EU) No 1307/2013 as the only compulsory criteria.

process of conversion whose profitability is temporarily depressed. These average profitability figures reflect market conditions between 2012 and 2016.

The FADN analysis shows that the underlying profitability of an average organic farm has been higher than that of a conventional farm in Croatia, France, Hungary, Ireland, the Netherlands and Romania between 2012 and 2016, and lower in Germany, Latvia, Portugal and Slovakia. The FADN analysis does not demonstrate that payments to support organic farmers were unnecessary, however. There are other obstacles to organic conversion besides profitability, such as knowledge barriers and the need in some cases for investment which may be difficult for a farmer to finance without access to a guaranteed revenue stream. So whilst the profitability analysis appears to imply that M11 payments in the five of the six Member States which use the measure (IE, FR, HR, HU, RO)[70] may have been set at rates which are higher than necessary, this is not a secure finding. However, evidence from the case studies of oversubscription of measure M11 (FR, HR) and overachievement of RDP targets provides some support for this hypothesis. So does anecdotal evidence such as the fact that organic payments levels are considered 'good' (i.e. adequately generous) in Croatia by both the farmers and the environmentalists interviewed, whilst M10 payments are not. Below, it is explained how payments have been calculated in Ireland (a Member State which sets out its methodology very clearly in its RDP). However, it should be recalled that those rates have been calculated at the beginning of this programming period and have been based on data and figures available at that time.

Payments for organic conversion and maintenance are set by Member States based on an assessment of the additional costs and/or income expected to be incurred or foregone during conversion (when premium prices often associated with organic produce cannot be obtained until certification is achieved). Member States may pay up to this amount, subject to per hectare ceilings in Regulation (EU) No 1305/2013 for annual and specialised perennial crops and other land uses (e.g. grazing). They may also pay transaction costs of up to 20% of the basic per hectare payment, or 30% in the case of applications by multiple farmers. Payments to farmers for maintaining their certification reflect an assumption that gross margins are expected to be lower than those for conventional farming which, as has been established, is not necessarily the case.

Payment rates differ quite significantly between land used for different types of produce (e.g. fruit trees versus rough pasture), where payment rates varied between €1,275/ha/year for the former and €90/ha/year for the latter in the case study Member States) and between Member States. Ireland's rationale for the level of its organic farm payments is examined below since it has provided a very transparent and detailed account in its RDP of how it calculated them.

Ireland justifies its payment rates by reference to the following factors:

- Outputs on Irish organic farms are 20 – 30% lower than on conventional ones;
- The price premium for organic produce is between 15 and 30% but is not always earned;
- Transportation costs are higher than for conventional farms since organic farms are dispersed and far from their markets;
- Labour input is assumed to be higher than for conventional farms;
- Organic inputs, especially livestock feed which must be imported, are more expensive.

Despite these disadvantages, the FADN data shows that the average profitability of fully converted organic farms in Ireland was over 50% higher between 2012 and 2016 than that of conventional farms, before CAP payments are taken into account. Since organic farming is still a very small proportion of Irish production (2% of UAA in 2016) it is possible that small fluctuations in demand, which may not be sustained, have had a big impact on profitability over that period. But the rate at which organic farming has grown, and the additional profits it has earned, suggest that an opportunity now exists to increase efficiency by reviewing current payment rates and perhaps combining continued financial support with market awareness measures to inform farmers of the economic opportunities which have existed in the recent past. In France including the case study region of Centre Val de Loire, heavy demand from farmers wishing to take advantage of strong growth in the market for organic farming has resulted in budgetary difficulties which have been tackled through a combination of additional funding transferred from Pillar 1 along with reductions in ceilings for payments per farm, and ESQ1 shows that Member States have consistently reacted to oversubscription of their budgets for measure

[70] The Netherlands does not operate measure M11, but does encourage organic farming through favourable tax treatment

M11 by increasing their size rather than cutting rates (with the exception of France which did both). In 2017 France's Agriculture Minister announced alongside an increase in its budget that support under M11 would no longer be available towards the maintenance of organic farming, being focussed instead on assisting further conversions. The analysis above suggests that payment rates should be kept under regular review in the light of market developments and desired policy outcomes.

7.1.3.4 Measure 12.1 & 12.2 – Compensation payments for Natura 2000 areas

M12.1 and M12.2 are more efficient measures than M13 with which to fund biodiversity since at least 95% of any expenditure must be in Natura 2000 areas and payment is limited to compensation for 'disadvantages' arising from 'requirements' relating to the implementation of the Birds and Habitats Directives (so long as those requirements are not already part of GAEC). However, M12 can only compensate land managers for costs which arise from requirements. Where a need for active conservation (as opposed to meeting requirements) by farmers or foresters is identified, another means of financial support is needed. AECM is well-adapted to this purpose.

Funding what is directly required using the M12 measure, and paying for other desired actions through the AECM, is a more efficient way of supporting biodiversity than using a broad measure such as ANC in the sense that in both cases payment is linked to the cost of the actions which are supported.

7.1.3.5 The extent to which regulatory requirements achieve biodiversity and landscape objectives efficiently: the greening ESPG and EFA measures

The greening ESPG measure is applied most efficiently when all valuable grassland habitats which are in need of protection (because vulnerable to ploughing) are designated ESPG but other grassland is not. The evaluation of the greening measure (Alliance Environnement and Thünen-Institut, 2017) noted that six Member States (EE, IE, LV, LU, AT, PT) had designated no more than 20% of the area of the grassland protected under Annex I of the Habitats Directive situated within their Natura 2000 areas as ESPG, even though all such habitats with the exception of machair are damaged by ploughing. Seven Member States had failed to designate even 20% of their Annex I grassland and peatland. Whilst this suggests strongly that these Member States had not maximised the benefits to biodiversity which could have been obtained through wider application of the ESPG designation, it must be borne in mind that Member States are required only to designate grassland which is 'in need of strict protection' and that some types of land for instance that which is very steeply sloping or boggy – is not ploughed.

The designation by a Member State of 100% of permanent grassland in its Natura 2000 area as ESPG may help to avoid confusion among farmers as to which grassland is restricted and which is not, and simplify the task of controlling compliance in cases where Member States lack appropriate mapping data to underpin a more targeted approach.

In the case of EFA, the best ratio of benefits to costs is achieved when farmers declare EFA types with the highest benefits to biodiversity and where that declaration provides additional protection (beyond, say, cross-compliance) but at a low cost to the farmer.

The changes to EFA introduced for 2018 by Regulation (EU) 2017/2393 sought to improve its environmental impact as well as simplifying some options. Following the introduction of the ban of use of pesticides, all productive areas declared as EFA such as N-fixing crops provide better outcomes for biodiversity.

7.1.3.6 Extent to which the balance between incentives and regulation has been optimised

The design of the CAP's incentives and regulations does not optimise efficiency because, depending on the choices made by a Member State, farmers can declare features already protected through cross-compliance as EFA. In these circumstances there is little value-added from the EFA component of the greening payment, although there are costs to the Member State and the farmer from the declaration process. A more efficient design would require the greening payment to be earned by actions not already required by cross-compliance. Member States themselves have the power to achieve such a separation by the choices they make for GAEC 7 and EFA options, but as shown by ESQ 1 have frequently allowed overlaps.

A more efficient relationship exists between cross-compliance and greening on the one hand and the RDP. All Pillar 2 measures require Member States to ensure that activity already required by cross-

compliance rules or already remunerated by the greening payment is not 'double funded' from Pillar 2. Pillar 2 incentives can be designed to complement the requirements of regulation. For instance a Member State which requires measures to control invasive species through cross-compliance may offer an AECM option to manage the habitat so spared on behalf of other species.

The design of M12 presents Member States with the opportunity to fund biodiversity actions in a particularly efficient way, paying only for the requirements set. Here, Member States have four different ways of combining regulation and financial incentives:

- Requiring action (or preventing unsuitable action) under cross-compliance. Farmers bear the costs;
- Requiring action in Natura 2000 areas through management plans or other rules. Farmers and foresters bear the costs unless the Member State chooses to pay compensation using measure M12;
- Paying via the greening payment for actions which may (and frequently will) include existing cross-compliance requirements; and
- Paying for actions which must not be otherwise paid for or required, using the AECM and forest environment measures.

The existence of these four options provides Member States with the possibility of creating an efficient, finely targeted suite of biodiversity actions, varying the extent to which farmers bear the costs. Unfortunately as ESQ 1 shows, the low uptake of M12 and the regularity with which cross-compliance and greening requirements overlap demonstrate that Member States have not usually taken the opportunity to tailor their implementation in this way.

7.1.4 MAIN FINDINGS

Analysis of FADN data has shown that the ANC measure is well targeted towards farms with marginal economic performance in areas where grassland likely to be of high biodiversity value is more predominant than elsewhere. However, few of the case study Member States had included conditions which could have better targeted this support to biodiversity needs and benefits to biodiversity would be achieved more efficiently by switching funding to other measures, in particular, measures M12 (which receives little funding) and M10 which allow Member States to make payments in return for specific actions by farmers which benefit biodiversity.

Analysis of the profitability of organic versus conventional farms using FADN data suggests that the average fully-converted organic farm had higher average underlying profitability than the average conventional or converting farm between 2012 and 2016 in six out of the ten case study areas. A strong market, as well as support from M11, whose payment rates are based on evidence of additional costs and/or lost income from organic conversion, has therefore helped organic farming to grow.

The greening instrument has not supported biodiversity as efficiently as it might because Member States have taken widely different approaches to the designation of ESPG, with some designating only a small proportion of the relevant grassland.

The efficiency with which the EFA requirement secured benefits to biodiversity is reduced by the fact that a very high proportion of declared hectares are catch crops, which have very little benefit to biodiversity, and N-fixing crops which, even when grown without pesticide, offer fewer benefits than other EFA options such as fallow and landscape features.

An inefficiency exists where Member States have allowed landscape features already protected by cross-compliance to be declared as EFA, since this is likely to involve additional mapping but no increment in environmental protection. A better balance between incentives and regulation is struck when Member States require basic environmental protection through cross-compliance and use the greening measure to incentivise further benefits.

7.2 ESQ 10: Regarding administration and simplification: to what extent

a) Are the administrative burden and administrative costs, also created through monitoring and reporting mechanisms, proportionate to the given support and the results achieved?

b) Is there scope for efficiency gains, simplification and burden reduction?

c) Did simplification occur in the evaluation period?

In answering questions 9 and 10 the contractor shall draw attention to the mix applied between incentive support measures and regulatory instruments and measures, and their efficiency in achieving the objectives related to biodiversity and landscapes.

7.2.1 Understanding of the question

Administrative burden is administrative cost which is additional to business as usual and arises from the need to exchange information which is not already available to authorities and farmers in order to operate the CAP measures. It is proportionate if the information which is exchanged serves a necessary purpose and is exchanged in an efficient way. Where this is not the case there is likely to be an opportunity for simplification. This question is addressed for the measures with biodiversity as their intervention logic identified in Table 5.

7.2.2 Process and methodological approach

Quantitative estimates of the administrative burden of cross-compliance, the greening instrument and the AECM (M10) are taken from literature and supplemented with qualitative information from the case studies. The principal source in literature is the evaluation of the administrative cost of the CAP's area-based measures which analysed data from a Standard Costs Model survey carried out in 12 Member States in 2017 (Ecorys et al, 2019). There are separate cost estimates for cross-compliance, greening and RDP area-based measures, but Member States do not in general allocate administrative cost between individual measures.

To provide a more finely grained picture, and to investigate the administrative burden of non IACS-based measures, literature and the case studies were used. The extent to which simplification has occurred during the evaluation period was assessed by analysing relevant literature, changes to the CAP regulations and the case studies.

Finally the results of all the analysis so far were compared using expert judgement to produce an assessment of the scope for further simplification and efficiency gain.

7.2.3 Proportionality of the administrative burden

At the aggregate level the administrative burden of the CAP – estimated at 3.5-3.9% of its budget – appears proportionate since it is close to the average for ESIF funds of 4%. The majority of cost (all of which is judged by Ecorys et al (2019) to represent a burden) is associated with the area-based measures which Ecorys et al (2019) assessed to be costing €1.7 – 1.9bn/year. This total included 94% of Pillar 1 costs but only 40% of those for Pillar 2. For Pillar 2 significant programming and non-IACS costs also need to be taken into account. Estimated total administrative costs of EAFRD at 8.5% of its budget.

Ecorys et al (2019) identify two of the CAP measures with direct biodiversity impacts as particularly significant contributors to administrative burden: the AECM and greening (especially EFA). RDP measures – with the AECM prominent among them – accounted in 2017 for €558-626m of the costs of managing and controlling the CAP with greening accounting for a further €166-186m. The costs of managing and controlling cross-compliance were estimated at €130-152m but this was mostly attributable to animal identification rather than the biodiversity-related SMRs 2 and 3 or GAEC 7.

The most significant administrative burdens associated with the greening measures are the creation of an EFA layer in the LPIS, which requires the mapping of numerous landscape features, and the ongoing costs of managing and controlling the measure including through on the spot checks. Ecorys et al (2019) estimated these costs would increase as a result of the changes introduced for 2018 by

Regulation (EU) 2017/2393 which added the need for Member States to check that the ban on inputs was being adhered to for any N-fixing crops declared as EFA.

The case studies found some examples of disproportionate cost. Ireland mapped its landscape features efficiently by starting with the farms known to have an EFA obligation, but the activity was not necessary in order to secure environmental benefits since the features were already protected by cross-compliance. The mapping costs could have been avoided altogether by relying on the protection already available through cross-compliance. The beneficiaries were the farmers who were able to use landscape features to meet their EFA obligations. Germany's (BW) insistence that hectares of eligible land should be declared by farmers to four decimal places was equally disproportionate.

The administrative burden of creating and maintaining a map of landscape features to support their declaration as EFA is almost certainly disproportionately high at EU level given that landscape features accounted for only 1.7% of declared EFA at EU level in 2018, and many of these were already protected through GAEC 7.

The principal purpose of management and control for greening is to satisfy the authorities that farmers have declared an adequate area of EFA, have met any applicable requirement for crop diversification and have not ploughed any designated ESPG on the holding. EFA checks in particular can involve complex measurement – so much so that difficulties in measuring the extent of features such as trees and field margins have caused farmers to choose other EFA options, such as N-fixing crops or catch crops, which are easier to measure, as reported for example in the Slovakian case study. Given that farmers are doing this – and given also that farmers have at least until 2018 declared a larger area of EFA than was necessary - it is doubtful that the administrative burden associated with controlling the EFA by means of precise measurement of individual features is proportionate. The flexibility introduced in Regulation (EU) 2393/2017 for 'missing' EFA to be replaced by other features on the farm which would have qualified if they had been declared is intended to facilitate a more pragmatic approach.

The majority of the administrative burden associated with the RDP is associated with the cost of processing applications against selection criteria (Ecorys et al, 2019). As discussed in ESQ 9, targeting of RDP measures is necessary in order to maximise benefits to biodiversity. Such targeting, however, comes at a cost. Its administrative burden is proportionate if the administrative tasks carried out by Member State and beneficiary are the minimum necessary to ensure that the targeting criteria are applied, and that information is exchanged efficiently between applicant and managing authority.

The costs of such checks result from the complexity of the M10 options applied for, and there is a trade-off between the benefits of targeting and the administrative burden involved in achieving it. Compared to other measures such as greening and measure M13 the administrative burden associated with measure M10 is much higher. However the degree of targeting which can be achieved is also much greater (see ESQ 1) and more beneficial (see ESQs 4 and 5). A 2015 report by the Court of Auditors in Germany (BW) found that the administrative costs of EAFRD during the previous programming period had been 32% of payments for the area-based measures, and 25% for non-area-based measures such as M4 (investment). The auditors observed that most of these costs were driven by the specific requirements of the EU regulations.

Some non-IACS measures involve significant administrative burden, although this has not been quantified in the literature. Case study Member States identified measure M4 as involving heavy administrative costs due to the complexity of the information needed to enable decisions about investment to be taken. Measure M2 initially involved so much administrative complexity that some of the case study Member States were deterred from implementing it at all as part of a total of 50 who did not programme this measure. These problems have now been addressed by Regulation (EU) 2017/2393.

The case studies demonstrated that the most common way in which Member States incurred unnecessary administrative burden was by designing options for M10.1 which were taken up by very few applicants. This appears to be a problem particularly associated with the biodiversity objective, due to the highly localised nature of some habitats. Slovakia received just one application for its AECM to protect the Great Bustard, and 11 farmers covering some 750 hectares applied for funding to protect ground squirrels. France (CVdL) was also reducing its list of AECM options because of low uptake. At the other extreme, Latvia has just four AECM options. However, no data is available from which to

compare the administrative burden of operating the AECM in Slovakia or France (CVdL) with that in a Member State with as few M10.1 options as Latvia.

Unnecessary burden can also arise from the way compliance with the conditions of RDP contracts is controlled. Certain types of management requirement exist – such as mowing a field from the centre outwards so as to give corncrakes a chance to escape – which are hard to check other than in real time. As the Slovakian authorities pointed out, it is not practicable to have an inspector on site whenever and wherever this type of management is carried out.

As noted by the 2017 evaluation of the greening instrument (Alliance Environnement and Thünen-Institut, 2017). Member States have in most cases made a wide range of EFA options available to farmers in an attempt to ease compliance costs. However the pattern of uptake by farmers, with very high proportions of catch crops, fallow and N-fixing crops being declared, means that administrative burden has been incurred to map other EFA features with very low uptake.

Particular administrative burdens encountered by the case study Member States, some of which arose from Member States' own implementation choices rather than inherent attributes of the CAP, included:

- Bottlenecks processing applications for the investment measure M4 (HR,SK) and the RDP in general (PT, which had spent only 50% of its funds by April 2019);
- Offering too many sub-measures under measure M10 including a number which attracted few if any applicants (DE, FR, HR, RO, SK);
- Burdensome application procedures involving resubmission of multiple documents (HR. HU had integrated its databases to avoid this);
- Problems measuring the eligible area of some types of semi-natural land (DE) due to dynamic changes. In addition to excessively precise measurement of EFA area (DE, where measurement to the nearest square metre was taking place);
- Problems caused by a Member State's frequent changes to eligibility criteria (HR);
- Problems with the operation of contracts (DE);
- Problems controlling some specific types of M10 option such as mowing outwards from the centre of a field, or stacking wood in a certain order, which can only be audited in real time (SK).

Administrative burden is also incurred by farmers and foresters in connection with the biodiversity related measures. In some cases administrative burden – or the fear of it, or fear of reductions/penalties – is sufficient to deter some farmers and foresters from participation at all.

7.2.4 SCOPE FOR EFFICIENCY GAINS AND SIMPLIFICATION AND BURDEN REDUCTION

Efficiency gains are available to Member States who:

- Reduce EFA mapping costs by not offering landscape features as an EFA option if they are already protected through cross-compliance, and avoid disproportionately precise measurement;
- Remove or modify M10 options with very low uptake;
- Streamline application procedures so that data already available to the Member State is not asked for more than once;
- Maintain a stable and coherent list of eligibility criteria and avoid unnecessary conditions set at MS level.

Further scope for simplification exists in the way EFA features are measured. Measurement only needs to be precise enough to provide assurance that an area equal to at least 5% of arable land has been declared. The flexibility introduced in Regulation (EU) 2017/2393 for 'missing' EFA to be replaced by other features on the farm which would have qualified if they had been declared may facilitate a more pragmatic approach.

The complex interaction between cross-compliance GAECs, the greening instrument and the RDP measures M10, M11 and M12 was cited by several of the case study Member States as a driver of administrative burden and appears to be a clear candidate for simplification, as the Commission has recognised in its proposals for CAP legislation post-2020.

7.2.5 THE EXTENT TO WHICH SIMPLIFICATION TOOK PLACE DURING THE PERIOD

Table 21 shows the simplifications to the greening instrument which took place during the programming period. There were also a few changes which increased its complexity. The introduction (in order to secure additional benefits to biodiversity) of a ban on pesticide use on declared N-fixing crops introduced the need to check that such a ban had been adhered to. An official of the paying agency interviewed for the Romanian case study felt that this would be difficult to control in practice. The creation of three additional EFA options also increased potential administrative burden for those Member States which chose to offer them (see ESQ 1).

Table 21: Simplification which took place during the programming period

Item	Content	Source
Crop diversification	Regional or sub regional control periods for crop diversification permitted.	(EU) 2017/1155 (Art. 1 (3))
Crop diversification	Possibility to count mixed crops as well as single species	(EU) 2017/1155 (Art. 1 (3))
Landscape elements / Buffer strips & field margins, etc.	Simplification of the size criteria for certain elements	(EU) 2017/1155 (Art. 1 (4))
Buffer strips & field margins, etc.	Simplification of the possibility to use the area	(EU) 2017/1155 (Art. 1 (4))
Payment reductions in case of non-compliance	Simplification of the calculation of administrative reductions	(EU) 2017/723 (Art. 1 (3,4))
EFA	Compensation for absent or non-qualifying EFA by another EFA (type and location can be modified by the farmer to a certain degree after the aid-application)	OTSC Guidelines
EFA	Not all potential permanent EFA must be mapped in the EFA layer	EFA Guidelines
EFA	No longer need to distinguish between hedges or wooded strips and trees in line Merged EFA in amended Delegated regulation	EFA Guidelines and (EU) 2017/1155 (Art. 1 (4))
EFA	Allow gaps in hedges or wooded strips of up to 4 meters	EFA Guidelines
EFA	Adjacent landscape features can be located within 5m buffer around agricultural parcel	EFA Guidelines
Permanent grassland	Reduced requirement for identification in the LPIS of areas with PG-ELP	LPIS Guidelines

Source: Alliance Environnement (2018)

Some of the case study Member States took steps to simplify the administration of the biodiversity measures for themselves. The Netherlands offered measure M10 only to applicants applying collectively on behalf of a group of farmers. This greatly reduced the number of individual applications, which Ecorys found to be a key driver of management costs. France (CVdL) attempted a similar simplification but the administrative vehicle through which they routed applications from individuals for M10 support was itself complex – for example requiring annual redesign of priorities for funding. The complexity of some measures also gave rise to a variety of means of helping farmers to navigate them. Ireland insisted on the involvement of a farm adviser in all applications for support under its GLAS (which could be expected to increase the benefits of participation as well as offering assistance with navigating the system). In France, the Chambres d'Agriculture developed a so-called 'serenity package' to help farmers maximise income whilst avoiding the risk of non-compliance which might result in financial penalties. In Romania NGOs took on the role of helping farmers to implement the newly-applied SMRs 2 and 3 along with GAEC.

7.2.6 MAIN FINDINGS

The administrative burden of the biodiversity measures is mostly associated with the AECM and greening but is mostly proportionate. Complex application procedures and controls are justified by the high degree of targeting and specificity of AECM contracts in particular.

