A NATIONAL BIODIVERSITY EXPENDITURE REVIEW FOR IRELAND

Tracking and Mobilising Finance for Biodiversity Conservation

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EXECUTIVE SUMMARY

Ireland's natural environment is in trouble. The most recent national assessment of the status of EU protected habitats and species reveals that 91% of 58 major habitat types are in unfavourable condition (NPWS, 2013). Of this proportion, 41% are described as 'bad' and another 50% as 'inadequate'. Although by comparison, 12% of species are listed as being in 'bad' status and 20% as 'inadequate', these figures include some formerly common species such as the freshwater pearl mussel. The Irish Red List of birds of most conservation concern lists 37 species, including once familiar birds such as the curlew and yellowhammer (Colhoun & Cummins, 2013).

These worrying trends of biodiversity loss are mirrored internationally. The major threats include habitat loss and degradation, climate change, pollution, over-exploitation and invasive species. These losses of biodiversity are relevant to all of us, not simply for the direct contribution that the natural environment makes to our quality of life, but because of the critical ecosystem services it supplies including for our food provision, materials supply, water quality, protection from natural hazards and the moderation of climate.

The Convention of Biological Diversity (CBD) was conceived by the United Nations Environment Programme (UNEP) and entered into force in December 1993 following the international Earth Summit in Rio de Janeiro the previous year. Ireland is a signatory to the Convention along with other EU members, and 195 countries internationally. To begin to counter biodiversity losses, the CBD has called for a major increase in spending to close the biodiversity funding gap. It has been estimated that this funding shortfall amounts to some 83% between current levels of spending and the approximate USD $300-350 billion per year needed to begin to meet the key targets of the Convention (Parker et al. 2012; Huwyler et al. 2014).

However, to define and implement a *'resource mobilisation strategy'* to bridge the funding gap, it is first necessary to understand *what* is currently spent, *how* this money is spent, and *how much* of it is directly spent on biodiversity or otherwise impacts positively on biodiversity protection through measures embodied in land use policy, water services, tourism and recreation policy, and planning and development.

To this end, the UNEP set up the Biodiversity Finance Initiative, or BIOFIN, to provide guidance and a methodological framework for countries to examine their levels of biodiversity finance and how these relate to national biodiversity targets and the international targets of the CBD. The guidance first requires a *biodiversity expenditure review* (BER) to provide a holistic picture of biodiversity finance. The BER provides a baseline for a biodiversity financing strategy. Its estimates of expenditure can be used as *indicators* to assess progress on government commitments on biodiversity and to *track* spending activity within different sectors and by different government departments or agencies, non-governmental organisations (NGOs) and the private sector.

In Ireland, the National Parks and Wildlife Service (NPWS), with support by the Irish Research Council, has backed this research by University College Dublin to prepare a National Biodiversity Expenditure Review (NBER). The review examines the levels and patterns of expenditure that are relevant to biodiversity and the degree to which this expenditure has contributed to Ireland's international and national commitments to halt biodiversity decline. The NBER has adopted the methodology and spreadsheet-based model of expenditure provided by BIOFIN. Although many countries are currently examining their biodiversity spending in relation to their obligations to the CBD, Ireland is amongst the first developed nation signatories to apply the BIOFIN approach.

The NBER records biodiversity spending by government departments, agencies and NGOs between 2010 and 2015, using the categories of expenditure provided by BIOFIN. It then compares these with the seven biodiversity objectives and associated targets contained in Ireland's National Biodiversity Action Plan 2011-2016 (maintained in the new NBAP 2017-2021) and the goals and targets comprising the Strategic Plan for

Biodiversity agreed by the CBD Conference of the Parties in Aichi, Japan in 2010. This tagging of expenditure in the NBER is combined with the use of coefficients that weight the relevance of any one item of spending to biodiversity by taking into account the degree to which this spending is directly or indirectly aimed at biodiversity. Following the BIOFIN guidance, a stepped set of coefficients (0%, 5%, 25%, 50%, 75% & 100%) has been applied based on transparent definitions of relevance.

The benefits of a National Biodiversity Expenditure Review

This report explains the findings from the NBER and describes how the data has been presented and analysed in the accompanying database. The review provides the baseline from which expenditure data can continue to collected and analysed on an on-going basis to map trends in biodiversity finance and to determine its continuing relevance to national and international biodiversity targets.