Member States can reduce their own administrative burden by not overlapping EFA options with existing cross-compliance GAECs, which will reduce the burden of mapping, and by reducing or modifying AECM options whose uptake is low. They can reduce the burden on applicants by simplifying application procedures, streamlining the handling of application data and maintaining a stable set of rules for applicants.

A wide range of simplifications to the greening instrument was introduced by Regulation (EU) 2017/2393 along with a small number of important policy changes which involve additional burden. The most significant of these is the new ban on the use of pesticide and herbicide on N-fixing crops declared as EFA.

8 COHERENCE

8.1 ESQ 11: TO WHAT EXTENT HAVE THE CAP INSTRUMENTS AND MEASURES, WITHIN THE CAP ARCHITECTURE BEEN COHERENT RELATED TO SUPPORTING BIODIVERSITY?

8.1.1 UNDERSTANDING OF THE QUESTION

Coherence is defined as the extent to which an intervention does not contradict other interventions with similar or different objectives. ESQ 11 tests the hypothesis that CAP instruments and measures are coherent in the way that they support biodiversity. The analysis assesses the extent to which the CAP instruments and measures operate in a way that is neutral, complementary or in contradiction to biodiversity objectives.

8.1.2 PROCESS AND METHODOLOGICAL APPROACH

The first step assesses coherence from a theoretical perspective. It considers the whole set of CAP instruments and measures *as defined at EU level* with respect to the general objective of the 'sustainable management of natural resources and climate action' as it relates to biodiversity. It takes as its starting point the intervention logic in which measures, their objectives and likely impacts on biodiversity are described. The analysis then focuses on how pairs of measures interact with each other, to assess whether these relationships are neutral, complementary or contradictory.

The second step assesses coherence in practice. It considers the identified relationships between the CAP instruments and measures *as implemented in the case study Member States,* based on the findings from other relevant previous evaluations and qualitative information drawn from the case studies.

8.1.3 ANALYSIS

Table 22 provides an assessment of the theoretical coherence between individual CAP instruments and measures with respect to biodiversity. This considers:

- Potentially positive relationships and synergies where the implementation of instruments and measures are mutually supportive and therefore has high potential for biodiversity outcomes to be maximised with greater benefits than would be achieved if implemented on a standalone basis;
- Potentially mixed outcomes where the implementation of instruments and measures might be mutually supporting and lead to additional benefits than would have been achieved alone, but could also create tensions, depending on the implementation choices made at national or regional level;
- Contradictory relationships where a measure reduces the ability of another measure in securing biodiversity benefits, for example by providing an exemption; and
- No relationship where two or more measures cannot affect each other's ability to secure benefits to biodiversity.

In most cases, the relationship between pairs of CAP measures and instruments is neutral in terms of their potential impact on biodiversity. The key relationships (positive, mixed, and contradictory) are examined further below drawing on examples from Member States' actual implementation choices.

Table 22: Summary of the theoretical coherence assessment of CAP instruments and measures under general objective related to biodiversity

Measure	FAS	XC	BPS/ SAPS	CD	PG	ESPG	EFA	VCS	Redi st.	SFS	Cott on	F/V OPs	M1	M2	M3	M4	M5	M7	M8	M10	M11	M12	M13	M15	M16	M19
FAS																										
XC																										
BPS/SAPS					ER		PC																			
CD																										
PG																										
ESPG																										
EFA																										
VCS																										
Redist.																										
SFS																										
Cotton																										
F/V OPs																										
M1																										
M2																										
M3																										
M4																										
M5																										
M7																										
M8																										
M10																										
M11																										
M12																										
M13																										
M15																										
M16																										
M19																										

Source: Own compilation based on expert judgement

Legend: Green=positive; red=conflict Amber= mixed i.e. potential synergies, but also conflicts; blue= neutral, XC=cross-compliance referring to SMRs 2 and 3 and GAEC 7, ER= eligibility rules, PC permanent crops

8.1.3.1 Positive relationships and synergies

Looking at the CAP instruments and measures as set out in the EU regulations, there are many ways in which they can in theory work together synergistically to have a positive impact on biodiversity. For example, cross-compliance requirements (SMRs 1, 2 and GAEC 7), green direct payments and rural development measures such as M4.4, M7.1, M10, M11, M12 and M15 can all be used in a synergistic way. For example:

- Protecting landscape features associated with ESPG under GAEC and/or via EFA options can reinforce the protection of certain habitats, such as traditional wood-pasture systems.
- Landscape features are protected under GAEC 7 and the EFA instrument, the management required for their maintenance can be funded under the AECM (M10 and the creation of new features can be provided for under non-productive investments (M4.4).
- The AECM can build on the crop diversification greening payment by supporting reductions in pesticide through the use of multi-annual crop rotations and greater crop diversity.
- The AECM may also build on the permanent grassland greening obligation and the ESPG designation through the provision of schemes to support active management of the semi-natural pastures and meadows which are protected.
- The use of M7.1 to support the implementation of Natura 2000 management plans can also work well in conjunction with the Natura 2000 measure (M12) as well as the AECM and the forest-environment measures (M15).

In practice, nine of the case study Member States have made the landscape features protected under GAEC 7 eligible as EFAs. The non-productive investments measure (M4.4) is often used to complement GAEC 7 as well as EFA elements to pay for the restoration or creation of features such as hedges, ponds and stonewalls. The AECM has also been used in combination with M4.4 to support actions beneficial for nature conservation (DE, HR, IT, HU, PT).

In the majority of the case study Member States, AECM schemes are offered that complement the greening measures so there are synergies between these two measures. For example, in Baden-Württemberg (DE), a scheme is in place to incentivise farmers to diversify their cropping systems with a minimum of five crops, both of which complement the crop diversification measure. A number of AECM schemes provide payments for the creation of buffer strips and field margins that work alongside the EFA measure. In addition, all case study Member States have AECM schemes to maintain and improve permanent grassland targeted primarily at biodiversity needs, which are coherent with the greening measures that aim to protect and maintain areas of permanent grassland, particularly ESPG. For example, RDPs in Croatia, Hungary and Romania have measures targeted at pastures of High Nature Value including specific operations for pastures important to birds and butterflies.

The way in which the AECM and organic farming measures are implemented are generally complementary and some of the requirements under the AECM are those that also apply in organic systems. For example, certain AECM operations in HR only permit organic fertilisers and plant protection products. In Ireland, organic farmers have priority access to a number of arable and grassland AECM operations.

The FAS and the RDP advice and training measures (M1 and M2) are coherent with other CAP Pillar 1 instruments and Pillar 2 measures with respect to biodiversity, since the flexibility exists to use these measures to provide advice on how to achieve better results for biodiversity under cross-compliance and the green direct payments, as well as other environmentally focused measures and sub-measures including M8, M10, M11, M12, M15 and M16.5. They can also support extension services for fruit and vegetable producers as part of environmental actions required under operational programmes.

In practice, the use of the advice and training measures was found to be coherent with the AECM in a number of case study Member States, where biodiversity advice was provided to farmers on the implementation of M10 (e.g. in DE, FR, HR, IE, LV, PT, SK). While advice and training may be offered, it is not always a requirement for the receipt of AECM payments. However, in four of the case study Member States, advice was compulsory. For example in Croatia and Ireland all beneficiaries of the AECM and organic farming are required to undertake mandatory training under M1 that includes a biodiversity focus. In Latvia, training supported under M1 and a LIFE project (NAT-PROGRAMME) is compulsory for beneficiaries of the AECM scheme focussed on the maintenance of biologically diverse grasslands and in France training is required for beneficiaries of the AECM scheme for reducing the use of herbicide and pesticide use.

The combination of environmentally focused measures (e.g. M10, M11, M12, M15) with other measures such as M3 (quality schemes for agricultural products) and M16 on cooperation (in particular M16.5) can be synergistic with respect to biodiversity outcomes. For instance, M3 can help to support information and promotion activities amongst groups of farmers who participate in an AECM scheme, an organic farming scheme or deliver biodiversity benefits under a Natura 2000 management plan. This may include support for certification costs, such as for organic farmers. By supporting the marketing of agricultural products and food where an active contribution is being made to biodiversity, M3 has the potential to increase the attractiveness of such measures amongst farmers. M16.5 could also be used to complement biodiversity-focused schemes through supporting relevant studies, training and networking. In practice, some Member States use M16 alongside other measures to maximise biodiversity outcomes, for example together with M7 and M4 in Germany, with M1 in Croatia and to complement M10 schemes in Ireland through the development of results-based pilot schemes.

8.1.3.2 Mixed coherence

The coherence of the interaction of other CAP instruments and measures is less clear cut and can lead to either a positive or a negative effect on biodiversity, depending on how they are implemented.

There is theoretical incoherence between some of the eligibility rules for direct payments and other area-based measures including forestry measures and the non-productive investments measure (M4.4). This arises to the extent that rules with which farmers must comply in order to claim direct payments require the clearance of trees or scrub. As discussed in ESQ 1, the rules on the definition of permanent grassland were modified in 2017/2018 to allow trees and shrubs used for grazing to be part of the eligible area. Nevertheless, despite these changes a theoretical tension remains which can be exacerbated by the way in which Member States choose to interpret the definition. This can result both in land abandonment or damage to semi-natural pastures and meadows in an effort to become eligible for direct payments. In addition it may also undermine schemes to manage extensive farmland and forest areas under M10 and M15 as well as schemes to support habitat maintenance and restoration under M4.4. In practice, the 2017/2018 revision to the definition of permanent grassland has allowed a number of Member States to incorporate additional farmland under the definition (e.g. EL, ES, FR, PT, UK). At the same time, evidence from the case studies shows that eligibility criteria still pose problems where grass cover is not dominant, but may contain other shrubs and woody vegetation (e.g. DE, IE, FR, SK).

Another example where issues can arise is with the implementation of VCS, which can be used to target different sectors and regions for economic, social or environmental reasons. It therefore can in theory be used coherently with the greening permanent grassland and ESPG instruments as well as the ANC, AECM and Natura 2000 measures to support extensive livestock farms located on semi-natural pastures and meadows particularly in HNV farmland areas. Moreover, VCS can be used together with the crop diversification and EFA instruments under greening to support the cultivation of crops that are beneficial to biodiversity. On arable land VCS support could therefore lead to a more diverse cultivation of crops than would have been the case without such support, e.g. legumes production. However, in the absence of specific management requirements for VCS, this could lead to more intensive management practices that may be damaging to biodiversity. For example, on permanent grasslands there are no common requirements for Member States to ensure that inappropriate stocking rates are not applied that could result in overgrazing and undermine the uptake and impact of more beneficial instruments and measures.

In practice, the evidence from the case studies shows that the way VCS is implemented largely replicates the way previous instruments were operated, driven primarily by socio-economic factors. For example, as mentioned in ESQ 1, VCS in France has been used to promote the economic competitiveness of different sectors, to expand protein crop production and to maintain the diversity of production and mixed farming, particularly in marginal areas. In the majority of case studies, VCS is not targeted at low-intensity grazing systems. An exception is in the Netherlands where VCS has a specific focus on biodiversity by supporting farmers to graze cows or sheep on dunes, heaths and salt marshes to manage scrub. In some case study Member States, there are eligibility requirements for the VCS payment requiring minimum stocking densities in order to promote appropriate grazing which can be expected to be of benefit for biodiversity (e.g. IE, LV).

8.1.3.3 Conflicts

There are only a few instances where the relationship between measures could lead to contradictory outcomes. These issues apply to two instruments where certain groups of farmers have been exempted. First is the fact that permanent crops in receipt of direct payments are not subject to relevant greening practices, which means this group of farmers are not required to carry out environmental management under Pillar 1 and yet still receive the support. The second example involves farmers under the Small Farmers Scheme (SFS) who are exempt from both cross compliance and greening requirements. In practice, there is limited available evidence to determine the specific implications for biodiversity, however in 2018 permanent crops accounted for 7% of EU farmland, while 5% was under the SFS.

8.1.4 MAIN FINDINGS

The analysis has shown that the majority of CAP instruments and measures of the horizontal Regulation and under both Pillar 1 and Pillar 2 are theoretically coherent (i.e. do not conflict with one another) with respect to biodiversity. However, coherence varies in practice, depending on the way in which the instruments and measures are implemented by Member States. Synergistic relationships were found between many of the EAFRD measures with a direct focus on biodiversity, for example M4.4, M10, M11, M12 and M15 as well as between these measures and those that have an indirect focus on biodiversity too, for example the FAS, M1, M2 and M3. In some Member States synergistic relationships were also found between the use of cross-compliance GAEC 7, the greening measures and the AECM.

More mixed coherence in relation to achieving biodiversity objectives was found in relation to CAP instruments and measures whose intervention logics do not directly focus on biodiversity. Examples include the absence of any requirement to include appropriate environmental conditions such as stocking densities when using VCS, and interactions between VCS or ANC payments and their interaction with the Pillar 1 greening payments, the AECM or the Natura 2000 payments. This reflects that instruments and measures whose primary purpose is not biodiversity may be implemented in a variety of ways, which may be either supportive of, or damaging to, biodiversity. Eligibility rules which restrict the extent to which direct payments may be claimed in respect of semi-natural features are in theory incoherent since farmers will then have a financial incentive to remove such features, unless they are protected through other means.

Finally, two specific examples of conflicts or incoherence with biodiversity objectives were identified, namely the exemption of permanent crops from the EFA requirements and the exemption of those under the Small Farmers Scheme from cross-compliance and greening requirements.

8.2 ESQ 12: ARE BIODIVERSITY-RELATED INSTRUMENTS AND MEASURES COHERENT WITH THE OTHER CAP GENERAL OBJECTIVES (VIABLE FOOD PRODUCTION AND BALANCED TERRITORIAL DEVELOPMENT)?

8.2.1 UNDERSTANDING OF THE QUESTION

This evaluation question is about the coherence of the instruments and measures designed for biodiversity with the CAP's other general objectives: viable food production with a focus on agricultural income, agricultural productivity and price stability; and balanced territorial development with a focus on rural employment, growth and poverty in rural areas. To ensure that coherence as an evaluation theme covers all CAP general and specific objectives, this question also covers the coherence with the CAP's environmental objectives other than biodiversity under the general objective of sustainable use of natural resources and climate action, i.e. greenhouse gas emissions, soil and water.

8.2.2 PROCESS AND METHODOLOGICAL APPROACH

The first step assesses coherence at a theoretical level. This has involved an evidence-based assessment of the extent to which the CAP instruments and measures related to biodiversity are working in a way that is complementary, neutral or in contradiction with the CAP's other objectives. Observed and potential conflicts and synergies between the measures of focus and other CAP general and specific objectives are identified and discussed.

The second step is an assessment of the actual coherence between the biodiversity related CAP instruments and measures and the CAP's other general objectives. Coherence can vary significantly depending on the way biodiversity related measures have been implemented in Member States and regions. The first step has therefore been complemented by examples drawn from the case studies as well as from previous evaluations and literature in order to build an informed judgement about the coherence of the way instruments and measures operate in practice.

8.2.3 ANALYSIS

8.2.3.1 The coherence of CAP biodiversity related instruments and measures with the objective of viable food production and balanced territorial development

Most of CAP biodiversity related measures were found not to raise particular coherence issues with the general objectives of viable food production and balanced territorial development. They do not lead to conflicts but equally do not create synergies with these objectives. A few biodiversity related CAP instruments and measures however do interact with these objectives, in particular with the objective of viable food production.

Cross-compliance instruments SMRs 2 and 3 theoretically conflict with aspects of the viable food production objective because their effect is that farmers may incur administrative penalties in case of non-compliance with the requirements of the Habitats and Birds Directives to which they relate, which would reduce farm incomes. However, SMR 2 and 3 are assessed as coherent on the basis that farmers who comply will not receive penalties. GAEC 7 (retention of landscape features) may reduce farms' productivity where it limits farmers' ability to increase field sizes. Business related co-benefits may also arise however from retained landscape features in the long term, for example better water retention, wind protection and biological control. For this reason, GAEC 7 cannot be assessed as being incoherent with the CAP's viable food production objective. The coherence of this measure with balanced territorial development is neutral or slightly positive considering the positive impacts resulting from the retention of features on landscapes, and the range of wider rural economic activities that can benefit from and be linked to landscape character, notably tourism.

Under greening, the crop diversification measure in principle conflicts with the objective of enhancing farm income, as it limits farmers' ability to choose which crops to produce. In practice, however, more diversified farms have more stable incomes as a more diverse portfolio of agricultural products provides some protection against unexpected market movements. In the longer term, crop diversification could have a positive effect by reducing the vulnerability of farm income to movements in the price of a single crop. Furthermore, the greening evaluation (Alliance Environnement and Thünen-Institut, 2017) found that the crop diversification measure had overall a limited impact on production, except for some specific Member States characterised by a previously low level of diversification of their cropping patterns (e.g. ES, in the case studies for that evaluation). In the longer term, crop diversification should also improve farms' resilience against pests and diseases which can have substantial negative effects on agricultural income. In conclusion, the measure does not compete with or contradict the objective of viable food production.

The permanent grassland ratio requirement has theoretical economic impacts on income and competitiveness similar to those of the crop diversification measure, since it can act as a constraint on farmers converting grassland to arable. The greening evaluation (Alliance Environnement and Thünen-Institut, 2017) assessed that the permanent grassland ratio was having little, if any, impact on either income or competitiveness. The extent to which the measure restricts the actions of farmers greatly depends on national circumstances. Some instances of incoherence were evidenced by the greening evaluation only where strict application of a ratio at regional level using authorisations impedes farmers' economic room for manoeuvre but overall this was the exception rather than the norm.

Lastly, the EFA measure is also in theory in contradiction with the objective as its requirements may reduce the land available for productive purposes. However, since the legislation offers Member States a very wide range of EFA elements to choose from, including both productive and non-productive ones, the potential conflict is small. In practice, Member States and farmers have used this flexibility and made their choices so as to avoid conflicts with the objectives of income and competitiveness (Alliance Environnement and Thünen-Institut, 2017).

Amongst RDP measures, agri- and forestry-environment-climate measures (M10 and M15) compensate farmers for the income foregone and additional costs potentially arising from the implementation of biodiversity related actions (amongst other topics). There should be no (or very little[71]) impact on farm net incomes, if farmers choose to take up these schemes. There may be cost-savings too, although these are often factored into the payment calculations (e.g. savings related to the reduced use of pesticides). M10 and M15 may indirectly support the maintenance or creation of new rural businesses, thereby supporting territorial development, for example cheese making using traditional livestock breeds, or tourism dependent on the presence of emblematic species. The non-productive investments measures (M4.4 and M8.5) were also found to be beneficial in this respect. For example M8.5 is used in Slovakia to support the development of small tourism infrastructure and in Germany to create nature friendly access to forest areas to promote recreation.

The organic farming measure (M11) is theoretically coherent with the objective of viable food production. As with M10 and M15 above, the payment available is intended to compensate only for additional costs and income foregone, leaving net income unchanged [73]. Organic farming may indirectly support the maintenance or creation of rural businesses, e.g. short supply chains, but the evidence collected does not enable an assessment to be made on this point.

Measure M12 compensates farmers for the costs incurred or income foregone as a result of requirements arising from the Nature Directives. This measure has therefore a positive impact on agricultural incomes as it provides farms with financial support to comply with legal requirements. It is coherent with the objective of viable food production M12 support may help farms in Natura 2000 areas to continue operating so it is coherent with the objective of balanced territorial development.

CAP measures funding the provision of biodiversity related training and advice through M1 and M2 have the potential to be synergistic with the objectives of viable food production and balanced territorial development, if Member States/regions decide to use them in this way. Similarly, M16 has the potential to be used to create synergies between biodiversity protection and other objectives of the CAP, notably economic outcomes (e.g. M16.1 funding for EIP Operational Groups) and environmental outcomes (e.g. M16.5 supporting collective action for the environment and GHG reduction). However, it has been difficult to assess the coherence of these measures in practice as little information was found on whether training/advice or projects funded were actually biodiversity related, let alone whether they also incorporated any wider considerations, such as viable food production or balanced territorial development.

For example, under M1, a number of vocational training topics appeared to be clearly designed to address several CAP objectives, e.g. sustainable fertiliser and pesticide use in Croatia, solutions at the interface between innovation, environment and climate mitigation/adaptation in the Netherlands or the development of Farm Improvement Plans in Ireland; but the extent to which any of these might also address biodiversity is unclear. For these measures, while EU legislation equips Member States/regions with the right toolbox to treat biodiversity (or environmental objectives more widely) and economic and social topics jointly and therefore create synergies, there is too little information to conclude whether such synergies occur in practice.

8.2.3.2 The coherence of CAP biodiversity related instruments and measures with the specific objectives of water, soil and greenhouse gas emissions

In theory all biodiversity related CAP instruments and measures can work coherently towards the specific objectives of sustainable use of natural resources other than biodiversity, especially with water and soil. This is explained by the fact that actions which promote biodiversity tend to lead to, or rely upon, a better environment, of which water and soil are essential components while GHG emissions reductions are often achieved in the process (e.g. through growing vegetation).

No biodiversity-related measures appear to work incoherently with these objectives and this was confirmed by the analysis of coherence in practice. The most important biodiversity related CAP measures appear to indeed deliver a range of environmental co-benefits; however, for a number of

[71] Payment calculations are made either nationally or regionally and not at the farm level and so the payment level chosen will have some impact on an individual farm's income, but it should be very limited. Those estimating they would lose too much are not likely to enter these schemes.

measures, the actual coherence was found to be less positive compared to the theoretical coherence assessment. These effects are explained below.

Biodiversity related measures which are particularly coherent with the water, soil and greenhouse gas emissions in practice include GAEC 7, ESPG, EFAs, M4.4, M10, and M11. For forestry, the biodiversity related measures M8.5 and M15 can also work coherently with these objectives (see below).

The retention of landscape features under GAEC 7, some EFA options and where funded by M4.4 (e.g. creation of hedgerows) deliver water and soil benefits in practice (slowing down water run-off, protecting soil against erosion, etc.) while trees and hedges act as carbon sink.

The EFA obligation has the potential to deliver various types of synergies with the water, soil and GHG emissions sub-objectives but the extent to which these are occurring on the ground depends on the EFA options chosen and their management. The ban on pesticide use on certain EFA options enables synergies with water and soil to be realised in practice and is therefore fully coherent with these objectives.

The ban on ploughing resulting from the ESPG designation leads to co-benefits for water, soil and GHG emissions. These arise from the absence of ploughing in these areas and even though the decisions about what areas to designate as ESPG have not necessarily taken these issues into account[72].

AECM schemes (M10) designed for biodiversity and the organic measure (M11) are likely to lead to lower levels of artificial fertiliser and pesticide use, with positive impacts on the three other environmental sub-objectives. On the other hand, both measures may promote practices resulting in lower yields, for example more extensive production methods or organic livestock farming, which can have a negative impact on GHG emission efficiency (Alliance Environnement and Ricardo-AEA, 2018). The extent to which the actions supported for biodiversity purposes generate environmental co-benefits in practice depends on the specific types of activities funded and the context. In the case studies, many examples confirm that biodiversity agri-environmental schemes work coherently with water and soil objectives (see Box 21). AECM operations are found along a gradient where their contribution to Priorities/Focus Areas other than Focus Area 4A (biodiversity) is more or less explicit, and their design/targeting reflects this.

Box 21: Examples of agri-environment-climate working synergistically for multiple environmental objectives in the case studies

Many agri-environment-climate schemes and operations designed to protect and enhance biodiversity were found to work coherently with the other environmental sub-objectives of the CAP.

In **Croatia**, a number of biodiversity-related AECM operations could lead to co-benefits for water, soil and reduced GHG emissions. For example the preservation of drystone walls and hedges could reduce soil erosion from water and wind, improve water quality and water retention, and sequester carbon. The creation of field strips can prevent soil erosion, and the use of pheromone traps for biological control and the mechanical removal of weed control can both improve water quality through reductions in pesticide use.

In **Germany** (B-W), AECM operations requiring for instance crop diversification, no use of pesticides, no fertiliser on arable land, or extensive management of grassland, generate co-benefits for water quality, soil protection and reduced GHG emissions.

In **Ireland** the Burren programme which supports the extensive management of limestone pavement contributes to protecting biodiversity, water and landscape character.

In **Latvia** the operation to maintain field stubble in the winter period helps to avoid soil erosion and nutrient run off as well as providing food resources for wild animals and birds.

In **Portugal**, the integrated farming and agro-forestry mosaics under M10 are schemes which provide wide-ranging environmental benefits such as improved water quality, soil erosion and desertification and reductions in GHG emissions by maintaining extensive or traditional systems.

[72] The criteria which Member States can use to designate ESPG beyond Natura 2000 include the occurrence of carbon rich soil, soils subject to a high erosion risk and land which is in a sensitive area from a water perspective (Delegated Regulation No 639/2014). In practice, these criteria have rarely been used by Member States to designate ESPG (there are a few examples).

Slovakia has programmed an operation to promote integrated production systems in horticulture and viticulture, leading to lower pesticide and fertiliser use and resulting biodiversity, water, soils and GHG emissions benefits.

Forestry measures M8.5 and M15 are respectively programmed in six and three of the case study RDPs (see also ESQ 1). Where programmed, their implementation in practice works coherently with the water, soil and GHG emissions objectives of the CAP (see Box 22).

Box 22: Examples of M8.5 (investments for forest ecosystems) and M15 (forest-environment-climate) operations working synergistically across the CAP's environmental objectives

In **Slovakia**, M8.5 is programmed with a view to support 'the stability of the forests and their resistance to climate change'. The types of actions supported include some in support of biodiversity, notably the creation/improvement of nesting opportunities for birds in the forests and other elements enhancing the biodiversity of forest ecosystems and the development of Forestry Management Plans, but also the building and construction of small tourism infrastructure which should benefit rural growth and employment under the balanced territorial development objective of the CAP.

In **Germany**, the M8.5 operation 'nature conservation in forest and improvement of the forests' regeneration function' focuses on biodiversity but also on small water bodies (wetlands, streams ≤ 10 m wide, still waters <1 ha in forest). As in Slovakia, the scheme includes the 'creation of nature-compatible and unrestricted accessible infrastructure to improve the recreational value of the forest'.

In **Portugal**, the forest-environment-climate measure M15.1 features an operation for the maintenance and the recovery of riparian forests, which has biodiversity and water objectives.

In **Slovakia** again, M15.1 and M15.2 are schemes targeted to SPA and SAC forests only, hence a primary biodiversity focus but climate is an explicit objective of these schemes as well. In addition, the use of plant protection products is excluded on aided forest land, which should generate water and soil benefits too.

Source: own compilation

Crop diversification and the maintenance of permanent grassland under greening are also coherent with the water, soil and GHG emissions objectives, but the extent to which benefits are delivered in practice is dependent on farming practices which are not stipulated by these measures. For these two measures, there are no rules that would prevent activities that could be counter to achieving water, soil and GHG objectives from taking place (Alliance Environnement and Ricardo-AEA, 2018; Alliance Environnement and Thünen-Institut, 2017). For this reason, in practice these measures were shown to deliver fewer environmental co-benefits than would have been theoretically possible.

The actual impacts of the permanent grassland ratio on soils, water and GHG emissions are influenced strongly by the management of permanent grassland. Regular ploughing and reseeding and the application of pesticides and fertilisers or indeed its conversion to arable, even if replaced by grassland elsewhere, are permitted under this sub-measure. Where this occurs, the PG maintenance measure may lead to no synergies to address soil and water objectives or the protection of soil carbon stocks.

Table 23: Assessment of the coherence of the CAP's biodiversity measures with its three objectives

	Viable food production (agricultural income, agricultural productivity, price stability)	**Balanced territorial development** (rural employment, rural growth, poverty in rural areas)	**Sustainable use of natural resources and climate action** (greenhouse gas emissions, water and soils)
Horizontal measures - Regulation (EU) No 1306/2013			
FAS	**0**	**0**	**0**
SMR 2	**0**	**0**	**0**
SMR 3	**0**	**0**	**0**
GAEC 7	**0**	**0**	**+1**
Pillar 1 - Regulation (EU) No 1307/2013			
Greening: Crop diversification	**0**	**0**	**0**
Greening: PG ratio	**0**	**0**	**0**
Greening: ESPG	**0**	**0**	**+1**
Greening: EFAs	**0**	**0**	**+1**
Pillar 2 - Regulation (EU) No 1305/2013			
M1 Knowledge transfer and information actions	-	-	-
M2 Advisory services, farm management and farm relief services	-	-	-
M4.4 Non-productive investments	**0**	**+1**	**+1**
M7.1 Drawing up and updating […] protection and management plans relating to Natura 2000 sites and other areas of high nature value	-	-	-
M7.6 Studies/investments on cultural and natural heritage	-	-	-
M8.5 Investments for the resilience and environmental value of forest ecosystems	**0**	**+1**	**+1**
M10 Agri-environment-climate	**0**	**+1**	**+1**
M11 Organic farming	**0**	**+1**	**+1**
M12.1 and M12.2 Natura 2000 payments	**+1**	**+1**	**0**
M15 Forest-environmental and climate services and conservation	**0**	**+1**	**+1**
M16.5 Support for joint action on climate and environmental projects	-	-	-

Source: own analysis

Legend: +1 (green) synergistic; 0 (blue): coherent or neutral relationship; -1 (red): incoherent; - (white): inconclusive assessment.

8.2.4 MAIN FINDINGS

The analysis has found that the CAP instruments and measures related to biodiversity are generally coherent with the CAP general objectives of viable food production and balanced territorial development. Although biodiversity instruments and measures could in theory lead to conflicts with the viable food objective, by constraining farm operations, the analysis shows that this rarely is the case on the ground. In particular, the greening EFA obligation have had little impact on agricultural income and productivity overall because Member States and farmers have used the flexibility offered in the legislation to make EFA choices so as to avoid conflicts with the objectives of income and competitiveness. The greening crop diversification measure also had an overall limited impact on production. Area-based RDP measures for biodiversity compensate farmers for the income foregone and additional costs they incur when enrolling in these schemes, which in principle means there is little impact on farmers' income. The biodiversity measures also have the potential to work synergistically to achieve the viable food production objective by improving the resilience of farming systems against climatic shocks and providing natural pest control and pollination services.

There are examples in the case studies where biodiversity related RDP measures (M10, M12 and M8.5) were found to deliver synergies with the objective of balanced territorial development through creating

opportunities for rural businesses and contributing to rural growth, for example, by adding value to products or tourism.

Overall, there is a high level of coherence between biodiversity related CAP instruments and measures and the other environmental objectives of the CAP (water, soil and GHG emissions), both in theory and in practice. However, coherence is often achieved indirectly with synergies occurring without measures being actively designed for these to be achieved.

8.3 ESQ 13: To what extent are CAP instruments and measures coherent with other related EU and national policies relevant for biodiversity (e.g. Birds and Habitats, Nitrates and Water Framework Directives, Sustainable Use of Pesticide Directive, ESI Funds)? In particular, to what extent have CAP instruments contributed to the actions of Target 3 of the EU Biodiversity Strategy to 2020, namely to

a) Enhance direct payments for environmental public goods in EU's CAP,
b) Better target Rural Development to biodiversity conservation,
c) Conserve Europe's agricultural and forest genetic diversity,
d) Encourage forest holders to protect and enhance forest biodiversity,
e) Integrate biodiversity measures in forestry management plans.

8.3.1 Understanding of the question

This question is about the external coherence of the CAP's instruments and measures with the other EU and national policies that are related to biodiversity. The evaluation tests the hypothesis that they are coherent with other related EU national and policy objectives, identifies any contradictions or conflicts and then describes the implications of these findings.

8.3.2 Process and methodological approach

The first step has been to define the scope of the analysis with respect to the inclusion of EU and national policies relevant to biodiversity**.** The Birds and Habitats Directives and the EU Biodiversity Strategy are of most direct relevance to this question. Moreover, as indicated in the ESQ, the actions under Target 3 of the EU Biodiversity Strategy, which is 'To increase the contribution of agriculture and forestry to maintaining and enhancing biodiversity' is of particular relevance. These instruments are therefore subject to a detailed assessment that considers the coherence of each of the CAP measures, as set out below under steps 2 and 3. At the same time, this also addresses coherence with Target 1 of the Biodiversity Strategy, which is to fully implement the Birds and Habitats Directives.

In addition, it is appropriate to consider the CAP measures' coherence with Target 2 of the EU Biodiversity Strategy, as this aims to maintain and enhance ecosystems and their services by establishing green infrastructure and restoring at least 15% of degraded ecosystems. A number of other EU policies that are not focused on biodiversity, nevertheless have key roles to play in its conservation and restoration and are potentially affected by the CAP measures. Based on the factors affecting biodiversity and landscapes (see section 2.3), those of most relevance to the assessment of external coherence are considered to be the Nitrates Directive, WFD and Sustainable Use of Pesticides Directive, all of which are mentioned in the ESQ. In addition to these, the National Emissions Ceiling Directive (NECD) has important biodiversity related objectives, particularly relating to reducing ammonia emissions (including from agriculture), which have significant impacts on sensitive ecosystems. The coherence of the CAP measures with these instruments is therefore assessed in general terms referring to more detailed studies where they have been carried out.

National policies relating to biodiversity also need to be considered. Of most relevance are the PAFs for 2014-2020 (which Member State authorities have developed to identify priority actions for the implementation of the Natura 2000 network). In addition, National Biodiversity Strategies and Action Plans (NBSAPs), as produced in accordance with requirements under Article 6 of the Convention on Biological Diversity (CBD), are also considered as these set out wider biodiversity needs and priorities.

The second step comprises an analysis of the theoretical coherence of the CAP instruments and measures with the objectives of the selected biodiversity related instruments (using the same approach as under ESQ 12). Based on an examination of the selected biodiversity instruments and their objectives, an assessment is made of the coherence of the CAP instruments and measures with these, in terms of whether they are synergistic or complementary; neutral; or, contradictory. These assessments firstly are carried out for each CAP instrument and measure (whether or not they are shown to have biodiversity as their intervention logic in relation to the Nature Directives and Biodiversity Strategy Target 3 actions). Secondly, a more general assessment of the coherence of the CAP instruments and measures with the other selected biodiversity related instruments is made (drawing on other studies where relevant), with specific issues discussed where merited.

The third step is an assessment of the actual coherence of the CAP instruments and measures in practice, as implemented at a national level in relation to the objectives of the Birds and Habitats Directive, Target 3 of the Biodiversity Strategy and the NBSAPs. This draws on the case studies' examination of the way CAP measures have been implemented in the Member States and regions and uses this to assess their actual coherence with the biodiversity policies in the Member State concerned. This takes particular account of the priorities identified in the national / regional PAFs for 2014-2020 as well as NBSAPs etc. However, as ESQ 7 has considered the degree to which CAP measures are addressing biodiversity priorities indicated in the PAFs and NBSAPs, this analysis draws on that information rather than duplicating it here. Instead, the focus is primarily on whether there are instances of incoherence.

8.3.3 ANALYSIS

8.3.3.1 The coherence of CAP measures with the objectives of the Birds and Habitats Directives and EU Biodiversity Strategy

The assessment of the theoretical coherence of CAP measures with the Nature Directives, and actions under Target 3 of the EU Biodiversity Strategy, set out in Table 24 reveals that no measures are considered to be fully incoherent (i.e. contradicting or competing) with any of these instruments and actions. Most of the CAP measures with the potentially highest impacts, as assessed in ESQ 4 are supportive. Most notably, these include the ESPG greening instruments, AECM, forest measures, the Natura measure and the organic measure. The designation of ESPG within Natura 2000 sites is coherent with, and possibly synergistic with Natura 2000 protection requirements under Article 6 of the Habitats Directive. Although it might be considered to duplicate the Habitats Directive's provisions, in practice it bolsters existing protection, which has been shown to be weak in some cases (EEA, 2015; ESQ 5). It also has the potential to complement the Habitats Directive, and protect green infrastructure in the wider environment, by enabling ESPG designation outside the Natura 2000 network, but in practice very little land is designated in such areas in most Member States (ESQ 1, Table 7). Other instruments that are in theory coherent, but with lower biodiversity impacts, are cross-compliance SMRs 2 and 3 and GAEC 7 (although this is affected by national choices), the permanent grassland ratio greening instrument and Pillar 2 measures for cooperation (M16) and LEADER (M19).

Table 24: Summary assessment of the coherence of CAP measures with the Birds and Habitats Directives and actions under Target 3 of the EU Biodiversity Strategy

Measure	Biodiversity strategy Target 3					
	Birds & Habitats Directives	Action 8: Enhance CAP direct payments	Action 9: Better target Rural Development	Action 10: genetic diversity	Action 11: Encourage forest conservation	Action 12: Biodiversity measures in forest plans
Horizontal measures - Regulation (EU) No 1306/2013						
FAS	**M**	**M**		**+1**	**+1**	**+1**
Cross-compliance (SMRs and GAEC)	**+1**	**+1**	**+1**	**0**	NA	NA
Direct Payment Regulation - Regulation (EU) No 1307/2013						
BPS & SAPS	**M**	**M**	**0**	**+1**	NA	NA
Redistributive payment	**M**	**M**	**0**	**0**	NA	NA
Greening: Crop diversification	**M**	**+1**	**0**	NA	NA	NA
Greening: PG ratio	**+1**	**+1**	**0**	**0**	NA	NA
Greening: ESPG	**+1**	**+1**	**0**	**+1**	NA	NA
Greening: EFAs	**M**	**+1**	**0**	**0**	NA	NA
VCS	**M**	**M**	**0**	**+1**	NA	NA
SFS	**M**	**M**	**0**	**+1**	NA	NA

Measure	Biodiversity strategy Target 3					
	Birds & Habitats Directives	Action 8: Enhance CAP direct payments	Action 9: Better target Rural Development	Action 10: genetic diversity	Action 11: Encourage forest conservation	Action 12: Biodiversity measures in forest plans
Crop-specific payment for cotton	-	-	0	NA	NA	NA
Common Market Organisation - Regulation (EU) No 1305/2013						
Operational programmes in the fruit and vegetables sector	-	-	0	NA	NA	NA
Rural Development Regulation - Regulation (EU) No 1305/2013						
M1 Knowledge transfer and information actions	M	M	M	+1	+1	+1
M2 Advisory services, farm management and farm relief services	M	M	M	+1	+1	+1
M3 Quality schemes	M	0	M	+1	NA	NA
M4 Investments in physical assets	M	0	M	+1	NA	NA
M5 Restoring and prevention actions after natural disasters	M	0	M	NA	+1	0
M7 Basic services and village renewal	M	0	M	+1	NA	+1
M8 Forest investments	M	NA	M	NA	M	M
M10 Agri-environment-climate	+1	0	+1	+1	NA	NA
M11 Organic farming	+1	0	+1	+1	NA	NA
M13 ANC	M	M	0	+1	NA	NA
M12 Natura 2000 and WFD payments	+1	0	+1	+1	+1	+1
M15 Forest-environment-climate	+1	NA	NA	NA	+1	+1
M16 Cooperation	+1	0	+1	+1	+1	+1
M19 LEADER	+1	0	+1	+1	NA	NA

Note: Assessments are only made where the measure has the potential to have an effect

Actions under Target 3:

- Action 8: Enhance CAP direct payments to reward environmental public goods such as crop rotation and permanent pastures; improve cross-compliance standards for GAEC (Good Agricultural and Environmental Conditions) and consider including the Water Framework in these standards.
- Action 9: Better target Rural Development to biodiversity needs and develop tools to help farmers and foresters work together towards biodiversity conservation.
- Action 10: Conserve and support genetic diversity in Europe's agriculture.
- Action 11: Encourage forest holders to protect and enhance forest biodiversity.
- Action 12: Integrate biodiversity measures such as fire prevention and the preservation of wilderness areas in forest management plans.

Legend: -1 (red) = contradicts or competes; 0 (blue) = neutral or no particular association; +1 (green) = positive or synergistic; M (amber) = mixed; - (white): inconclusive assessment; NA (white): not applicable.

The remaining instruments and measures are considered to have the potential to be both coherent and incoherent with biodiversity objectives, depending on their sub-measures and context, which can lead to differing effects on farming systems and practices, and in turn biodiversity. Most notable amongst

these are the direct payments measures and VCS. This is because, as discussed in ESQs 1 and 4, whilst these measures are likely to reduce agricultural abandonment and thereby help maintain HNV farmland and associated biodiversity, the support has been assessed in one evaluation study question (see ESQ 3) as playing a possible role with an unintended effect particularly on more productive land of facilitating agricultural improvements that are damaging for biodiversity. Furthermore, as VCS is still coupled to production under certain conditions, it can also create an incentive for agricultural intensification unless a Member State has taken steps to limit this. ANC payments may also have mixed effects that are similar to those of the other direct payments, although in this case they may be expected to be more likely to help maintain HNV systems rather than fund agricultural improvement, because by definition they are targeted towards areas where such improvements may not be practical or economically advantageous.

A further, more fundamental issue is that the eligibility criteria for direct payments exclude large areas of grasslands, shrublands and agro-forestry (i.e. dehesa and other wood pastures) of high biodiversity value (much of which is within Natura 2000 areas) on the basis that they are not agriculturally productive, or readily capable of being returned to agricultural production. Whilst the 2013 CAP reform has probably reduced the eligibility problem, there is evidence of ongoing conflicts between nature conservation requirements and the CAP eligibility rules, as for example indicated in the Ireland and Slovakia case studies, where rules incentivise farmers to remove scrub and other vegetation, which is often of high biodiversity value. Thus, this is a clear incoherence between CAP direct payment eligibility rules as implemented by these Member States and the objectives of the Birds and Habitats Directives and Action 8 of the EU Biodiversity Strategy, and internal incoherence concerning the CAP's environmental objectives.

The remaining Pillar 1 greening instruments, diversification and EFAs, generally provide overall benefits for biodiversity that are coherent with the objectives of the biodiversity instruments considered here. However, they may also have unintended effects, such as declines in the area of stubbles that are retained over winter, thereby reducing food availability for seed eating birds, and some EFAs can also create ecological traps if inappropriately managed. Consequently, the greening evaluation considered that both measures have mixed coherence with EU biodiversity objectives (Alliance Environnement and Thünen-Institut, 2017), and although some rule changes have reduced the risk of unintended detrimental impacts, the general conclusions on coherence remain valid.

RDP measures, other than those mentioned above, are also considered to have mixed positive and negative effects on biodiversity depending on the particular sub-measures in question and the actions that they support. For example, as described in ESQ 4, measures have the potential to be coherent where they fund actions that help maintain HNV farming systems by increasing their profitability whilst maintaining the habitats and farming practices that are of key importance for their associated biodiversity. On the other hand, such measures would be incoherent with biodiversity objectives where they support agricultural improvements, without environmental conditions, that lead to detrimental changes in habitats and farming practices, such as drainage, irrigation or use of damaging machinery. Similarly, the forest measures can be coherent where they fund the restoration of forest habitats by e.g. funding the planting of local native species in place of non-native plantations, or the restoration of natural forest hydrology (Box 9). Forest measures can, however, also be used to fund the maintenance of forest drainage systems that degrade forest habitats, plantations of non-native species, or forest roads in previously untracked forests. The agricultural investment measures may be coherent if they, for example, fund irrigation system improvements that reduce pressures on natural water-dependent habitats and land consolidation that creates additional semi-natural habitats and landscape diversity, or the opposite.

8.3.3.2 The coherence of CAP measures with other selected EU biodiversity related instruments

Although it is beyond the scope of this evaluation to carry out a detailed assessment of the coherence of the individual CAP measures with the other EU policy instruments that are affected by the CAP and have significant effects on biodiversity, it is apparent that similar coherence issues arise to those discussed above in relation to key biodiversity objectives. Firstly, no CAP measures appear to be clearly incoherent with the objectives of the WFD, Nitrates Directive, NECD and Sustainable Use of Pesticides Directive (Box 23). Furthermore, measures that are most positive and coherent with respect to biodiversity focussed instruments, namely ESPG, AECM, organic farming and the Natura 2000 measure are also coherent with these other environmental instruments, as they are considered to lead to lower levels of artificial fertiliser and pesticide use and do not encourage detrimental changes. As with the biodiversity instruments, the mixed effects of direct payments, and possibly ANC, on farming systems

and practices may lead to incoherencies if they encourage agricultural improvements and intensification although direct evidence of this was not found during this study. Of particular concern are the effects of the VCS measure on livestock, as it can lead to high stocking rates, which is incoherent with the NECD objective to reduce ammonia emissions. Higher stocking rates also tend to require higher levels of fertiliser use, and lead to higher levels of animal waste and soil erosion resulting in nutrient-rich run-off with water quality and ecosystem impacts that are not coherent with WFD objectives.

It is evident that the cross-compliance elements have a more important role to play in tackling water pollution issues, than meeting biodiversity objectives, and are coherent with WFD objectives. All cross-compliance elements can contribute to improving water quality, thereby benefiting aquatic biodiversity, by reducing the source of pollution (e.g. SMR 1, SMR 10, GAEC 3), reducing run-off (e.g. GAEC 1, GAEC 4), leaching (e.g. GAECs 5, 6, 7) and erosion (e.g. GAEC 5, 7)[73]. These measures are further supported by the FAS, which is required to help farmers comply with EU farming legislation.

As for biodiversity, the coherence of other Rural Development measures with other biodiversity related measures depends on the sub-measure, its context and the particular activities that are supported. Therefore, for example, in addition to the measures listed above, WFD objectives that also provide biodiversity benefits may be supported by M1 and M2 measures on farmers' awareness and knowledge, investment measure M4, measures M8 and M15 regarding forest areas, and cooperation measure M16. Measure M4.1 can support investments in new equipment for manure management, waste storage and treatment and can support precision agriculture equipment. However, where these support farming improvements such as drainage measures, irrigation, and other actions that could lead to agricultural intensification, then the measure will be incoherent with WFD objectives.

Cross-compliance elements currently do not include measures that actively promote the sustainable use of pesticides or pesticide use reduction, although they support compliance with application rules. The ban on pesticide application in nitrogen-fixing EFA crops is coherent with the Sustainable Use of Pesticides Directive. RDP measures, particularly AECM, can be synergistic by supporting integrated pest management methods and avoidance of use of certain products, supported by advisory measures and farm exchanges / pilot farm networks. Other measures for agriculture or forestry may prohibit the use certain products if Member States so decide.

Box 23: Relevant objectives of EU instruments that are affected by the CAP and have a significant role to play in supporting EU biodiversity objectives

National Emissions Ceiling Directive (Directive (EU) 2016/2284: Member States shall, as a minimum, limit their annual anthropogenic emissions of …. ammonia in accordance with the national emission reduction commitments applicable from 2020 to 2029 and from 2030 onwards, as laid down in Annex II.

Nitrates Directive (91/676/EC): To reduce the pollution of water caused or induced by the application and storage of inorganic fertiliser and manure on farmland and prevent further such pollution to safeguard drinking water supplies and to prevent wider ecological damage through the eutrophication of freshwater and marine waters.

Water Framework Directive (2000/60/EC): To enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands, promote the sustainable use of water and reduce water pollution

Sustainable Use of Pesticides Directive (2009/128/EC): To reduce risks and impacts of pesticide use on human health and the environment and encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides

[73] GAEC 1 requires the establishment of buffer strips along watercourses, GAEC 3 targets groundwater protection, GAEC 4 requires minimum soil cover, GAEC 5 aims at limiting erosion, GAEC 6 targets the maintenance of soil organic matter and GAEC 7 promotes the retention of landscape features, SMR 1 targets nitrates pollution and SMR 10 concerns the use of plant protection products.

8.3.3.3 *The coherence of CAP instruments and measures as implemented in the case study Member States with the objectives of the Birds and Habitats Directives and EU Biodiversity Strategy and national biodiversity priorities*

The degree to which the CAP measures as implemented in the case study Member States are generally coherent with the Birds and Habitats Directives and EU Biodiversity Strategy and national biodiversity priorities varies. Most implementation decisions do not conflict with EU and national biodiversity conservation needs as set out in NBSAPs and the 2014-2020 PAFs, so are coherent in these very broad terms. Most Member States also appear to have taken these biodiversity needs into account in the design of their RDPs, primarily through the development of required AECM schemes, with supporting measures in some cases (e.g. support for management planning); although, as discussed in ESQ 7, the degree to which all available measures are used in relation to national priorities is more mixed. Furthermore, in some Member States there are cases where the application of RDP measures has the potential to be incoherent with biodiversity needs, as they could lead to damaging agricultural improvements or inappropriate afforestation. For example, in Latvia biodiversity safeguard criteria (requiring that only native tree species are planted) are in place but they allow for exceptions on climate adaptation and economic grounds in low fertility soils. Moreover, they appear to be insufficient to prevent afforestation under M8.1 in locations that are inappropriate from a biodiversity viewpoint, e.g. in valuable mosaic agricultural landscape. Afforestation measures are also considered to be potentially damaging for biodiversity in Hungary despite authorisation processes being in place in protected areas, as large areas of lowland agricultural land have been afforested causing significant habitat changes at landscape level.

8.3.4 MAIN FINDINGS

Most of the CAP instruments and measures are theoretically coherent with other related EU and national policies relevant for biodiversity, in particular the Nature Directives and the Target 3 actions of the EU Biodiversity Strategy. These include those with the highest potential biodiversity impacts, most notably the designation of ESPG, AECM, the Natura 2000 measure, forest measures and the organic measure. However, ANC, direct payments and VCS have the potential to be both coherent and incoherent, with the highest risks of incoherence arising from direct payments, and especially VCS (as this could incentivise higher production) unless environmental conditions are attached. Some RDP measures may also be both incoherent and coherent with biodiversity needs depending on national choices regarding their objectives, design and environmental conditions.

In the case studies, Members States' decisions on the use of the CAP instruments and measures were mostly broadly coherent with biodiversity needs as set out in the PAFs and NBSAPS. Most Member States took biodiversity needs into account in the design of their RDPs, primarily through the development of required AECM schemes, with supporting measures in some cases. However, RDP measures could be more coherent with specific biodiversity priorities in some Member States. In relation to Pillar 1, mixed coherence was found in the case studies. In particular, very limited ESPG designation occurred outside Natura 2000 areas, despite the protection of semi-natural grasslands outside the Natura 2000 network being a very high priority requirement in all Member States.

9 RELEVANCE

9.1 ESQ 14: TO WHAT EXTENT DO THE CAP INSTRUMENTS AND MEASURES CORRESPOND AND ALLOW ADAPTATIONS TO THE CURRENT NEEDS AND/OR NEW OR EMERGING ISSUES IN RELATION TO BIODIVERSITY AND LANDSCAPES IN AGRICULTURAL AND FORESTRY AREAS?

9.1.1 UNDERSTANDING OF THE QUESTION

The assessment of the extent to which CAP instruments and measures address the current needs, and/or new or emerging issues facing biodiversity in agricultural or forest areas is not straightforward as biodiversity is complex and multi-dimensional and therefore needs vary. Needs also vary according to policy objectives. At an EU level, whilst the overall objective of EU biodiversity policy is currently to halt the loss of biodiversity by 2020, priority actions are to achieve the favourable conservation status of BHD habitat and species, as these are most threatened and of EU level conservation importance. Therefore, whilst the relevance of the CAP measures to achieve the high-level goal is taken into account under this question, the assessment mainly focusses on the EU level needs of BHD species and habitats. However, as this question concerns the relevance of interventions, which is the extent to which their objectives are pertinent to identified needs, it only relates to the CAP instruments and measures that have biodiversity objectives. For such instruments and measures it builds on the closely related analysis of coherence under ESQ 13.

A further complication is that biodiversity needs tend to vary according to scale and location. Therefore, the analysis also considers the relevance of the CAP instruments and measures, as implemented in the case study Member States/regions, in relation to their potential contributions to EU objectives and their own national priorities.

9.1.2 PROCESS AND METHODOLOGICAL APPROACH

The analysis has been carried out in two main steps. The first step examines the EU level relevance of each of the CAP instruments and measures that aim to contribute to biodiversity conservation (as indicated in section 3), taking into account their objectives and general implementation as described in ESQ 1 and the pressures and threats (including emerging issues) that they address, as identified in the literature and data reviewed for this study. The priorities and needs identified for the BHD species are then compared with the detailed objectives of the CAP policy instruments/measures to determine the extent to which each instrument or measure, or combination, is being used to address the identified needs. This is carried out using expert judgement, drawing on the previous evaluations of the greening measures (Alliance Environnement and Thünen-Institut, 2017) and forestry measures (Alliance Environnement and EFI, 2017) and other relevant studies (Ecorys, IEEP and WUR, 2016).

The second step examines the relevance of each of the biodiversity related CAP instruments and measures to national needs in each of the case study Member States. This assesses the relevance of the CAP instruments and measures in more depth, and focuses on those with the highest potential relevance and impacts, in particular the ESPG instrument, AECM and Natura 2000 measure (as revealed in ESQs 4 and 5). It mainly draws on the information in the case study reports on the pressures and threats affecting biodiversity, taking into account the priorities and needs that have been identified at a national level in the 2014-2020 PAFs, and in NBSAPs. The analysis builds on and complements the ESQ 13 coherence analysis by considering whether the actual scope, targeting and design of the instruments and measures are relevant to the pressures and threats affecting biodiversity, and in particular the habitats and species that are most at risk. The analysis also identifies situations where instruments and measures with potentially high relevance do not meet their potential.

9.1.3 ANALYSIS

9.1.3.1 The relevance of the CAP biodiversity related instruments and measures to EU biodiversity and landscape needs

Table 25 provides a summary of the assessment of the potential relevance of CAP instruments and measures in relation to the need to address key pressures and threats affecting EU biodiversity and landscape in agricultural and forest areas.

Table 25: Summary assessment of the potential relevance of CAP instruments and measures in relation to the need to address key pressures and threats affecting EU biodiversity and landscape in agricultural and forest areas

		Horizontal							Pillar 1									Pillar 2					
Key pressures / threats affecting agricultural and forest biodiversity in EU	**Extent and magnitude**	FAS	SMR	GAEC	CD	PGR	ESPG	EFA	VCS	M1 & M2	M4.4	M7	M8.5	M10.1	M10.2	M11	M12.1	M12.2	M13	M15.1	M15.2	M16.5
Agricultural abandonment	Wide & moderate	M							M	M	M	L		M					H			M
Loss of semi-natural grassland from agricultural improvements	Wide & very high	M	H	L		L	H		L/D	M	M	M		H		L	H		L?			M
Intensive agriculture on improved grasslands and cropland	Very wide & high	M	M	L	L	M		M		M	M	L		H		M	L		L			L
Loss of non-farmed habitats and landscape features	Wide & high	M	M	L-H				M		M				H		L	L					L
Loss of agricultural & forest genetic diversity	Wide & high	M					L			M	L			M	H	L	L		L	L	H	
Forest management & exploitation intensification	Wide & high												H/D					H		H		
Invasive Alien Species	Wide & moderate	L		(M)						M	L			M						M		M
Climate change	Very wide & moderate& increasing	L		L	L	L	M	L	L	L	L	L	L	M	M	L	L	L	L	M	M	M

Note: Pressures and threats are based on a summary of the analysis presented in ESQ 5 on BHD habitats and species, but also takes into account effects on wider biodiversity and landscapes. Pressures affecting aquatic habitats and the relevance of the CAP instruments in addressing them are not assessed here.

Legend: Potential positive relevance assessment summaries (i.e. NOT taking into account actual Member States implementation choices): H = High (dark green); M = Medium (light green); L = Low (blue). Codes in brackets are for optional instruments and measures. D = may have detrimental impacts depending on Member States implementation and circumstances.

As discussed in section 2.2, the biodiversity importance of agricultural and forest habitats and landscapes declines in proportion to the degree to which semi-natural features are modified by human intervention. Hence those that remain as semi-natural habitats in the face of agricultural and forestry management are by far the most important for biodiversity conservation in the EU. Furthermore, such habitats have declined greatly, and continue to decline and be degraded over much of the EU through agricultural or forestry improvements, or in some cases agricultural abandonment (e.g. EEA, 2015). Consequently, the CAP instruments and measures that target semi-natural habitats and aim to address the key pressures affecting them are of most relevance to achieving EU biodiversity objectives, especially with regards to BHD habitats and species (see ESQ 5). In this regard, AECM (M10.1), Natura 2000 (M12) and forest measures (M15.1) are of particularly high relevance as these (or, in the case of M12, the rules for which the measure provides compensation) can be tailored to the specific needs of the habitats and species concerned and their local context, and targeted to key areas or sites. AECM and the forest measures can therefore play a similar role to Natura 2000 payments if targeted to Natura 2000 sites, but as their take-up by farmers and foresters is voluntary this reduces their relevance to some degree. Cross-compliance SMR 2 and SMR 3 requirements and the ESPG instrument are of high potential relevance on semi-natural grasslands, as they reinforce their protection, and thereby also help to create an incentive for AECM uptake. However, the relevance of ESPG designation is reduced by its focus on preventing ploughing and conversion of grassland, rather than other forms of degradation (e.g. increased use of fertilisers, or drainage, see section 2.2.1).

BPS/SAPS and/or M13 ANC measure, and the VCS instrument, are also relevant to the maintenance of semi-natural habitats, in that they can support the maintenance of HNV farming systems, although this is not their explicit aim. However, their relevance is limited by the fact that support is not connected to biodiversity or other environmental requirements other than through cross-compliance.

In more intensively managed grasslands and croplands, the main conservation needs are to reduce fertiliser and pesticide inputs, and retain or restore important in-field habitats (e.g. fallow, overwinter stubbles, flower-rich or seed-rich margins) and non-farmed landscape features (e.g. patches of semi-natural habitat, hedgerows, trees and ponds). Although such needs are to some extent met by the cross-compliance – GAEC 7 requirement, some Pillar 1 greening measures (especially EFA fallow and landscape feature options) and the M11 organic farming measure, all of these provide rather broad biodiversity benefits, and therefore are of no more than moderate relevance (see ESQ 4). Furthermore, as discussed in ESQs 1 and 4, and below, Member States' implementation choices often considerably reduce the actual relevance of GAEC requirements and Pillar 1 greening measures. Consequently, as is the case with semi-natural habitats, the AECM measure is also of highest relevance to more intensively managed grasslands, croplands and permanent crops due to its ability to be tailored and targeted to the actual needs of the habitats and species concerned. Additionally, AECM can be of particularly high relevance to the conservation of the remaining scarce areas of low intensity arable cropland, pastoral woodlands and traditional orchards and olive groves.

The RDP non-productive measures (M4.4), basic services and village renewal (M7) and investments in forests (M8.5) can also be of moderate to high relevance to biodiversity conservation, in all types of farm and forest, as they can provide funding for complementary actions to those covered by AECM and forest measures. They can also provide complementary support e.g. through the development of Natura 2000 site management plans. However, if their scope and objectives are wide, they are of low relevance to biodiversity conservation in many Member States, as further discussed below.

The principle measures that address agri-genetic needs are the AECM (M10.2) and forest measures (M15.2) that are specially designed for this purpose. However, it is important to note that other CAP instruments and measures, such as AECM, Natura 2000 payments and ANC payments, are also of some relevance as they support the maintenance of semi-natural habitats and HNV farming systems, and often only traditional hardy breeds of livestock can thrive in them.

Other important pressures that can be addressed to some extent by CAP instruments and measures relate to invasive alien species (IAS) and climate change. AECM and the M8.5 and M15.1 forest measures are most relevant to tackling these, but most other measures can also help to address the impacts on biodiversity of climate change to a small degree by increasing the general resilience of the habitats and associated species (e.g. by reducing existing pressures, and improving habitat quality and connectivity).

Consideration of the extent to which the CAP instruments and measures can currently address or be adapted to new and emerging measures can be most reliably assessed by examination of the threats to HD habitats and species that were reported by Member States in their most recent Article 17 report

in 2013[74]. In these reports threats are defined as factors that are expected to occur within the next 12 years (i.e. up to 2025).

Summaries of the pressures and threats affecting HD habitats and species are provided in the State of Nature Report (EEA, 2015), and these indicate that, in general, for cropland, grassland, shrubland and forest habitats, and their associated species, the frequency of predicted threats are generally very similar to the observed pressures in 2013. However, for semi-natural habitats and their associated species small increases in threats from vegetation succession are expected, probably as a result of increasing risks of land abandonment. The EEA report states that air pollution threats are also expected to increase, such as eutrophication from ammonia deposition, possibly due to increases in livestock numbers and/or its cumulative long-term impacts. In cropland ecosystems, threats to HD species from the use of pesticides and the modification of cultivation practices are expected to increase marginally.

The trends foreseen by the EEA closely match recent pressures and in general existing CAP measures have the potential to deal with them. However, based on the reported expected changes in threats, it may be necessary to ensure that the measures are increasingly targeted towards maintaining semi-natural habitats that are at risk of abandonment, where such abandonment would be detrimental for biodiversity. Increased steps may also be needed to reduce livestock densities where this leads to high levels of ammonia deposition on sensitive habitats, which may entail the use of existing CAP measures but also other non-agricultural policy instruments. Some current CAP measures, such as AECM, may also be used to help mitigate the effects of nutrient deposition, as livestock grazing and/or mowing, can be used as means of removing excess nutrients from the system.

9.1.3.2 The relevance of the CAP biodiversity related instruments and measures to national biodiversity and landscape needs

The analysis of the biodiversity and landscape conservation needs and the CAP measures being used in the case study Member States/regions (as set out in the supplementary information at the end of this report) provides similar results to those set out above in relation to the general relevance of the measures. This is mainly because they are all subject to very similar environmental changes that are the primary pressures and threats causing biodiversity declines. In particular, the remaining areas of semi-natural grasslands and other semi-natural habitats, are subject to substantial agricultural abandonment, or in some cases agricultural improvements and management intensification. In agriculturally improved grasslands and most croplands, the key pressures are again similar: ongoing impacts of high fertiliser and pesticide use, intensive cultivation techniques, crop specialisation, increases in field size and losses of non-farmed habitats and landscape features.

Consequently, the CAP measures of most relevance in a national context are very similar to those identified as high relevance in Table 25: Natura payments, AECM, forest measures and in some cases biodiversity focused schemes supported through other RDP measures (e.g. M4.4, M7, M8 and M16). These measures are being used in the case study Member States, sometimes with tailored schemes of high relevance to addressing priority biodiversity needs. The relevance of AECM, forest measures and similar interventions, is greatly increased with appropriate targeting to habitats and species that are of most importance and most threatened, and areas of greatest importance for them. Hence such schemes should be firstly targeted to BHD habitats and species, especially in Natura 200 sites (unless they are adequately addressed by the Natura measure), and secondly to other habitats and species of national biodiversity priority (as identified in NBSAPs), and areas of high importance for them. Tailored and targeted schemes of high biodiversity conservation relevance exist in some of the case study Member States/regions, for example, Croatia, Ireland, Portugal, Romania and Slovakia, where they prioritise Natura 2000 areas, and provide a variety of options that are designed to meet the specific requirements of high priority habitats and species, such as semi-natural grasslands and peatlands. But in other cases their relevance is reduced by inappropriate design, such as in Latvia, where one very general nationwide AECM scheme for grasslands is in place. In most of the other cases, targeting to Natura 2000 sites is not clearly in place, and the schemes have rather general aims.

Cross-compliance SMRs 2 and 3 and the ESPG measure are of high relevance in all the Member States, both inside and outside Natura 2000 sites. However, not all Member States appear to adequately integrate the relevant articles in the Nature Directive into their cross-compliance provisions (ESQ 1). And, as discussed under ESQ 4, the ESPG measure is not being used to full effect in some of the case study Member States/regions, particularly outside the Natura 2000 network. ANC payments are also relevant as they can help to maintain HNV systems. VCS can be also used to support HNV including in

[74] In their reporting on birds Member States make no distinction between pressures and threats.

semi-natural habitats that are ineligible for direct payments, as for example in the Netherlands where it is supporting required livestock grazing in dunes, heaths and saltmarshes.

Of highest potential relevance in improved grassland and cropland areas is the application of the cross-compliance SMRs and GAEC requirements (especially GAEC 7), the use of EFAs of high biodiversity value (in particular, fallow and landscape features) and organic farming. However, the actual relevance of some of these measures in addressing the pressures and threats affecting habitats and species in the Member State/region is reduced as a result of the Member State and/or farmer choices. In particular, in all but one of the case study Member States/regions, the most commonly declared EFA features are of low biodiversity value, as options of low biodiversity value are offered to farmers, and these tend to be the most popular. The only exception amongst the case studies, is in Portugal, where over 50% of declared EFA comprises fallow - and this is often of very high biodiversity value, in particular for declining farmland birds. Also, whilst the conservation of landscape features is of moderate importance, EFA declarations of these types of EFA have generally been low. Furthermore, the GAEC 7 requirements relating to the protection of landscape features are often minimal, such as in the Netherlands where the only obligation is to obtain a permit for tree felling.

9.1.4 MAIN FINDINGS

At EU level, and in the case study Member States, the CAP instruments and measures of most relevance to addressing the pressures and threats (including currently foreseeable emerging issues) affecting biodiversity and landscapes are those that maintain and restore semi-natural agricultural and forest habitats and landscapes. These are primarily EAFRD measures, such as the Natura 2000 measure (M12), the AECM (M10) and the forest measures (M8 and M15), complemented by actions supported under measures such as M4.4 and M7, which all help to maintain the necessary HNV farming systems whilst also providing tailored interventions that can meet the specific habitat and ecological requirements of threatened high priority habitats and species. The relevance of these measures is heightened if they are targeted towards Natura 2000 sites.

The ESPG greening measure is also very relevant, but it does not protect semi-natural grasslands from all potential pressures, such as increases in the use of fertiliser or drainage. ANC payments, and to a lesser extent other BPS/SAPS support and, in some circumstances VCS, are also of relevance to the maintenance of semi-natural habitats, but their relevance is lower as they do not necessarily have environmental conditions that protect the habitat from damaging agricultural and forest activities (as cross-compliance requirements are not sufficient to achieve this).

In improved grassland and intensive cropland habitats, the AECM is of greatest relevance as it has the ability to provide tailored interventions that can maintain and restore semi-natural elements in the landscape, other important habitat features (e.g. hedgerows, field margins, fallow, stubbles, plants for pollinators) and certain conditions (e.g. appropriate grazing, reduced fertiliser and pesticide use). Some EFA measures are also of relevance, as they can provide similar needs, but in practice the majority of the EFA area is dominated by catch crops and nitrogen-fixing crops and therefore is of low relevance to biodiversity needs (with the exception of multi-annual forage crops such alfalfa). Whilst organic farming is also of relevance, it mainly benefits generalist species, and its relevance varies considerably depending on the various organic practices that are carried out, and their context.

Cross-compliance SMRs 2 and 3, GAEC and advisory measures (M2) have the potential to be of relevance to all ecosystems and biodiversity in agricultural areas. However, their relevance in practice depends greatly on the way in which Member States apply them. In this respect GAEC requirements, including GAEC 7, as formulated in most Member States are currently of variable relevance to the priority issues affecting biodiversity and landscapes.

10 EU ADDED VALUE

10.1 ESQ 15: TO WHAT EXTENT HAVE THE CAP INSTRUMENTS AND MEASURES CREATED EU ADDED VALUE IN RELATION TO BIODIVERSITY AND LANDSCAPES?

10.1.1 UNDERSTANDING OF THE QUESTION

EU added value is defined in the Better Regulation Guidelines (European Commission, 2015a) as the value resulting from applying policy measures at EU level which is additional to the value that would have resulted from public authorities applying similar measures solely at the regional or national level. This means that added value considers effects that are due to implementation of CAP instruments and measures rather than to any other factor. Added value refers also to the effect of the CAP at EU level, as a common legal reference and policy framework which helps to ensure that, to a large extent, Member States follow common aims (European Commission, 2015b). Nevertheless, an assessment of the EU-added value of the CAP in terms of the preservation, restoration and enhancement of biodiversity and landscapes must take into account that the CAP legislation allows Member States some degree of choice in how they implement of measures for biodiversity and landscapes, particularly in Pillar 2. It can potentially take several forms:

- Increased **effectiveness** in achieving environmental outcomes, for example those with a transboundary dimension or where coherent European networks add value;
- Gains in **coordination** of approaches to biodiversity conservation (e.g. along flyways of migratory species) and landscapes (e.g. connectivity) which are more effective than isolated Member State initiatives;
- Improved **complementarity** where legislative actions are complementary to existing funding instruments/programmes at different levels of governance, thereby seeking to fill gaps and avoid duplications; and
- Greater **legal certainty** for farmers, foresters and other stakeholders compared to less predictable or more frequently changeable measures adopted at national or regional level;

The evaluation considers the extent to which the CAP instruments and measures have provided added value for biodiversity and landscapes compared to Member States' national, regional and/or State-aid in the absence of the CAP, assuming that the rest of the EU regulatory framework (including biodiversity regulations) remains in place.

10.1.2 METHODOLOGY

To assess the added value of action under the CAP in relation to biodiversity and landscape, we consider a hypothetical counterfactual in which there are no EU funded direct payments and no EU co-financed rural development measures. National or regional governments would be free to incentivise biodiversity and landscape action by rural land managers and businesses in ways of their choosing and using their own funds. Member States have shared competence with the EU to require farmers to meet environmental requirements or provide environmental services. They can exercise these powers to the extent that the EU has not done so, provided that they remain consistent with Single Market principles and the rules on State Aids. They are also free to impose higher environmental standards than those required by the EU in their own territory if they wish.

Therefore, for the purposes of this analysis, the counterfactual is assumed to be:

- In the absence of Pillar 1 direct payments, most national governments would choose to implement some form of decoupled direct support, for at least some of their farmers, but the current CAP conditionality and eligibility rules would not apply;
- There would be no EAFRD funding for biodiversity and landscape action and the national/regional budgets that are used for co-funding RDPs would not necessarily be used for similar purposes or be of the same/similar size, in the absence of the CAP; if Member States/regions chose to incentivise biodiversity and landscape action, current EAFRD rules would no longer apply (but for some land management payments MS would have to demonstrate compliance with WTO green box requirements);
- Transposed EU Directives and other national/regional legislative requirements applicable to rural land managers would remain part of the baseline for incentive payments;
- Current EU biodiversity targets would remain.

Some secondary effects of CAP withdrawal have not been taken into account in the definition of the counterfactual or the assessment of added value, because they are beyond the scope of this study. These include any consequential amendments to other EU environmental Directives and policies, which now rely in part on the CAP to fund or otherwise support their implementation[75].

The assessment is based firstly on analysis already undertaken in previous ESQs on effectiveness of the CAP's instruments and measures contributing to biodiversity conservation and consideration of the potential difference between this EU action and national/regional action, and secondly on identifying other areas of potential EU added value, other than effectiveness and efficiency, for example in relation to environmental coherence, complementarity and legal certainty.

10.1.3 ANALYSIS

10.1.3.1 Member State ambition in the absence of the CAP

If the CAP were not in place Member States would still be obliged to meet their obligations under the Natura Directives on agricultural and forest land, and to contribute to Target 2 of the EU Biodiversity Strategy 2020 (to maintain and enhance ecosystems and their services by establishing green infrastructure and restoring at least 15 % of degraded ecosystems). Target 3 would no longer apply, because it concerns biodiversity-related CAP contracts on agricultural land and sustainable forest management standards in forests supported by the EAFRD. It is difficult to assess what requirements linked to biodiversity and landscape objectives beyond the regulatory baseline Member States might have attached to national decoupled direct support in the absence of the CAP, other than by reference to the choices they made for the CAP 2014-20 period.

The evidence in ESQ 2 indicates that improving the competitiveness of agriculture was a strong driver of Member States' CAP choices, for example in making the new greening measure accessible to farmers with minimal changes to existing management practices needed. Other important economic drivers were maintaining the viability of farming in remote rural areas, plus financial and administrative simplicity, with biodiversity considerations less important drivers of measure choice and design. This implies that in the absence of the CAP Member States' underlying ambition to use agricultural support payments to deliver biodiversity ambitions could be quite low.

ESQ 1 found significant variations between Member States in how EAFRD measures are structured and implemented, with many different approaches to scheme focus, level of ambition and targeting. In some case studies there was a significant focus on semi-natural habitats and species-driven approaches but it is not possible to judge if the Member State who take a more ambitious approach to using EAFRD for biodiversity and landscape would, in the absence of the CAP choose to replace EAFRD funds and to change some of the CAP administrative rules (e.g. define eligibility rules for different permanent grassland and traditional agroforestry land to make it easier for all Natura 2000 habitats that depend on agricultural management to qualify for support).

10.1.3.2 Increased effectiveness as a result of EU-wide action

Increased effectiveness is achieved when the benefits from biodiversity and landscape actions being carried out in all Member States are greater than the benefits of separate actions. There is clear potential for increased effectiveness at EU level through implementation of individual instruments and measures and the over-arching requirements for Member States to contribute to EAFRD priority 4A and to use 30% of the EAFRD co-financing for seven environmental and climate measures and 30% of their direct payment allocation for greening requirements (especially EFAs which have biodiversity as their intervention logic).

This study found evidence that the EFA measure and, to a more limited extent, the crop diversification measure have helped stem the decline of fallow in many Member States and stimulated increases in others (ESQ 3). The AECM (M10) has contributed to reducing the intensity of management on crop and arable land and to maintaining extensive pastoral systems and landscape features (ESQ 4). Several EAFRD measures are making significant contributions to the conservation of biodiversity and landscapes (notably the AECM (M10), especially in HNV farming areas and other semi-natural habitats) but it is not possible to reliably estimate their net combined impact (ESQ 4). In contrast there was little evidence of

[75] For example, the Natura 2000 Directives, the Water Framework Directive, the Nitrates Directive and the EU Forest Strategy.

the influence of cross compliance on farmers' behaviour and practices, and no direct evidence of actual impacts on biodiversity.

It is judged that the CAP instruments and measures identified above have provided added value at EU level in terms of the scale of benefits compared to what individual Member States might have done in the absence of the CAP and equivalent obligations. Lack of evidence made it impossible to assess the contribution of other EAFRD measures which have potential for added value, for example Agricultural Knowledge and Information System (AKIS) measures (M1 and M2), non-productive investment (M4.4), HNV and Natura 2000 management plans (M7) and the co-operation and innovation measure (M16).

Increased effectiveness at EU level could occur where CAP measures have supported transboundary action, for example where AECM schemes are linked to Member State implementation of other EU policies (e.g. Water Framework Directive, Nitrates Directive, Natura 2000 Directives), for example through conversion of arable to permanent grassland or afforestation in 'shared' catchments, or action on migratory species). The examples which were found were often linked to non-legislative transboundary initiatives outside the CAP such as action plans on large carnivores or geese. These together with the other EU policies, would be likely to remain in the counterfactual.

10.1.3.3 Coordination gains

The CAP has considerable potential to foster EU-scale approaches to biodiversity and landscape action, for example by improving land managers' knowledge and skills, and sharing best practice (e.g. through enhanced advisory services, EIP operational groups, which are important catalysts for effective uptake and implementation of the CAP land management and investment measures). The preceding analysis has not identified any instances of EU-level coordination gains linked to biodiversity action from the CAP mandated Farm Advisory Services, but some case studies have identified more specialised biodiversity advice and training using EAFRD measures. Both the ENRD and EIP-Agri networks have undertaken work to promote and share good practice for biodiversity action among RDP managing authorities and other stakeholders, and to provide forums for discussion between Member States and regions. It is still too early to assess the cumulative effect of this work on the development of Operational Groups or the design of land management measures at RDP level.

10.1.3.4 Legal certainty and policy framework

EAFRD 5-7 year contracts for environmental land management provide individual beneficiaries with greater legal certainty than would be the case if separate national measures, enacted in the absence of EAFRD, had shorter contracts. The potential variability of different national schemes reduces the certainty for the sector as a whole at EU level, particularly in the absence of the CAP requirement for Member States to implement agri-environment-climate schemes across their whole territory.

10.1.3.5 Complementarity

The CAP measures are designed to be used in a way that they complement each other, the Natura Directives (through the PAFs), other EU Funds and national/regional biodiversity policies, as discussed extensively in previous ESQs. EAFRD has been used in synergy with other Funds, particularly LIFE.

10.1.4 MAIN FINDINGS

The presence of the CAP has raised Member States' biodiversity ambition and increased the effectiveness of biodiversity action at EU scale. Comparison with the counterfactual shows that the CAP instruments and measures provide EU added value in relation to biodiversity and landscapes, particularly the EAFRD environmental land management measures (principally AECM) and to a more limited extent certain EFA elements of the greening measure.

The funding rules for the CAP have required Member States to use 30% of their direct payment allocation for Pillar 1 greening measures and 30% of their EAFRD budget for specific environmental and climate measures, as well as provided opportunities for synergy between EAFRD and other EU funds. These plus the compulsory use of the AECM have led to higher financial allocations for biodiversity than would be the case in the absence of the CAP. Arrangements to share knowledge at EU level, for example through the ENRD Contact Point and the EIP-AGRI also have the potential to improve the effectiveness of RDP actions to a greater extent than would be the case were Member States to make their own arrangements. Although the CAP does provide a degree of legal certainty to Member States about the objectives and funding availability for biodiversity, this certainty is only for

the duration of each programming period and the design of the CAP instruments and measures gives only partial legal certainty about the biodiversity outcomes to be achieved, given the flexibilities afforded to Member States in terms of the way they are designed and implemented and the conditions attached, and how they allocate funding.

11 CONCLUSIONS

11.1 CAUSAL ANALYSIS

Member State implementation choices:

The flexibility afforded to Member States to design and target certain CAP Pillar 1 instruments and all Pillar 2 measures for the 2014-2020 period has led to a wide array of implementation choices, both in terms of the instruments and measures applied, their focus and the budget allocated to them.

The wide variation (described in ESQ 1) in how Member States have approached eligibility rules for permanent grassland has left some farmers in a few Member States unable to access direct payments on this land. Few Member States took advantage of the option to include additional semi-natural grassland by adopting the extended definition to include land which is traditionally grazed, capable of being grazed or (since 2018) capable of producing feed for animals, although there were notable exceptions such as France which introduced very complex rules intended to ensure full coverage of all grassland capable of supporting agriculture.

Pillar 1 instruments dominate in terms of the area of agricultural land that is supported and the budget allocated, with 86.5% of UAA in receipt of BPS/SAPS, 83.5% subject to cross-compliance and 79% of UAA subject to one or more greening measure in 2017. Despite these overall figures for greening in practice the area under the various EFA elements is equivalent of 9% of the total arable area (before weighting factors) – still more than the area required under the regulations, however the area declared by farmers as ESPG accounts for under a third of all permanent grassland in Natura 2000 areas, and only 1% of permanent grassland outside Natura 2000 areas, partly as a result of some Member States designating only a proportion of permanent grassland with Natura areas, and very few designating outside them. The area of agricultural land under Pillar 2 measures and the associated budget is much smaller in comparison, with 27% UAA under the ANC measure, 14.6% under an agri-environment-climate agreement and 3.9% under the organic farming measure by the end of 2017. In Natura 2000 areas, 8.9% of the UAA in these areas was under agreement by 2017 and 0.7% of their total forest area. Forest measures outside Natura 2000 areas have experienced low uptake to date compared with the targets set.

It is concluded that direct payments support, and the strengthened protection from ploughing which comes from ESPG designation, have not been applied by Member States as widely as was possible.

Drivers affecting Member State and farmer implementation choices:

Looking at the drivers influencing Member States' implementation decisions in the case studies, the analysis showed that in the majority of Member States examined, biodiversity, alongside other environmental objectives, was secondary to socio-economic concerns, such as strengthening the competitiveness of the agricultural sector, improving rural and agricultural employment, particularly in more remote areas and avoiding significant changes in the level of support provided to farmers. Where biodiversity was prioritised this tended to be a focus of decisions relating to specific measures (primarily Pillar 2 measures). The involvement and influence of environmental institutions and stakeholders on RDP design, was varied, with any influence limited generally to the design of specific AECM options, rather than the overall strategic approach taken. In some Member States, the availability (or absence) of up to date scientific data and monitoring information on the performance of schemes on biodiversity, and Member States' own capacity and experience in designing measures, have also influenced the way CAP instruments and measures are designed, for example to enable an accurate mapping of grassland which should be designated ESPG or to inform the targeting and tailoring of the AECM. The conclusion drawn from these findings is that the absence of a strategic framework which required Member States to give greater priority to biodiversity has left them able to prioritise other objectives. Furthermore, not all Member States have yet fully developed the experience and capacity to design effective measure, and most lack scientific support to at least some degree.

In relation to the drivers influencing uptake of the measures by farmers, the literature identifies a whole range of factors that potentially have an influence. However, of all these, it is a combination of financial factors, policy design and degree of fit with existing practices, environmental awareness and market developments that appear to influence engagement with environmental measures the most. The case studies, backed up by implementation data, showed that farmers tended to take up measures that focused on maintaining existing farming practices to a far greater extent than those which would introduce environmental management into intensive cropping areas. This is due both to the changes in

management that are required, and the level of payment rates proposed which were often considered too low to compensate for the reduction in production that was perceived to be involved. However, ease of application and controls as well as awareness and understanding of environmental issues and the availability of advice were also identified as important factors influencing uptake.

The conclusion from these findings is that the design and funding of AECM schemes for intensive cropping farms have often not been sufficient to incentivise strong participation by these farmers.

Impact of implementation choices on land use change, land management intensity and geographical distribution of production:

Modelling results demonstrate that direct payments play a role in enabling the continuation of agriculture on land which is economically marginal and which would otherwise probably be abandoned, and have sustained livestock production. However Member States have not always made this support available to the full range of types of permanent grassland to which the regulations would allow it to be applied, which means that agricultural activity has not been supported on some habitats which need agricultural management for their maintenance. Member States' decisions not to apply designation of ESPG more widely both within and particularly outside their Natura 2000 areas also means that grassland of biodiversity value remains vulnerable to ploughing. It is concluded that greater support and protection for grassland of biodiversity interest could have been achieved if more Member States had chosen a broad definition of permanent grassland and if a higher proportion had been designated as ESPG.

Whilst the AECM (particularly) supports less intensive forms of farm management, and EFA has been instrumental in encouraging greater use of fallow than would otherwise have been the case, the relationship between direct payments and the intensity with which land is managed is more complex. Maintaining agricultural production on marginal land depresses prices, since there is more production. The economic modelling examined for this study assumed that lower prices result in less intensive production (because the inputs needed for additional production become less cost-effective). Whilst there is some support in academic literature for the opposite conclusion – that support which increases farm incomes makes investment more likely, some of which could lead to intensification – the study found insufficient evidence from which to conclude that this had happened in practice.

11.2 EFFECTIVENESS

Contribution of the CAP instruments and measures to biodiversity and landscapes:

Due to a number of uncertainties, including the potential effects of some instruments and measures (in particular the indirect effects of direct payments) and the actual impacts that arise, which depend on the scale of their coverage and their proper implementation, it is difficult to draw conclusions on the contribution of the CAP instruments and measures to the conservation and restoration of biodiversity and landscapes.

Nevertheless, on the basis of the available evidence, it can be said with some certainty that some of the CAP instruments and measures (in particular the AECM, the Natura 2000 measure, and the ESPG greening measure) are making significant contributions to the conservation, and to a lesser extent restoration, of semi-natural farmland habitats and their species, which are of particularly high biodiversity importance.

In the wider farmland environment, which is predominantly intensively managed and less biodiverse, the most effective CAP instruments and measures are the AECM, alongside the organic farming measure and some EFA elements (especially fallow land). However, their effectiveness is constrained by their insufficient coverage (especially AECM), and habitat fragmentation.

Due to a lack of data, it is not possible to estimate the net combined impact, of the CAP instruments and measures on biodiversity, even in semi-quantitative terms. However, overall, biodiversity monitoring evidence indicates that the combined effects of the CAP have not been sufficient to counteract the pressures on biodiversity from agriculture both in semi-natural habitats and in more intensively management farmland.

For forest habitats and species, although the relevant CAP instruments and measures have the potential to be highly effective in delivering improvements, the limited uptake of these (less than 1% of forests covered) means that their overall impacts at EU level are low, although important locally significant benefits are likely to occur if the measures are targeted at BHD forest habitats and species in Natura 2000 sites.

Contribution of the CAP instruments and measures to protected habitats and species:

Whilst there are examples of the CAP's instruments and measures being used in a way that has been sufficient to maintain and, in some cases, even increase BHD habitats and species, such cases appear to be relatively scarce. Indeed, the status and trends of biodiversity in agricultural and forestry habitats indicates that overall losses of biodiversity have taken place despite significant intervention under the CAP and there is evidence that this is also the case with BHD habitats and species. An analysis of the status and trends in BHD habitats and species over 2013-2018, indicates that a significantly higher proportion of agricultural habitats have an unfavourable conservation status and declining trends than other non-forest terrestrial habitats. A similar, but less significant pattern, is also seen with forest habitats and species. Thus, whilst the CAP instruments and measures cannot be expected to address all biodiversity pressures affecting BHD habitats and species, it is clear that they, and other nature conservation instruments, are currently insufficient in terms of coverage and/or effectiveness to halt their ongoing declines.

Co-existence:

A wide range of CAP instruments and measures from both Pillars have significant potential to support the co-existence of agriculture with large carnivores, geese and cranes, arable weed species of conservation importance as well as to encourage the increase in wild pollinators and biological control agents. At present, the key CAP instruments and measures used to encourage co-existence are the AECM and the non-productive investment measure (as well as the EFA option for melliferous fallow to encourage pollinators). Particularly in relation to CAP support to encourage wild pollinators and biological control agents, the uptake of suitable measures has been shown to be insufficient to support the recovery of wild populations. In addition, there are missed opportunities to make use of a wider range of CAP instruments and measures to support co-existence, including providing specialist advice and knowledge transfer and exploring opportunities for co-operation at a landscape scale. The networks that have been set up to help support effective co-existence to take place in Member States have considerable potential to build on the work done to date and to inform more effective design, implementation and monitoring of future CAP support measures for co-existence, especially where action is required across administrative boundaries.

Alignment between CAP instruments and measures and EU and national biodiversity priorities:

Although there is a generally good alignment between the priorities identified in Member State PAFs and NBSAPs and those identified within the SWOT analyses and needs assessments in RDPs, this does not always follow through into the way that the CAP instruments and measures have been designed and implemented. Based on an analysis of the ten case studies carried out for this study, the main biodiversity priorities identified in the NBSAPs and PAFs that are also prioritised via the CAP in the majority of the case study Member States are those to protect and maintain grassland habitats and species, to protect farmland birds, to preserve and manage plant and animal genetic resources as well as to minimise the external impact of agriculture on biodiversity (for example by reducing chemical inputs). However, even for these objectives, the range of CAP instruments and measures used is variable as is their biodiversity ambition. Other biodiversity priorities identified in the NBSAPs and PAFs are not addressed by the CAP in such a systematic way by Member States, with some priorities only identified as a focus for CAP instruments and measures in around a third to half of the Member States in which they were identified. Overall, therefore, the case study Member States are not using as wide a range of CAP instruments and measures or implementing them as fully as might be expected to deliver against national and regional priorities identified for biodiversity.

Factors influencing the success of biodiversity and landscape interventions:

A number of factors appear to be particularly important to the success of biodiversity and landscape interventions:

- Clear, specific and targeted biodiversity and landscape objectives, and science-led approaches to designing, testing and implementing schemes to achieve those objectives;
- Networks, cooperation and processes that draw upon expertise, knowledge transfer, data and other resources from government, farmers, researchers and specialist NGOs throughout the design, implementation and evaluation stages of a scheme including specific advice for farmers;
- Coherent and targeted use of packages of CAP instruments and measures at farm and landscape level, supported by training and on-farm advisory and facilitation support that recognises and develops farmers' knowledge and skills in biodiversity management; and, most importantly

- Sufficient levels and security of funding at programme level (including from sources outside the CAP) to deliver the scale and quality of implementation required to achieve specific biodiversity objectives in the long-term; and at scheme level, funding allocations to secure the 'critical mass' of uptake needed, and payment rates and eligibility set at levels that encourage high-quality biodiversity management.

11.3 EFFICIENCY

The study found that efficiency – the ratio of costs to benefits – had not been optimised in a number of ways. It must be stressed that the efficiency which was examined was that with which CAP instruments and measures designed for the purpose support biodiversity. ANC support was included in this analysis because nearly all the budget for this measure was programmed by Member States to Priority 4, even though biodiversity objectives do not form part of the intervention logic of this measure and the analysis in ESQ 2 showed that it is used for socio-economic reasons. The lack of optimisation of costs and benefits arose from the fact that Member States overall had spent as much on ANC support – in most cases without any conditions to limit agricultural practices which might damage biodiversity – as on the much more targeted AECM, and had spent little on the Natura 2000 measure which also supports specific nature protection rules. For the greening instrument the ratio of biodiversity benefits to costs was reduced in Member States who designated only a small proportion of the permanent grassland which should have been protected both within and outside Natura 2000 areas, and by Member States permitting farmers to earn their greening payment with EFA options of little value to biodiversity.

By contrast it is concluded from the findings of ESQ 10 that the administrative costs of the biodiversity instruments and measures have in general been proportionate, given the complexity of some that are driven by inherent difficulties in delivery rather than poor policy design. There were, however, some examples of Member States who had implemented CAP instruments and measures in ways which entailed additional administrative complexity for themselves, as was the case with Member States who allowed landscape features to quality as EFA when already protected by GAECs. In such cases a wish to minimise burdens on farmers by presenting them with a wide range of compliance options appears to have prevailed over Member States' wish to minimise their own administrative costs.

11.4 COHERENCE

Looking at the way the rules for the CAP instruments and measures are set out at EU level, there is good coherence overall both for achieving the CAP's objectives for biodiversity (under the 'sustainable use of natural resources and climate action' objective), viable food production and territorial development as well as with other EU and national policies for biodiversity. The only clear issue of incoherence that was found for achieving the CAP's biodiversity objectives was relating to certain exemptions, for example the exemption of permanent crops from the EFA greening obligations and of farmers under the SFS from complying with the greening measures and from cross-compliance requirements.

The potential exists for CAP instruments and measures to be designed in a way that enables them to work together in a synergistic way to deliver biodiversity and wider socio-economic benefits.

Although theoretical coherence is strong overall, there are a few opportunities for conflict in practice. This is due to the fact that there are often no safeguards in place, either in the rules at EU level or in the way in which the instruments and measures are implemented in Member States, to prevent conflicts from occurring in practice. The CAP eligibility criteria, the Pillar 1 BPS/SAPS and VCS and the Pillar 2 ANC and agricultural and forest investment measures were all identified as potentially being coherent with biodiversity objectives within the CAP and with other EU and national policies for biodiversity, although direct payments could also be incoherent. There were also no safeguards identified – such as a requirement to use appropriate environmental conditions e.g. stocking density when implementing VCS - to prevent the measures being used in a way that could be damaging to achieving biodiversity objectives.

Under coherence the study also examined the relationship between the CAP and the EU's Biodiversity Strategy to 2020, and particularly the five actions indicated under Target 3. No CAP instrument and measure was found to be incoherent with the strategy or the measures. However, given the status and trends of farm- and forestland habitats and species subject to the CAP's influence, it is reasonable to conclude that the CAP could have made a greater contribution to the objectives of the Biodiversity Strategy and especially the implementation of the Birds and Habitats Directives and the Natura 2000

network had Member States prioritised differently and had they always used the most effective and efficient measures.

11.5 RELEVANCE

The key current and foreseeable future need relating to biodiversity in agricultural and forest areas is to maintain semi-natural agricultural and forest habitats, in semi-natural landscapes and more intensive farmland landscapes; and to restore them where necessary to meet biodiversity objectives. It is the CAP's EAFRD measures that have been identified as having the greatest relevance for addressing these needs, due to their ability to be tailored and targeted to specific needs within each Member State. The most relevant measures are the AECM, the Natura 2000 measure and the forest measures, complemented by non-productive investments and support for the development of management plans in Natura 2000 areas. Amongst the most relevant Pillar 1 instruments is the designation of ESPG, although this does not protect against all potential pressures. The relevance of other Pillar 1 instruments, such as EFAs, VCS and the ANC Pillar 2 measure is much lower as they generally lack the environmental conditions required to prevent damaging land management activities on semi-natural habitats. Cross-compliance SMRs 2 and 3 also play potentially important roles in reinforcing the requirements of the Birds and Habitats Directives, particularly in semi-natural habitats and Natura 2000 sites, but also in the wider countryside.

It is also necessary to address ongoing pressures on biodiversity in improved grassland and croplands. In these situations, the AECM is the most relevant EAFRD measure alongside the organic farming measure and elements of the Pillar 1 EFA measure, mainly the fallow and landscape feature elements. Cross-compliance GAEC 7 can also play an important role in maintaining important habitat features in the landscape, although its actual relevance depends considerably on how Member States define its scope and level of protection.

11.6 EU ADDED VALUE

The presence of the CAP has raised Member States' ambition, resulted in higher financial allocations and increased the effectiveness of biodiversity, habitat and landscape action at EU scale than would be the case with purely national measures. These effects are attributable particularly to the use of AECM and other EAFRD measures and, to a more limited extent, of certain EFA elements of the greening measure. Knowledge sharing on best practices and innovative use of measures have been facilitated by the ENRD Contact Point and the EIP-AGRI. The flexibilities afforded to Member States in implementation choices mean that there is only partial legal certainty about the outcomes to be achieved. Therefore the CAP overall provides EU-added value in terms of Member States' level of ambition, expenditure on habitats, landscape and biodiversity, and in opportunities for Member States to share knowledge on these CAP priorities.

12 RECOMMENDATIONS

The analysis for this evaluation leads to a number of recommendations to inform both policy design (at EU and Member State/regional level) and CAP implementation. A number of research and data gaps have also been identified.

Recommendations for policy design – EU and Member State level

- It is important from the perspective of biodiversity (including many BHD habitats and species) that direct payments should be available on all semi-natural grassland, heathland, wood pasture and other semi-natural habitats that need grazing or other agricultural management to retain their ecological quality and characteristic biodiversity. It is therefore recommended that the Commission should provide Member States with guidance on how to map where such habitats are present and then to ensure via the future CAP Strategic Plans that the way they make use of the available options for the CAP definition of 'permanent grassland' to include them as eligible for direct payments and other area-based payments.
- It is also necessary to maintain habitat and landscape features on farmland. Some types of farming system inherently incentivise their removal in order to free up land for production. There is some evidence that direct payments may still be adding to this incentive – despite changes designed to address it in 2014 - when features such as trees and scrub are ineligible for payment. Better protection for such features can be achieved by designating them under GAEC (in which case they become eligible for payments) and/or protecting them under other legislation besides the CAP.
- Member States using VCS to support ruminant production and using ANC should be required to set appropriate conditions to protect sensitive habitats including conditions for stocking density and grazing regimes.
- Further academic studies of the effect of direct payments on farmers' behaviour are needed. These should aim to assess (a) whether farmers change their management practices when there is an increase in their basic direct payment and (b) whether they do so following an increase in the coupled payment available per animal or per hectare of supported crop.

CAP instruments and measures should be designed to maximise their biodiversity benefits:

- Member States should plan their use of all CAP instruments and measures strategically in order to achieve coherence and synergies. In particular, they should review whether they are using the right measures in the right combinations, in the right location and to the extent needed to deliver their biodiversity strategies and Prioritised Action Frameworks (PAFs). The future CAP proposals provide a vehicle for doing this and it is important that environmental and conservation authorities are fully involved in decision-making for the new CAP Strategic Plans.
- Cross-compliance is intended to provide a strong baseline of protection for biodiversity, habitats and landscapes on which payments for specific activities can build. Under the current CAP, Member States set their own GAEC standards within the framework set out in the legislation and there is wide variation. In future, the Commission's proposals for the new CAP envisage that it will check and approve the content of 'environmental conditionality'. The Commission should when carrying out the approval process ensure that Member States set appropriately high standards of protection, including for biodiversity.
- To maximise the benefits which can be achieved for biodiversity from available CAP funding, a higher priority should be given to focusing CAP instruments and measures that have biodiversity objectives on maintaining the extent and quality of semi-natural habitats that depend on agricultural or forest management (in particular those listed in Annex I of the Habitats Directive or of importance to Annex II species) and their associated characteristic species, where these are at risk, and especially within Natura 2000 areas, in particular by implementing as far as is feasible the relevant recommendations in each Member States' PAF. In other areas of farmland, CAP measures should be targeted towards maintaining, restoring and enhancing the extent and quality of semi-natural components in the landscape; and providing other required habitats for declining specialist farmland species, in particular those listed on Annex II of the Habitats Directive and Annex I of the Birds Directive.

Member States should make use of the full range of CAP instruments and measures to support biodiversity including the co-existence of agriculture with protected species. This means providing

targeted advisory support throughout the lifetime of a scheme when necessary, using measures in combination such as investment and support for management, and supporting steps to improve the marketing of produce from biodiversity-rich locations and HNV farming systems. Measure design should be science-led and should set out clear, specific and targeted biodiversity objectives which correspond to needs identified in the proposed new Strategic Plans. More specifically:

- Member States should be required to ban ploughing/conversion of all permanent grassland in all Natura 2000 sites (unless it has been mapped as non-Annex I grassland) and on all Annex I permanent grassland outside the Natura 2000 sites. They should provide a justification as part of their future CAP Strategic Plan submission for any cases in which they propose not to ban ploughing/conversion in unmapped Natura areas or of Annex I permanent grassland elsewhere.
- Given the poor biodiversity performance of the EFA to date, lessons should be learned for the proposed new conditionality requirement for 'non-productive areas', which should not include 'productive' elements of limited benefits for biodiversity such as catch crops or nitrogen fixing crops, unless there is evidence of significant benefits for biodiversity (e.g. some multi-annual forage crops such as alfalfa).

Greater emphasis should be placed on advice, training and knowledge transfer:

- Member States should be required to provide basic advice to farmers on how to use CAP instruments and measures to improve biodiversity. More specific advice and training should be available for beneficiaries who take up measures that require more tailored on-farm support (e.g. higher level AECM schemes). This can be done by requiring such provision to be part of the compulsory Farm Advice Service. Member States should be able to fund such advice from the Rural Development Programme without co-funding.

Data gaps and priorities for future evidence gathering

The following data gaps should be filled to allow for more effective design and implementation of CAP instruments and measures as well as to enable improved evaluation of their impacts:

- All areas of HD Annex I grasslands and other habitats that may qualify as ESPG within and outside Natura 2000 sites should be mapped so that CAP instruments such as ESPG can be effectively targeted.
- The proposed CAP network should review the investment measures to identify those which are capable of adverse impacts on biodiversity and how such impacts may best be avoided, using case studies of good and less good practice.
- To monitor and improve the effectiveness and efficiency of agri-environment-climate measures, forest measures and other measures with biodiversity objectives, each scheme should set, monitor and report on scheme-specific, measurable, achievable, realistic and timebound objectives, and evaluate the scheme in terms of results, coverage and impacts. Such monitoring and evaluation should be carried out by independent, professional assessors using scientifically robust and adequate sampling approaches, with samples taken within scheme areas and appropriately located control areas (i.e. to assess the counterfactual). Member States should report on the achievement of each schemes' objectives for the mid-term and final evaluations of each CAP programming period. The Commission should develop, in consultation with Member States, a reporting system via which the results of this monitoring can be aggregated into a further CMEF impact indicator (e.g. the percentage of schemes funded by the CAP in each Member State that have biodiversity objectives and are achieving them).

ANNEX 1: BHD HABITATS AND SPECIES ASSOCIATED WITH AGRICULTURE AND FORESTS

Agriculture dependency according to Halada *et al* (2011) and association with agricultural and forest habitats (ETC/BD, 2015); **Priority** = Priority Status according to Habitats Directive Annex I.

Table 26: Habitats listed on Annex I of the Habitats Directive that are closely associated with agriculture

Code	Habitat	Priority
Fully dependent on agricultural management		
21A0	Machairs	1
2310	Dry sandy heaths with *Calluna* and *Genista*	
2320	Dry sandy heaths with *Calluna* and *Empetrum nigrum*	
2330	Inland dunes with open *Corynephorus* and *Agrostis* grasslands	
4060	Alpine and Boreal heaths	
5120	Mountain *Cytisus purgans* formations	
5210	Arborescent matorral with *Juniperus* spp.	
5330	Thermo-Mediterranean and pre-desert scrub	
6190	Rupicolous pannonic grasslands (Stipo-Festucetalia pallentis)	
62A0	Eastern sub-Mediterranean dry grasslands (*Scorzoneratalia villosae*)	
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)	
6220	Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea	1
6230	Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and sub-mountain areas, in continental Europe)	1
6250	Pannonic loess steppic grasslands	1
6260	Pannonic sand steppes	1
6270	Fennoscandian lowland species-rich dry to mesic grasslands	1
6280	Nordic alvar and precambrian calcareous flatrocks	1
6310	Dehesas with evergreen *Quercus* spp.	
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	
6440	Alluvial meadows of river valleys of the *Cnidion dubii*	
6450	Northern boreal alluvial meadows	
6510	Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)	
6520	Mountain hay meadows	
6530	Fennoscandian wooded meadows	1
9070	Fennoscandian wooded pastures	
Partially dependent on agriculture		
1340	Inland salt meadows	1
1630	Boreal Baltic coastal meadows	1
2190	Humid dune slacks	
2250	Coastal dunes with Juniperus spp.	1
4090	Endemic oro-Mediterranean heaths with gorse	
5130	*Juniperus communis* formations on heaths or calcareous grasslands	
5420	*Sarcopoterium spinosum* phryganas	
5430	Endemic phryganas of the Euphorbio-Verbascion	
6120	Xeric sand calcareous grasslands	1
6140	Siliceous Pyrenean *Festuca eskia* grasslands	
6150	Siliceous alpine and boreal grasslands	
6160	Oro-Iberian *Festuca indigesta* grasslands	
6170	Alpine and subalpine calcareous grasslands	
6180	Macaronesian mesophile grasslands	
6240	Sub-pannonic steppic grassland	1

Code	Habitat	Priority
6420	Mediterranean tall humid herb grasslands of the Molinio-Holoschoenion)	
7230	Alkaline fens	
8240	Limestone pavements	1
Partially dependent but only for some sub-types or over part of the distribution		
1530	Pannonic salt steppes and salt marshes	1
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)	1
2140	Decalcified fixed dunes with Empetrum nigrum	1
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	1
2340	Pannonic inland dunes	1
4020	Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*	1
4040	Dry Atlantic coastal heaths with *Erica vagans*	1
6110	Rupicolous calcareous or basophilic grasslands of the Alysso-Sedion albi	1
7210	Calcareous fens with *Cladium mariscus* and species of the Caricon davallianae	1

HD and BD species associated with CROPLAND ecosystem (arable, permanent crops, and farmland mosaics) as preferred habitat

Table 27: Species listed on Annex II of the Habitats Directive and bird species listed on Annex I of the Birds Directive associated with agricultural and forest ecosystems

Species group	HD and BD species associated with CROPLAND ecosystem (farmland mosaics with arable) as preferred habitat
Birds of prey	Levant Sparrowhawk (*Accipiter brevipes*) Cinereous Vulture (*Aegypius monachus*) Short-eared Owl (*Asio flammeus*) Montagu's Harrier (*Circus pygargus*) Red-footed Falcon (*Falco vespertinus*)
Birds – insectivores and mixed diet (breeding)	Greater Short-toed Lark (*Calandrella brachydactyla*), Calandra Lark (*Melanocorypha calandra*) Corncrake (*Crex crex*) Eurasian Golden-plover (*Pluvialis apricaria*) European Roller (*Coracias garrulous*) Syrian Woodpecker (*Dendrocopos syriacus*) Ortolan Bunting (*Emberiza hortulana*) Olive-tree Warbler (*Hippolais olivetorum*) Red-backed Shrike (*Lanius collurio*) Lesser Grey Shrike (*Lanius minor*) Masked Shrike (*Lanius nubicus*) Common Crane (*Grus grus*) Iberian Grey Partridge (*Perdix perdix hispaniensis*) Great Bustard (*Otis tarda*) Little Bustard (*Tetrax tetrax tetrax*)
Birds – granivores (wintering)	Greenland White-fronted Goose (*Anser albifrons flavirostris*), Lesser White-fronted Goose (*Anser erythropus*), Barnacle Goose (*Branta leucopsis*) Tundra Swan (*Cygnus columbianus bewickii*), Whooper Swan (*Cygnus cygnus*)
Carnivorous mammals	Steppe Polecat (*Mustela eversmanii*)
Rodents	European Hamster (*Cricetus cricetus*), Souslik (*Spermophilus citellus*), Spotted Souslik *(Spermophilus suslicus*), Severtzov's Birch Mouse (*Sicista subtilis*)
Bats	*Miniopterus schreibersii, Rhinolophus ferrumequinum, Rhinolophus hipposideros, Rhinolophus mehelyi, Eptesicus nilssonii, Myotis emarginatus, Myotis myotis, Myotis punicus, Pipistrellus kuhlii, Plecotus austriacus*
Reptiles	Maltese Wall Lizard (*Podarcis filfolensis*) Milos Wall Lizard (*Podarcis milensis*)
Amphibians	Green Toad (*Bufotes viridis*)

	Common Spadefoot Toad (*Pelobates fuscus*)
Arthropods	Balkan Pincer Grasshopper (*Paracaloptenus caloptenoides*), longhorn beetle (*Pilemia tigrina*), Eastern Eggar moth (*Eriogaster catax*), Raetzer's Ringlet (*Erebia christi*), Danube Clouded Yellow (*Colias myrmidone*)
Plants	*Notothylas orbicularis, Bromus grossus, Linaria ricardoi, Agrimonia pilosa*

Table 28: Species listed on Annex II of the Habitats Directive and bird species listed on Annex I of the Birds Directive associated with grassland (pastures, meadows and natural grasslands) and/or heath/scrub ecosystem as preferred habitat

Species group	HD and BD species associated with grassland and/or heath/scrub ecosystems as preferred habitat
Birds of prey	Golden Eagle (*Aquila chrysaetos*), Imperial Eagle (*Aquila heliaca*), Spanish Imperial Eagle (*Aquila adalberti*), Lesser Spotted Eagle (*Aquila pomarina*) Long-legged Buzzard (*Buteo rufinus*) Short-toed Snake Eagle (*Circaetus gallicus*) Northern Hen Harrier (*Circus cyaneus*), Pallid Harrier (*Circus macrourus*), Montagu's Harrier (*Circus pygargus*) Black-winged Kite (*Elanus caeruleus*) Saker Falcon (*Falco cherrug*), Lanner Falcon (*Falco biarmicus*), Gyr Falcon (*Falco rusticolus*), Lesser Kestrel (*Falco naumanni*), Merlin (*Falco columbarius*) Short-eared Owl (*Asio flammeus*), Snowy Owl (*Bubo scandiaca*)
Birds – insectivores and mixed diet (breeding)	Greater Short-toed Lark (*Calandrella brachydactyla*), Calandra Lark (*Melanocorypha calandra*), Thekla Lark (*Galerida theklae*), Dupont's Lark (*Chersophilus duponti*), Wood Lark (*Lullula arborea*) Tawny Pipit (*Anthus campestris*) Nightjar (*Caprimulgus europaeus*) Stone Curlew (*Burhinus oedicnemus*) Eurasian Golden-plover (*Pluvialis apricaria*) Collared Pratincole (*Glareola pratincola pratincola*) European Roller (*Coracias garrulous*) Ortolan Bunting (*Emberiza hortulana*) Red-backed Shrike (*Lanius collurio*) Trumpeter Finch (*Bucanetes githagineus*) Cyprus Wheatear (*Oenanthe cypriaca*), Canary Islands Stonechat (*Saxicola dacotiae*) Bluethroat (*Luscinia svecica svecica*) Aquatic Warbler (*Acrocephalus paludicola*) Dartford Warbler (*Sylvia undata* with *dartfordiensis*), Marmora's Warbler (*Sylvia sarda*), Rueppell's Warbler (*Sylvia rueppelli*), Barred Warbler (*Sylvia nisoria*) White Stork (*Ciconia ciconia ciconia*) Iberian Grey Partridge (*Perdix perdix hispaniensis*), Italian Grey Partridge (*Perdix perdix italica),* Barbary Partridge *(Alectoris barbara),* Rock Partridge *(Alectoris graeca graeca, whitakeri* and *saxatilis),* Pyrenaean Rock Partridge *(Lagopus muta pyrenaica)* Black Grouse (*Tetrao tetrix tetrix*), Great Bustard (*Otis tarda*), Little Bustard (*Tetrax tetrax tetrax*), Houbara Bustard (*Chlamydotis undulata*), Common Buttonquail (*Turnix sylvaticus*) Pin-tailed Sandgrouse (*Pterocles alchata*) and Black-bellied Sandgrouse (*Pterocles orientalis*)
Birds – granivores (wintering)	Greenland White-fronted Goose (*Anser albifrons flavirostris*), Lesser White-fronted Goose (*Anser erythropus*), Barnacle Goose (*Branta leucopsis*) Tundra Swan (*Cygnus columbianus bewickii*), Whooper Swan (*Cygnus cygnus*)
Carnivorous mammals	Grey Wolf (*Canis lupus*), Arctic Fox (*Alopex lagopus*), Eurasian Lynx (*Lynx lynx*), Iberian Lynx (*Lynx pardinus*), Wolverine (*Gulo gulo*), Wildcat (*Felis silvestris*), Steppe Polecat (*Mustela eversmanii*), Marbled Polecat (*Vormela peregusna*), Brown Bear (*Ursus arctos*)
Grazing mammals	European Bison / Wisent (*Bison bonasus*), Spanish Ibex (*Capra pyrenaica pyrenaica*), Wild Sheep (*Ovis aries*), wild mountain goat (*Capra aegagrus*), Appenine Chamois (*Rupicapra pyrenaica ornata)*, Balkan Chamois (*Rupicapra rupicapra balcanica*), Tatra Chamois (*Rupicapra rupicapra tatrica*), Corsican Red Deer (*Cervus elaphus corsicanus*)
Rodents & others	European Hamster (*Cricetus cricetus*), Souslik (*Spermophilus citellus*), Spotted Souslik *(Spermophilus suslicus*), Severtzov's Birch Mouse (*Sicista subtilis*), Northern Birch Mouse

	(*Sicista betulina*), Romanian Hamster (*Mesocricetus newtoni*), Cabrera's Vole (*Microtus cabrerae*), Tundra Vole – Netherlands subspecies (*Microtus oeconomus arenicola*), Central European Tundra Vole (*Microtus oeconomus mehelyi*), Tatra Alpine Marmot (*Marmota marmota latirostris*), Sicilian Shrew (*Crocidura sicula*), Roach's Mouse-Tailed Dormouse (*Myomimus roachi*), Hazel Dormouse (*Muscardinus avellanarius*), Forest Dormouse (*Dryomys nitedula*), Crested Porcupine (*Hystrix cristata*) North African Hedgehog (*Erinaceus algirus*)
Bats	*Miniopterus schreibersii, Rhinolophus ferrumequinum, Rhinolophus blasii, Rhinolophus hipposideros, Eptesicus serotinus, Eptesicus bottae, Eptesicus nilssonii, Myotis emarginatus, Myotis blythii, Myotis bechsteinii, Myotis capaccinii, Myotis alcanthoe, Myotis aurascens, Barbastella barbastellus, Pipistrellus pygmaeus, Plecotus austriacus, Plecotus kolombatovici, Plecotus macrobullaris, Tadarida teniotis*
Reptiles	Javelin Sand Boa (*Eryx jaculus*), Leaden-Colored Racer (*Coluber nummifer*), Western Whip Snake (*Coluber viridiflavus*), Horseshoe Whip Snake (*Hemorrhois hippocrepis*), Caspian Whip Snake (*Coluber caspius*), Cyprus Whip Snake (*Coluber cypriensis*), Large Whip Snake (*Coluber jugularis*), Dahl's Whip Snake (*Coluber najadum*), Smooth Snake (*Coronella austriaca*), Soosan Snake (*Telescopus fallax*), Aesculapian Snake (*Elaphe longissima*), Italian Aesculapian Snake (*Elaphe lineata*), Four-lined Snake (*Elaphe quatuorlineata*), Blotched Snake (*Elaphe sauromates*), European Ratsnake (*Elaphe situla*), Cyclades Blunt-nosed Viper / Milos Viper (*Macrovipera schweizeri*), Orsini's Viper / Meadow Viper (*Vipera ursinii* with *macrops* and *rakosiensis*), Ottoman Viper (*Vipera xanthina*), Seoane's Viper (*Vipera seoanei*) East Canary Gecko (*Tarentola angustimentalis*), Tenerife Wall Gecko (*Tarentola delalandii*) European Glass Lizard (*Pseudopus apodus*) Maltese Wall Lizard (*Podarcis filfolensis*), Tyrrhenian Wall Lizard (*Podarcis tiliguerta*), Sicilian Wall Lizard (*Podarcis wagleriana*), Pyrenean Rock Lizard (*Iberolacerta bonnali*), Schreiber's Green Lizard (*Lacerta schreiberi*), Balkan Green Lizard (*Lacerta trilineata*), Sand Lizard (*Lacerta agilis*), Western Green Lizard (*Lacerta bilineata*), European Green Lizard (*Lacerta viridis*), Snake-eyed Lacertid (*Ophisops elegans*), Erhard's Wall Lizard (*Podarcis erhardii*), Dalmatian Wall Lizard (*Podarcis melisellensis*), Common Wall Lizard (*Podarcis muralis*), Balkan Wall Lizard (*Podarcis tauricus*), Viviparous Lizard (*Zootoca vivipara ssp pannonica*), (*Podarcis lilfordi*), (*Podarcis cretensis*), (*Podarcis levendis*), (*Algyroides marchi*), (*Algyroides moreoticus*), (*Algyroides nigropunctatus*) Tenerife Lizard (*Gallotia galloti*), Giant Canary Island Lizard (*Gallotia stehlini*), Atlantic Lizard (*Gallotia atlantica*), Gallot's Lizard (*Gallotia galloti insulanagae)* European Copper Skink (*Ablepharus kitaibelii*), Bedriaga's Skink (*Chalcides bedriagai*), Gran Canaria Skink (*Chalcides sexlineatus*), West Canary Skink (*Chalcides viridanus*), Ocellated Skink (*Chalcides ocellatus*), Canarian Cylindrical Skink (*Chalcides simonyi*) Spur-thighed Tortoise (*Testudo graeca*), Hermann's Tortoise (*Testudo hermanni*), Marginated Tortoise (*Testudo marginata*), Sicilian Pond Turtle (*Emys trinacris*)
Amphibians	Common Spadefoot Toad with Po subspecies (*Pelobates fuscus* and *insubricus*), Spanish Spadefoot Toad (*Pelobates cultripes*), Eastern Spadefoot Toad (*Pelobates syriacus*), Natterjack Toad (*Epidalea calamita*), Green Toad (*Pseudoepidalea viridis*), Common Midwife Toad (*Alytes obstetricans*), Iberian Midwife Toad (*Alytes cisternasii*), Painted Frog (*Discoglossus pictus*), Middle East Tree Frog (*Hyla savignyi*) Alpine Salamander (*Salamandra atra*), Golden Alpine Salamander (*Salamandra atra aurorae*), Salamandra di Lanza (*Salamandra lanzai*), Luschan's Salamander (*Mertensiella luschani)*
Arthropods	Spider - *Macrothele calpeiana* Beetles (Coleoptera) - *Carabus hungaricus, Carabus zawadszkii, Dorcadion fulvum cervae, Bolbelasmus unicornis, Probaticus subrugosus, Pilemia tigrina, Carabus olympiae, Carabus variolosus, Pseudogaurotina excellens* Butterflies and moths (Lepidoptera) - *Eriogaster catax, Paracossulus thrips, Chondrosoma fiduciarium, Lignyoptera fumidaria, Phyllometra culminaria, Glyphipterix loricatella, Cucullia mixta, Gortyna borelii lunata, Polymixis rufocincta isolata, Lycaena dispar, Lycaena helle, Maculinea arion, Maculinea nausithous, Maculinea teleius, Plebicula golgus, Polyommatus eroides, Pseudophilotes bavius, Agriades glandon aquilo, Coenonympha hero, Coenonympha oedippus, Erebia calcaria, Erebia christi, Erebia medusa polaris ,Erebia sudetica, Melanargia arge, Proterebia afra dalmata, Colias myrmidone, Euphydryas aurinia Hesperia comma catena, Parnassius apollo, Parnassius mnemosyne, Zerynthia polyxena, Papilio alexanor, Papilio hospiton, Fabriciana niobe elisa, Lopinga achine, Clossiana improba, Hyles hippophaes, Proserpinus proserpina, Callimorpha (Euplagia) quadripunctaria, Apatura metis, Erannis ankeraria* Grasshoppers (Orthoptera) - *Odontopodisma rubripes, Paracaloptenus caloptenoides, Stenobothrus eurasius, Baetica ustulata, Isophya costata, Isophya harzi, Isophya stysi, Pholidoptera transsylvanica, Saga pedo, Apteromantis aptera*

	Dragonflies (Odonata) - Pronged Clubtail *(Gomphus graslinii)*
Molluscs	*Caseolus calculus, Caseolus commixta Helicopsis striata austriaca Idiomela subplicata, Discula turricula Hystricella leacockiana, Vertigo angustior, Vertigo geyeri, Vertigo moulinsiana, Lampedusa imitatrix, Discus guerinianus, Geomitra moniziana* Kerry Slug *(Geomalacus maculosus)*
Plants	281 vascular plant spp

Table 29: Species listed on Annex II of the Habitats Directive and bird species listed on Annex I of the Birds Directive associated with forest ecosystem (forests, woodland, wooded pastures) as preferred habitat

Species group	HD and BD species associated with forest ecosystem as preferred habitat
Birds of prey, owls	Cinereous Vulture (*Aegypius monachus*) Bonelli's Eagle (*Aquila fasciatus*), Lesser Spotted Eagle (*Aquila pomarina*), Short-toed Snake-eagle (*Circaetus gallicus*), White-tailed Sea-eagle (*Haliaeetus albicilla*), European Honey-buzzard (*Pernis apivorus*), Booted Eagle (*Hieraaetus pennatus*), Greater Spotted Eagle (*Aquila clanga*), Imperial Eagle (*Aquila heliaca*), Osprey (*Pandion haliaetus*), Levant Sparrowhawk (*Accipiter brevipes*), Black Kite (*Milvus migrans),* Red Kite (*Milvus milvus*), Red-footed Falcon (*Falco vespertinus*), Boreal Owl (*Aegolius funereus*), Earasian Eagle Owl (*Bubo bubo*), Eurasian Pygmy Owl (*Glaucidium passerinum*), Great Grey Owl (*Strix nebulosa*), Ural Owl (*Strix uralensis*), Northern Hawk Owl (*Surnia ulula*)
Birds – insectivores and mixed diet (breeding)	La Palma Chaffinch (*Fringilla coelebs ombriosa*), Blue Chaffinch (Gran Canaria) (*Fringilla teydea polatzeki*), Wood Lark (*Lullula arborea*) Olive-tree Warbler (*Hippolais olivetorum*) Black Stork (*Ciconia nigra*) Nightjar (*Caprimulgus europaeus*) Dark-tailed Laurel-pigeon (*Columba bollii*), White-tailed Laurel-pigeon (*Columba junoniae)*, Azores Wood Pigeon (*Columba palumbus azorica*), Trocaz Pigeon (*Columba trocaz*) Scottish Crossbill (*Loxia scotica*) European Roller (*Coracias garrulous*), Red-backed Shrike (*Lanius collurio*) Collared Flycatcher (*Ficedula albicollis*), Red-breasted Flycatcher (*Ficedula parva*), Semicollared Flycatcher (*Ficedula semitorquata*), Krueper's Nuthatch (*Sitta krueperi),* Corsican Nuthatch (*Sitta whiteheadi*), White-backed Woodpecker (*Dendrocopos leucotos*), Middle Spotted Woodpecker (*Dendrocopos medius*), Syrian Woodpecker (*Dendrocopos syriacus*), Black Woodpecker (*Dryocopos martius*), Eurasian Three-toed Woodpecker (*Picoides tridactylus*), Grey-headed Woodpecker (*Picus canus*) Hazel Grouse (Bonasia bonasia), Black Grouse (continental) (Tetrao tetrix tetrix) Western Capercaillie (Tetrao urogallus with aquitanicus), Cantabrian Capercaillie (Tetrao urogallus cantabricus)
Carnivorous mammals	Grey Wolf (*Canis lupus*), Eurasian Lynx (*Lynx lynx*), Iberian Lynx (*Lynx pardinus*), Wolverine (*Gulo gulo*), Wildcat (*Felis silvestris*), Brown Bear (*Ursus arctos*)
Grazing mammals	European Bison / Wisent (*Bison bonasus*), Wild Sheep (*Ovis aries*), Finnish Forest Reindeer (wild) (*Rangifer tarandus fennicus*), Corsican Red Deer (*Cervus elaphus corsicanus*)
Rodents & others	European Beaver (*Castor fiber*), Tatra Pine Vole (*Microtus tatricus*), Northern Birch Mouse (*Sicista betulina*), Roach's Mouse-Tailed Dormouse (*Myomimus roachi*), Hazel Dormouse (*Muscardinus avellanarius*), Forest Dormouse (*Dryomys nitedula*), Siberian Flying Squirrel (*Pteromys volans*), Caucasian Squirrel (*Sciurus anomalus*) North African Hedgehog (*Erinaceus algirus*)
Bats	*Miniopterus schreibersii, Tadarida teniotis, Rousettus aegyptiacus, Rhinolophus blasii, Rhinolophus euryale, Rhinolophus ferrumequinum, Rhinolophus hipposideros, Rhinolophus mehelyi, Barbastella barbastellus, Eptesicus nilssonii, Eptesicus serotinus, Hypsugo savii, Myotis alcathoe, Myotis aurascens, Myotis bechsteinii, Myotis brandtii, Myotis capaccinii, Myotis dasycneme, Myotis daubentonii, Myotis emarginatus, Myotis*

	escalerai, Myotis myotis, Myotis mystacinus, Myotis nattereri, Nyctalus azoreum, Nyctalus lasiopterus, Nyctalus leisleri, Nyctalus noctula, Pipistrellus maderensis, Pipistrellus nathusii, Pipistrellus pipistrellus, Pipistrellus pygmaeus, Plecotus auritus, Plecotus sardus, Plecotus teneriffae, Vespertilio murinus
Reptiles	Aesculapian Snake (*Elaphe longissima*), Italian Aesculapian Snake (*Elaphe lineata*), Blotched Snake (*Elaphe sauromates*) Viviparous Lizard (*Zootoca vivipara ssp pannonica*), Danford's Lizard *(Lacerta danfordi),* Oertzen's Rock Lizard (*Lacerta oertzeni*), Spanish Algyroides (*Algyroides marchi*), Greek Algyroides (*Algyroides moreoticus*), Dalmatian Algyroides (*Algyroides nigropunctatus*), Fitzinger's Algyroides (*Algyroides fitzingeri*) Gran Canaria Skink (*Chalcides sexlineatus*), West Canary Skink (*Chalcides viridanus*) Hermann's Tortoise (*Testudo hermanni*)
Amphibians	Fire-bellied Toad (*Bombina bombina*), Yellow-bellied Toad (*Bombina variegata*), Common Midwife Toad (*Alytes obstetricans*), Middle East Tree Frog (*Hyla savignyi*), Moor Frog / Altai Brown Frog (*Rana arvalis*), Agile Frog (*Rana dalmatina*), Greek Stream Frog (*Rana graeca*), Italian Agile Frog (*Rana latastei*), Pool Frog (*Rana lessonae*) Golden-striped Salamander (*Chioglossa lusitanica*), Alpine Salamander (*Salamandra atra*), Golden Alpine Salamander (*Salamandra atra aurorae*), Salamandra di Lanza (*Salamandra lanzai*), Luschan's Salamander (*Mertensiella luschani)),* Spectacled Salamander *(Salamandrina terdigitata)* *Italian Crested Newt (Triturus carnifex), Northern/Great Crested Newt (Triturus cristatus), Danube Crested Newt (Triturus dobrogicus), Italian Newt (Triturus italicus), Balkan Crested Newt (Triturus karelinii), Macedonian Crested Newt (Triturus macedonicus), Marbled Newt (Triturus marmoratus), Carpathian Newt (Triturus montandoni), Transylvanian Smooth Newt (Triturus vulgaris ampelensis)*
Arthropods	Arachnida- *Anthrenochernes stellae*, *Macrothele calpeiana* Hemiptera - *Aradus angularis* Beetles (Coleoptera) - *Xyletinus tremulicola, Boros schneideri, Stephanopachys linearis, Stephanopachys substriatus , Buprestis splendens,Carabus hampei, Carabus menetriesi pacholei, Carabus nodulosus, Carabus olympiae, Carabus variolosus,Carabus zawadszkii, Corticaria planula,Cerambyx cerdo, Mesosa myops, Morimus funereus, Pseudogaurotina excellens, Rosalia alpina, Osmoderma eremita, Cucujus cinnaberinus, Limoniscus violaceus, Propomacrus cypriacus, Agathidium pulchellum, Lucanus cervus, Phryganophilus ruficollis, Pytho kolwensis, Rhysodes sulcatus, Oxyporus mannerheimii* Butterflies and moths (Lepidoptera) - *Callimorpha (Euplagia) quadripunctaria, Erebia sudetica, Erannis ankeraria, Arytrura musculus, Dioszeghyana schmidtii, Xestia borealis, Xestia brunneopicta, Xylomoia strix, Apatura metis, Coenonympha hero, Fabriciana niobe elisa, Hypodryas maturna, Lopinga achine, Nymphalis vaualbum, Parnassius mnemosyne, Leptidea morsei, Graellsia isabellae* Grasshoppers (Orthoptera) - *Odontopodisma rubripes, Pholidoptera transsylvanica*
Molluscs	*Caseolus sphaerula, Geomalacus maculosus, Discus guerinianus, Elona quimperiana, Drobacia banatica, Kovacsia kovacsi, Leiostyla cassida, Leiostyla lamellosa, Vertigo angustior*
Plants	Bryophyta - *Bryhnia novae-angliae, Bryoerythrophyllum campylocarpum, Buxbaumia viridis, Cephalozia macounii, Cynodontium suecicum, Dichelyma capillaceum, Dicranum viride, Distichophyllum carinatum, Echinodium spinosum, Herzogiella turfacea, Orthotrichum rogeri, Plagiomnium drummondii, Scapania carinthiaca, Tayloria rudolphiana, Mannia triandra* 77 vascular plant spp

ANNEX 2: SUPPLEMENTARY INFORMATION ON AECM IN THE CASE STUDY MEMBER STATES

Table 30: Focus of the AECM in the ten case study Member States (uptake data included where available)

	Arable / Horticulture	Grassland	Permanent Crops	Landscape features	Specific Habitats & Species	Advice a requirement?	Areas targeted
DE (B-W)	C* – extensive arable farming (U: 626 ha) (0.007% of arable land) C – conversion arable to permanent grassland (U: 2,702 ha) (0.3% of arable land) F* – crop diversification (5 crops min) (U: 101,851 ha) (12.4% of arable land) F - Greening fallow land with flowering mixtures (11,080 ha) (1,4 of arable land) F -Ban on herbicide use (2,263 ha) (0.3% of arable land) F- Natural pest control for maize (using trichogramma) (U: 28,288 ha) (3.5% of arable land) F- Natural pest control in horticulture	C–management of extensive grasslands and hay meadows (U: 16,578 ha) (3% of grassland) C – extensive grazing (U: 19,595 ha) (3.5% of grassland) C – maintaining management adapted to specific habitats and species (6,363 ha) (1.2% of grassland) C – maintenance of non-agricultural land (agricultural land not eligible for CAP – heaths, reed beds, mires etc) (U: 1,830 ha) (0.3% of grassland) F – management of species rich grassland (U: 21,370 ha) (3.9% of grassland) F – payment for dairy farms that stop silage production (U: 6,549 ha) (1.2% of grassland)	F - Conservation of orchards (U: 1,278,732 trees) F - Maintaining wine production on steep slopes (352 ha) (0.7% of permanent crops) F - Natural pest control in orchards (pheromones) (U: 1,183 ha) (2.4% of permanent crops)		F - Extensive management of habitats protected Federal Nature Conservation Act (e.g. sedge rich wet meadows) (U: 2,306 ha) F - Extensive management of lowland grassland and mountain hay meadows for their flora and fauna. (U: 16,382 ha) F - Conservation of endangered indigenous livestock breeds (U: 8,350 cattle, 248 horses, 2,368 pigs)	No – but advice is available	* C = nature conservation contracts F = FAKT Areas targeted are all very low – less than 5% UAA

	under glass (using beneficial insects) (U: 104 ha) (0.01% of arable land)	F – extensive management of PG with livestock (U: 57,574 ha) (10.5% of grassland) F – extensive management of PG areas without N fertiliser for holdings with more than 0.3 LU/ha (U: 4,395 ha) (0.8% of grassland)					
FR (CVdL)	Promoting mixed farming (with livestock) where cereals are dominant Management of field cropping systems Creation of ecological networks (fallow, field strips, hedgerows) Creation of grass plots or strips Creation of cover for birds, small mammals or pollinators. Improvements in fallow management and location Support for reducing pesticide & herbicide use	Maintenance of grassland and pastoral systems Ban on fertiliser us (mineral and organic) on meadows Cessation of grazing and mowing in winter on meadows and important wetland habitats Delayed mowing on grassland and important habitats Maintenance of pastures Maintaining species-rich meadows Wetland management Restoration of grasslands after flooding (in flood management areas)		Hedgerow management Maintenance of: isolated trees trees in a row riparian trees groups of trees ponds (and restoration) shelter belts	Protecting rare and endangered poultry breeds (2 measures) Protecting important habitats (e.g. marsh areas, reedbeds, dune habitats, springs) which may move each year within the plot of land – mainly N2K sites Habitat restoration – where it has been abandoned Protection of endangered breeds Preservation of plant resources threatened by erosion Measure to improve the pollinating potential of bees (focussed on beekeeping practices)	Training is required for the 'reducing herbicide and pesticide use' measures.	There are specific eligibility criteria for some of the measures on grassland and arable areas – these are linked to proportion of the land under a particular land use or whether a similar AECM measure was in place in the previous period. Where the focus is on important habitats, these are identified – these are N2K areas as well as their surrounding areas (e.g. in the Loire valley where the N2K site is restricted to the riverbanks, the priority area also includes adjacent plots.

							For landscape features, generally only those comprising local species are eligible.
HR	Crop management on slopes (9-15%) to protect soil biodiversity (U: 0 ha) Flower strips for pollinators & grass strips for birds (U: 0 ha)	Protection of HNV grasslands (no chemical inputs, mowing dates, min and max LU/ha) (U: 3,703 ha) (0.6% of grassland)	PC management on slopes (9-15%) to increase biodiversity (U: 365 ha) (0.5% of permanent crops) PC management on slopes less than 9% (U: 269 ha) (0.4% of permanent crops) Maintenance of extensive orchards (U: 18 ha) (0.03 of permanent crops) Maintenance of extensive olive groves (U: 294 ha) (0.4% of permanent crops) 2 measures supporting natural pest control (U: O_12 868 ha / O_13 172 ha) (1.2/0.2% of permanent crops) Supporting the use of organic fertilisers (U: 1,488 ha) (2.1% of permanent crops) Support mechanical weed control	Protection of dry-stone walls (U: 935,155 m) Protection of hedges (U:9,000 m)	Protection of: • corncrake (Crex crex) (U: 160 ha) • butterflies - grassland (pilot) (U: 2 ha) for farmers with grasslands in areas identified as having these species Preservation of endangered native and protected breeds of domestic animals (U: 17,639 LU)	Yes Each year, for 5 years, 6 hours of training or demonstration programmes must be attended.	Very specific target areas set. Highest target areas are for field strips on intensively managed arable land (9,500ha), protection of extensive orchards & olive groves (~7,500 each) and for HNV grassland (7,000 ha)

			(U: 1,321 ha) (1.8% of permanent crops)				
HU	Horizontal arable – basic commitments (U: 406,286 ha) (9.4% of arable land) Species specific measures on HNV arable (see relevant column) Zonal arable measures for: • inland water protection (U:764 ha) (0.02% of arable land) • preventing erosion (U: 5,224 ha) (0.12% of arable land) • areas with high risk of drought (U: 1,522 ha) (0.04% of arable land)	Horizontal grassland – basic commitments (U: 34,687 ha) (4.3% of grassland) Species specific measures on HNV grassland (see relevant column) Zonal grassland measure for: • inland water protection (U: 1,283 ha) (0.2% of grassland)	Horizontal orchards/vineyards – basic commitments (U: 66,287 ha) (37.8% of permanent crops)		Protection of great bustard (U: arable 15,463 ha / g'ld 43,740 ha) & red-footed falcon (U: arable 1,617 ha) in HNV arable and grassland areas Protection of lowland / upland common birds in specific HNV lowland / upland arable and grassland areas (U: lowland arable 14,764 ha / upland arable 283 ha / lowland grassland 29,432 ha / upland grassland 4,033 ha) Protection of butterflies in HNV grassland areas (U: 136 ha) Horizontal measures for reedbeds (U: 1,321 ha) Conservation of endangered indigenous livestock breeds Ex situ protection of the plant genetic resources and micro-organisms of rare and endangered plant species	No	No specific targets – all farmers are eligible.
IE	Creation of arable grass margins (U: 324,199 m) Environmental management of fallow land (U: 1,567 ha) (0.4% of arable land)	Development of a Commonage Management Plan and a Commonage Farm Plan to ensure their appropriate management (U: 233,049 ha) (5.8% of grassland) Low input permanent grassland on suitable pasture (must have 4		Hedgerow coppicing (U: 2.6 km) Hedgerow planting (currently suspended)	Installation of boxes for bats (U: 211,423), birds (U: 209,030) and solitary bees (U: 18,794) Management of habitat for: • curlew & breeding waders (U: 1,289 ha) • chough (U: 12,687 ha) • geese & swans (U: 16,056 ha)	All applications must be prepared by a trained adviser.	The GLAS operates a tiered approach – those farms with one or more of priority environmental assets have priority access to the scheme and must carry out required actions

	Seed crop mix to provide wild bird cover and food source (U: 19,427 ha) (4.4% of arable land)	suitable grass spp). (U: 273,145 ha) (6.8% of grassland) Maintenance of traditional hay meadows (U: 63,408 ha) (1.6% of grassland) Riparian margins on grassland (72,507 ha) (1.8% of grassland)		Maintenance of dry stone walls (U: 11.1 km) Planting small groups of trees (U: 1.6 million trees) Protection of watercourses from bovines (U: 14.9 km)	• corncrake (U: 218 ha) • grey partridge (U: 134,942 ha) • hen harrier (U: 48,276 ha) • twite (4 measures in different habitats) (U: 3,768 ha) Burren programme – to ensure the sustainable agricultural management of this important habitat/landscape Retain and where possible increase populations of specific rare breeds to ensure their long term survival (4,098 LU)		to protect and enhance these. The characteristics and location of other farms inform the measures they must carry out.
LV	Integrated production – fruit and vegetables (U: 6,400 ha) (0.5% of arable land) Over-winter stubbles (on arable farms over 10 ha) (U: 110,138 ha) (8.5% of arable land) Create habitats for pollinators (on farms where bees are kept) (U: 943 ha) (0.07% of arable land)	Maintenance of biological diversity in grassland habitats of EU importance – inside and outside N2K areas (U: 37,028 ha) (5.8% of grassland) Most of these grasslands correspond to grassland habitats of EU importance and grasslands important for birds. However, as the mapping categories do not directly correspond to EU habitat types, the term *biologically valuable grassland* was used.				Beneficiaries of the grassland sub-measure are obliged to undertake the training courses 'Management of grassland habitats of EU importance'	No specific targeting
NL	*See habitats and species column*	*See habitats and species column*		'dry and wet green infrastructure' including: wooded banks, hedgerows, tree lanes, pollarded trees, coppice and traditional high-stem orchards,	'Open grassland' measures for meadow bird protection 'open arable land' measures for breeding and wintering field birds	No	Measures are available through the 'collectives' set up in the Netherlands. No individual applications can be made.

				maintenance of ponds and small historic water bodies.			
PT	Adoption of integrated farming methods (U: 787,460 ha) (83.6% of arable land) Specific measures in N2K areas Maintenance of High Nature Value agro-forestry systems (montado) (U: 170,274 ha) (18.1% of arable land) Support for the use of traditional varieties of cereal crops	Specific measures in N2K areas (see relevant column) Maintenance of High Nature Value meadows – irrigated (U: 9,179 ha) (0.5% of grassland) Maintenance of High Nature Value meadows – non irrigated (U: 7,239 ha) (0.4% of grassland)	Maintenance of traditional permanent crop systems to prevent land abandonment (olive groves, orchards) (U: 113,406 ha + 13,742ha for Douro Vinhateiro) (6.1% + 0.7%)	Maintenance of terraces in N2K area 'Peneda-Gerês (U:1,117 ha) Support for active management to promote open landscapes – creating an agro-forestry mosaic (U: 2,792 ha)	Management of grazing on common land in N2K area 'Peneda-Gerês (U: 25,592 ha) Conservation of notable forests with Castanea sativa in N2K area 'Montesinho-Nogueira' (U: 152 ha) Maintenance of rotation of dry cereal-fallow and livestock farming – specific measure in N2K area 'Castro Verde' (U: 31,428 ha) and general measure in other N2K areas (U: 5,001 ha) Support for beekeeping (U: 1,008 ha) Conservation and improvement of animal genetic resources (U: 67,353 animals) Conservation and improvement of plant genetic resources	No	The measures for specific habitats and species are targeted to particular N2K areas. Only some measures are available in the wider countryside.
RO	Winter cover crops for soil and water conservation (U: 79,922 ha) (0.9% of arable land)	Maintenance of extensive management of HNV grasslands and grazed orchards (U: 339,577 ha) (7.7% of grassland) (additional measure available to promote scything (U: 34,500 ha) (0.8% of grassland) and hay-making (U: 29,047 ha) (0.7% of grassland)			Management of habitats important for: • corncrake (U: 17,700 ha) • Red-footed falcon (U: 26,589 ha) • Lesser grey shrike • Spotted eagle • Great bustard • Red breasted goose Management of permanent grassland areas for the endangered Maculinea	No, but M2 is intended to provide specific advice to beneficiaries of M10 and M11	For the measures focussing on specific species, the location of the relevant habitats are pre-designated

					butterfly species (targeted to specific areas) (U: 2,674 ha) Conservation of nesting and feeding areas for common farmland bird species, especially on intensively managed farmland Support for endangered local breeds of farm animals		
SK	Multifunctional field margins for birds, small mammals and pollinators Integrated production: fruit and vegetables	Management of 7 types of semi-natural and natural grasslands (in N2K and HNV areas particularly): A. Thermophylic and xerophytic permanent grasslands B. Mesophile permanent grasslands C. Mountain meadows D. Hydrophilous vegetation of lower areas E. Lowland alluvial meadows F. Hydrophilous vegetation of higher areas, fen and purple-moorgrass meadows G. Alpine grasslands (U: 135,235 ha) (26.1% of grassland)	Integrated production: viticulture (U: 14,677 ha) (81.6% of permanent crops)		Protection of the habitats of: • Great Bustard (U: 758 ha) • Ground Squirrel (U: 1,788 ha) Breeding and preservation of endangered animal species (U: 5,593 LU)	No	Targeting is at the habitats and species which are the focus of the measures and primarily at Natura 2000 and HNV areas.

ANNEX 3: SUPPLEMENTARY INFORMATION ON COHERENCE IN THE CASE STUDY MEMBER STATES

Table 31 presents a summary of the main issues relating to the coherence of CAP measures as implemented in each case study Member State with the Birds and Habitats Directives, Target 3 of the EU Biodiversity Strategy and national biodiversity priorities

Table 31: Summary of main coherence issues relating to ESQ 13

Member State	Summary of main coherence issues
Germany - Baden-Württemberg	The RDP offers a rich menu of possible measures for biodiversity that address key biodiversity needs and are largely coherent with the PAF and the regional Nature Conservation Strategy (NCS-BW, 2013). These focus primarily on grassland habitats, in particular promoting extensive grassland habitats, which are a high priority. However, the greening instruments are not so coherent with the biodiversity priorities identified for arable land in the PAF and NCS-BW (which proposes more ambitious greening, i.e. to have complete ban on conversion of grassland, a minimum requirement for crop rotation, and 10% area for EFAs with clear benefits for biodiversity). This was not followed, and instead the EFA options in Germany at the federal level offers significant flexibility to farmers as to which elements they can choose, thus limiting its potential to deliver for biodiversity objectives in arable land.
Ireland	The coherence with some elements of the National Biodiversity Action Plan (NBAP) and the PAF has improved significantly with very recent introduction of specific EIP programmes for key Natura 2000 habitats and species in a few selected areas and for certain key species. Elsewhere there are specific AECM options for key bird species' habitats. Beyond these, coherence has been hampered by the impact of rigorous implementation of CAP land eligibility criteria on semi-natural grasslands. This has had an impact on the economic viability of the HNV farming systems on which these habitats depends, and also on the uptake of relevant AECM. The coherence between CAP measures and the woodland elements of the NBAP and the PAF is very limited (just investment support for planting native trees on patches of land <0.1 ha). Ireland does provides substantial support for afforestation, but as a state aid, not under the CAP. There is coherence of some targeted AECM and investment measures with the All Ireland Pollinator Plan.
France	In general the RDP is quite coherent with biodiversity and landscape policies, including the regional strategy for biodiversity (e.g. according to the ex-ante evaluation). However, the strategic priority of improved forest management is not addressed by the RDP.
Croatia	The main driver behind the choice and development of the 2014-2020 CAP measures has been the Ministry of Environment, supported by an agri-environment project, which helped the Ministry and Ministry of Agriculture design biodiversity-related RDP measures as well as biodiversity-related SMRs and GAEC 7. As a result, the measures are coherent with EU and national biodiversity priorities in the National Biodiversity Strategy and Action Plan (OG, 2008).
Latvia	Although the CAP instruments and measures are generally coherent with EU level biodiversity objectives, implementation decisions have reduced their coherence with some national priorities. Their use and design does not appear to adequately take into account priorities as identified in the Environmental Policy Strategy for 2014-2020, PAF, or the results of the HD Article 17 assessment. A high level of coherence was achieved in relation to the priority requirement to semi-natural grasslands, primarily through a dedicated sub-measure M10.1.1, which was supported by compulsorily training in synergy with a LIFE programme project. However, no measures addressed protected species of semi-natural habitats (e.g. grassland birds, despite being highlighted as a need in the PAF). A clear gap in the measures was the Natura 2000 measure in agricultural areas (M12.1), which was withdrawn for the current period; rather than improved as proposed by biodiversity conservationists. Biodiversity priorities were also only partly addressed for forest habitats and species (M12.2). In particular a detailed proposal for wood pasture was not taken up. Other decisions that reduced the level of coherence with national biodiversity priorities include only using one over-simply measure for priority agricultural habitats, the lack of a regionalised approach and particular support for small farms, the absence of measures to protect landscape features in grasslands, and inadequate biodiversity criteria for the use of some measures (e.g. M8.1 which can lead to detrimental landscape impacts from inappropriate afforestation).

Member State	Summary of main coherence issues
	One clear incoherence that has been identified relates to forest measures, which are overly targeted towards climate objectives, and consequently allow the replacement of native trees with non-native fast growing species.
Hungary	Interviews revealed that the planning of the different CAP measures took into account key strategies, i.e. PAF, National Strategy for the Conservation of Biodiversity (NSCB), and National Landscape Strategy of Hungary (NLSH). As a result, there is considered to be a high level of coherence between the use of the CAP instruments and measures and the requirements identified in national strategies. Thus indications in the PAF to use M4.4 non-productive (environmental) investments, M8.2 agro-forestry, M10.1 AECM and M15 forest-environment measures are taken up. Requirements for additional CAP instruments and measures in the NSCB and NLSH are also incorporated (M1, 2, 7.1, 7.6, 8.1, 8.5, 10.2, 11, 12, 13 & 16). Furthermore, although not explicitly referred to in the PAF or other strategies, clear links are evident with the greening instruments and cross-compliance. However, some measures have the ability to have negative impacts, as well as positive, namely the basic direct payments, M8.1 Afforestation, and the horizontal measures. An ex-post evaluation found that some horizontal measures contribute to biodiversity loss, through indirectly enhancing intensification. As the uptake of the horizontal schemes are relatively high, the estimated indirect negative can be significant.
Netherlands	Nature conservation policy in the Netherlands has changed in recent years as a result of growing evidence of its ineffectiveness particularly in agricultural habitats. The implementation of the CAP has responded to this in the development of its 2014-2020 RDP, which refers to the needs of Natura 2000 and the PAF. The RDP is therefore largely coherent with current biodiversity priorities by providing targeted support that is only available to collectives of farmers that are in areas that have been identified by the nature authorities as being most suitable for the conservation of a set of 67 identified BHD species. However, there are concerns that this polarised approach results in inadequate biodiversity conservation actions for other species and outside the targeted areas. In particular, the lack of designation of ESPG outside Natura 2000 areas can be seen as being incoherent with broader biodiversity objectives in the wider environment.
Portugal	The National Strategy for Nature Conservation and Biodiversity (ENCNB) recognises the importance of the agricultural and forest sectors in the maintenance of the natural heritage, and highlights the need for an integration of policies. This is also recognised in the RDP SWOT analysis. In general the RDP 2014-2020 measures are coherent with the national biodiversity and landscape priorities. Of particular importance are measures M13 or M10, which are in line with the strategy designed to support territorial strengths and with the ENCB, and are likely to have a positive impact on species and habitats dependent on low-intensity farming systems. M12.1 is also used to supports farmers within Natura 2000, in line with the ENCNB. M10.1 also targets the Iberian wolf and M15.1 is designed to support the Iberian lynx, in accordance with the ENCBN and previous PAF. Other biodiversity measures, such as M4.4, are specifically aimed at the eradication of woody invasive species. Other CAP measures are also coherent with landscape priorities as defined by the European Landscape Convention and National Planning instruments (DR, 2005; DGOTDU, 2011), such as the recovery of stone walls (M4.4), maintenance of terraces, and of traditional permanent crops (M10). M8 and M10 included measures that aim to improve forest resilience and support agro-forestry mosaics, respectively, converging major national priorities for forest landscape maintenance and sustainability.
Romania	On December 2012 the Prioritised Action Framework (PAF) was concluded, but it was not taken into consideration during the programming period 2014- 2020. At the time of approval of the RDP 2014-2020, there were very few Natura 2000 management plans in place. Currently, there are no Natura 2000 compensations measures applied in Romania. In the absence of such conservation measures, AECM are designed to provide broad protection schemes to contribute to the conservation objectives set up at national, EU and international level as a precursor to the Natura 2000 management plans. Maintenance of the PG ratio and designation of ESPG provides an additional level of protection for semi-natural grasslands in designated Natura 2000 areas. Afforestation is not permitted on Natura 2000 sites without consent. Regarding the landscape preservation, although the National Biodiversity Strategy and the National Climate Change Adaptation strategy, propose the implementation of

Member State	Summary of main coherence issues
	measures to improve landscape connectivity, no specific relevant measures in this direction have been instituted. Romania specified in the RDP 2014-2020 that when more Natura 2000 management plans were adopted, it would review the AECM schemes and consider the introduction of the Natura 2000 support measure. There are ongoing discussions between the relevant authorities.
Slovakia	The CAP RDP measures are broadly coherent with EU and national biodiversity priorities, primarily through AECM support and mostly for maintenance of grassland biotopes. However, the most valuable mountain grasslands are not included in LPIS and thus are not eligible for financial support from the CAP.

ANNEX 4: SUPPLEMENTARY INFORMATION ON THE RELEVANCE OF CAP MEASURES IN THE CASE STUDY MEMBER STATES

Table 32: The relevance of CAP instruments and measures in relation to national/regional biodiversity and landscape priorities, and the factors affecting them

Member State	Key biodiversity and landscape priorities and the pressures and threats affecting them	Instruments and measures of most relevance, and factors affecting them
Germany - Baden-Württemberg	Extensive grassland is affected by abandonment, whereas arable land and more productive grasslands are affected by intensification of production. In addition to increased pesticide and fertiliser inputs, loss of fallow land, removal of field stubble, increased use of winter cereals are drivers for biodiversity loss on arable land.	GAEC 7 in Germany protects hedges, rows of trees, woodland copses (up to 2000 m2), wetlands (up to 2000 m2), single trees, field margins, drying stone walls or natural stone walls, other stones gathered in a length of > 5 m, rocks and stone bars and terraces. ESPG: By definition, ecological sensitive grasslands are located in the Natura2000 network, but no percentage information is available. EFA benefits for biodiversity are limited as 50% of the EFA-obligation are covered by catch crops or green cover and nitrogen-fixing crops. Approximately 45% of the investments were allocated to farmers in ANC areas. No information on whether or not ANC payments are being intentionally targeted to Natura 2000 sites or HNV is available. The Baden-Württemberg RDP has 14 schemes with a primary focus on biodiversity, including under M4, M7, M10, M12. The Landscape Conservation Regulation (LCR), which provides the regulatory frame for six conservation-contract schemes (M10.1.1. – M10.1.6) and includes both co-funded and nationally funded measures outside of the CAP, is seen by stakeholders as a very valuable system, with a rich offering of measures.
Ireland	A key pressure and threat is encroachment/undergrazing. Over the past century plantation forestry has increased, much of it on marginal agricultural land of the uplands. Ireland's approach to delivering climate targets includes an ambitious afforestation target and the development of upland wind-farms	Since 2009, landscape features defined under GAEC 7 (i.e. hedgerows including gappy hedgerows, trees in a line, drains and ditches, combinations of hedge, drain and area within fence) are eligible. Within Natura 2000 areas only 4% of the permanent grassland has been designated as ESPG, and none has been designated outside Natura 2000 areas. EFA choices are hedges, trees in a line, drains, buffer strips/field margins, fallow, catch crops, short rotation coppice, group of trees/field copses and land afforested since 2009. ANC payments clearly have an impact on farm incomes in these marginal areas, and hence reducing the risk of abandonment of HNV farmland, but the biodiversity impacts are unclear, given the absence of environmental requirements and the eligibility criterion of a minimum stocking rate (now reduced to 0.15/ha from the 2012 rate of 0.3ha) which excludes some HNV farms form these payments. There are two AECM schemes under M10: the nationwide GLAS and The Burren Programme. GLAS has a prioritised tired approach which includes private Natura 2000 sites in the highest tier, as well as farms with rare breeds. M12 was dropped for the 2014-20 RDP because Natura 2000 areas are targeted through GLAS and the EIP programme.
France	Key concerns include declines in farmland bird populations, e.g. Over the last 15 years, several bird species such as *Alauda arvensis* or *Sylvia communis* have lost about 1/3 of their population. This trend seems to	Features eligible as EFA submitted to GAEC 7 are hedges, copses and ponds. All ESPGs in France are located within Natura 2000 area. However, the percentage of Natura 2000 permanent grassland designated as ESPG is not available.

Member State	Key biodiversity and landscape priorities and the pressures and threats affecting them	Instruments and measures of most relevance, and factors affecting them
	have accelerated lately. The use of pesticides is still a major threat for biodiversity and it has not reduced in France, despite the green payment, the AECMs and a dedicated national plan (Ecophyto). Together with the maintenance of extensive farming practices on high nature value grasslands, it is the main agriculture-biodiversity issue in France.	The choice was made to allow all the EFA options in order to take into account the heterogeneity between different parts of France and not to disadvantage any regions. VCS payments have no environmental criteria in France. No information on whether or not ANC payments are being intentionally targeted to Natura2000 sites or HNV (or potential overlaps) is available. AECM have been the main tool for nature conservation actions within Natura 2000 sites, and have been shown to be effective. Since 2015, a list of types of operation (TO) for the AECM measure is defined at 'hexagonal' level in the National Framework Programme. However, the actual design of the AECMs is defined at regional level based on this list of TOs (e.g. several TOs can be combined to build an AECM). Therefore, the regions can adapt the design of the AECMs to their local needs. M12 in relation to Natura 2000 is not used in France.
Croatia	Key pressures and threats are predominantly the loss and fragmentation of habitats, as a result of intensive agriculture and infrastructure development, IAS, pollution, urbanisation and climate change. However, in contrast, in other areas, especially with high natural value, the main threat is the declining number of farmers and abandonment of traditional, low-productivity agriculture practices, leading to succession and loss of semi-natural grasslands etc. This has already affected the majority of low productivity grassland, and this trend is most likely to continue.	GAEC 7 is of low relevance, as whilst it bans hedge cutting during the breeding season it does not afford protection for landscape features. The% of permanent grassland within N2k sites designated as ESPG was just under 60% in 2018 (a decline from approx. 80% in 2016). No ESPG has been designated outside the N2k network, despite the pressures on it (but the N2k network is large and contains most semi-natural grassland). EFAs are of limited relevance, as although they include options with most biodiversity value, 75% of the area is N-fixing crops. M10 is the primary measure used for biodiversity conservation, and is of high relevance as it has a range of sub-measures targeting important habitats (e.g. HNV grasslands) as well as some important species, and actions to increase biodiversity with intensive arable areas. Organic farming is widely taken up, but given the biodiversity priorities and threats, this is of rather low relevance. Of higher relevance are the ANC payments, which apply to approximately 60% of UAA, and cover a high proportion of N2k and HNV areas.
Latvia	The major trend in the development of agriculture in Latvia is polarisation (intensification and abandonment) with both extremes threatening agricultural biodiversity. Land abandonment and the withdrawal of traditional management is a major threat to agricultural biodiversity on farmland in agriculturally marginal areas. Intensification of agriculture is a major threat on farmland in areas with good environmental conditions for agriculture. The main pressures and threats for forest habitats are forest harvest (mostly by clearcutting), removal of dead wood, drainage and modifications in hydrological functioning, past soil alterations by land use, expansive and invasive species, fragmentation and isolation.	Protected trees, alleys and boulders are GAEC elements. Over 50% of EU importance grassland habitats are located outside the Natura 2000 network. The designation of these grasslands as ESPGs was an important decision to facilitate maintenance and conservation of grassland biodiversity. The landscape features offered by the EFAs are field margins, groups of trees/ field copses, ponds, protected trees, alleys and boulders. AECM measures include just four schemes, addressing over-winter stubbles, maintaining grasslands protected under the nature directives, creating habitats of pollinator species and integrated farming techniques for horticulture. The grassland and scheme is of most relevance to biodiversity priorities, but it has very general and broad prescriptions. Compensation payment for Natura 2000 agricultural areas (M12.1) is not being continued.
Hungary	The overall decline of agricultural land, the increasing use of pesticides and fertilisers, the intensity of land management and the	Features included as GAEC 7 are shadoofs, standalone trees, groups of trees or bushes and small ponds. Under Cross-compliance (GAEC) rules it is forbidden to cut

Member State	Key biodiversity and landscape priorities and the pressures and threats affecting them	Instruments and measures of most relevance, and factors affecting them
	loss in ecological corridors in agricultural habitats are key causes of biodiversity decline. Habitats and species of priority are endangered by a number of interrelated factors: e.g. inappropriate management, including the inadequate (too low or too high) intensity of use (mowing or grazing), the bad timing of mowing, and conversion of grasslands into arable land or vineyards, human-induced fires, clear-felling of forests and artificial forest renewal with non-native species.	trees, hedges or bushes during the breeding season of bird species (01/03-31/08) All Natura 2000 grasslands have been designated as ESPG but no such areas have been designated outside Natura 2000 network. Hungary decided not to renew the ANC designation between 2015 and2020. AECM considered having the highest impact on biodiversity among the CAP measures, but low level of AECM commitments limits their ability to halt biodiversity loss, while targeted measures (e.g. HNVA measures) played a significant positive role on the conservation of natural assets. The Natura 2000 compensation measure is considered to be the second most important CAP measure
Netherlands	Key pressures include the very high intensity of agricultural management over most of the Member State, with very high levels fertiliser and pesticide use, high stocking levels, use of silage and stockyards rather than outdoor grazing, and lowered water levels on previously wet grasslands. Habitat fragmentation is also a major problem, as well as high levels of predators in the farmland landscape. The high stocking levels give rise to very high ammonia emissions, which cause eutrophication on sensitive semi-natural habitats.	The protection of hedges and trees is included in GAEC 7, but the relevance of this is uncertain as the only requirement is to obtain a permit. All permanent grasslands in Natura 2000 were designated as ESPG, but none outside. AECM is the main nature conservation measure. NL chose to distinguish between four broad categories of habitats to which sub-measures were tailored: Open grassland habitat; Open field habitat; Dry green infrastructure; and Wet green infrastructure.
Portugal	Abandonment or intensification are the major drivers of change, and related to negative impacts on biodiversity, with key pressures including a lack of grazing causing vegetation succession, and in contrast, high grazing pressure, use of biocides and fertiliser, and changes in farming and forestry practices.	No information on GAEC 7 was found. Only 1.3% of permanent grassland has been designated as ESPG, and none outside (ESQ 1) Potential areas of EFAs include fallow land (over 50% of declared EFS), nitrogen fixing crops, agro-forestry areas implemented under the RDP, afforestation of agricultural areas implemented under the RDP, and landscape elements in the context of cross-compliance (riparian forests within Natura 2000) and linear elements related to rice cultivation (e.g. drainage ditches, ditches) ANC payments are not intentionally targeted to Natura 2000 or HNV While measures supporting farmers within Natura 2000 existed in other periods, M12.1 measures designed and implemented within the RDP 2014 introduced, for the first time, a compensation specifically targeting additional costs and loss of income of farmers. In these areas Natura 2000 payments (M12.1) were designed to work together with AECM, namely zonal supports targeting specific Natura 2000 areas and natural values.
Romania	Key pressures include overgrazing, pressure on grazing rights, competition for communal grazing areas and increasing the pressure on HNV grasslands.	GAEC 7 is particularly important in hilly – mountain areas. GAEC 7 requires preservation of landscape features including trees, preventing unwanted vegetation and ensuring a minimum level of maintenance of farmland. Prohibits the cutting of wild hedges and trees during the breeding and rearing season of wild birds (15 March - 30 June). 100% of Natura 2000 permanent grassland is designated as ESPG (ESQ 1), but none outside In lowland areas, the greatest proportion of the EFA area was occupied by nitrogen fixing crops, many of which were supported via voluntary coupled support (VCS).

Member State	Key biodiversity and landscape priorities and the pressures and threats affecting them	Instruments and measures of most relevance, and factors affecting them
		Greater flexibility compared to specific environmental requirements has been introduced recently. Natura 2000 payments will not be implemented in the near future, mainly due to the very small number of approved management plans.
Slovakia	Key pressures are intensification of grasslands, with production of large amounts of biomass, intensive use of fertilisers, mowing and or/grazing.	No information on GAEC 7 was found. EFAs includes solitaires, lines of trees, groups of trees, baulks or hedges. 100% of permanent grassland designated as ESPG in N2k. The largest share of RDP money under this objective (53%) goes to farming in M13 - Areas with Natural Constraints (ANC), but they are not tied to concrete environmental targets or conditions AECM is the key tool for maintaining and improving the favourable status of grassland habitats, and targeted primarily at Natura 2000 and HNV. Payments for Natura 2000 agricultural and forest areas are very small

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