There are a range of justifications for continuing to track biodiversity expenditure:

- **Marking progress** towards the achievement of national and international biodiversity objectives and targets;
- **Providing data and indicators** for reporting to the CBD, the EU on biodiversity objectives;
- **Tracking biodiversity expenditure by individual government departments** and its relationship to biodiversity objectives and targets;
- **Allowing for an evaluation of the effectiveness of government expenditure**, including the relationship between budgetary allocation and actual spending;
- **Identifying trends in biodiversity expenditure over time** in different sectors in relation to a financial needs assessment.
- **Comparing government expenditure with that of NGOs or the private sector** to examine the extent to which the latter two sectors can deliver complementary support for biodiversity;
- **Helping to identify where to prioritise future biodiversity expenditure** for on-going financial planning;
- **Raising awareness of the value of expenditure** and its ecosystem services contribution to different economic sectors and to Irish society;
- **Providing information with which to analyse the drivers** of biodiversity loss and enhancement;
- **Informing strategic planning** of future biodiversity protection.

To be most effective, the NBER should be accompanied by a financial needs assessment (FNA) to indicate where investment is most needed to protect and restore biodiversity, what types of measures are necessary and how much these will cost to implement. The NBER and FNA together can inform a prioritised set of actions to protect and conserve biodiversity. The evaluation of the NBER can be used to determine the effectiveness of current measures and expenditure and the synergies that are possible with the economic and social priorities of other government departments through which much spending is made, but for whom biodiversity will not be the primary objective.

Findings of the National Biodiversity Expenditure Review (2010-2015)

Over the 6-year period between 2010-2015, total national expenditure on biodiversity is estimated to have amounted to €1.49 billion with an annual average expenditure of €250 million. Table 1 and 2 below list this spending against both the CBD and NBAP targets and objectives.

Although these figures sound significant, biodiversity expenditure represents on average only 0.31% of total government expenditure. Much of this expenditure suffered significant reductions as a consequence of the economic recession of 2008-2011 and has yet to recover. In addition, 80% of expenditure is classified as subsidies, 10% is operational costs and 6% as salaries.

Expenditure on biodiversity in Ireland is primarily the domain of the state. State-led institutions are responsible for channelling 96.6% of expenditure compared with only 1.2% by local government (itself largely centrally financed) and 1.3% by environmental NGOs (many also largely supported by government funding). The two core sources of state-led finance are central government and the EU. EU funding was linked to 42% of state spending, indirectly through the European Agricultural Fund for Rural Development, the European Maritime and Fisheries Fund, and more

directly through the LEADER, INTERREG and LIFE programmes.

The NBER data confirms that agricultural policy has a significant influence on biodiversity and is the main sector for biodiversity-related finance, accounting for 75% of expenditure between 2010-2015. Much of this spending has an indirect influence, being linked to agri-environmental measures that are also intended to provide social support and to sustain lower intensity farming, particularly in less advantaged areas. Agricultural spending generally has been linked to trends towards increased intensification or specialisation which have implications for habitats, water quality and species dependent on traditional or low intensity farming. However, the biodiversity effectiveness and targeting of agri-environmental schemes is generally thought to be improving, and a new generation of locally-led agri-environment schemes conceived under the European Innovation Partnership (EIPs) could have a measurable positive impact on biodiversity.

Ireland's terrestrial territory is far smaller than its marine territory, however over 90.3% of total expenditure was linked to terrestrial biodiversity. This distribution of spending accounts for the dominance of spending on NBAP objective 4 (78% between 2010-2015) to 'conserve and restore biodiversity in the wider countryside'. By comparison, just 8.4% can be confidently linked to freshwater biodiversity and just 1.3% to the conservation of marine biodiversity. Here again, much expenditure has been directed at minimising or correcting for the adverse biodiversity impacts of over-exploitation of fisheries and by measures intended to push the industry towards more sustainable fishing practices.

Indeed, to counter the external environmental and social costs of public and private sector activities in various economic sectors related to land use, planning and energy, significant sums are spent by agencies such as the Environmental Protection Agency (EPA) to monitor and minimise environmental impacts. As these sums (€1.5 billion) are directed at wider *environmental protection* for the protection of human health, this important expenditure has been kept separate from specific biodiversity expenditure, although the close connection is acknowledged.

By comparison, expenditure with a direct and positive contribution to biodiversity has been made by some EU programmes, especially EU LIFE. Amongst national bodies, positive actions are also attributed to Forest Service schemes, Inland Fisheries Ireland, local government and the Heritage Council, especially on awareness. The NPWS is itself responsible for just 9% of total expenditure and has endured significant budget cuts in recent years. An important direct contribution is also made by environmental NGOs. However, while NGOs make a distinct contribution to public awareness and could be very important for biodiversity enhancement, the NBER reveals that many are struggling with budgets that are barely sufficient to cover yearly administrative, personnel and management costs.

OPTIONS FOR FUTURE RESOURCE MOBILISATION

By linking the data and analysis from the NBER with the FNA, there is an opportunity to estimate the additional sums needed for the protection of biodiversity, as well as to develop a strategy for its restoration and enhancement. This strategy must also include planning for adaption to climate change.

In the first instance, such a strategy will require a realisation of the implications of biodiversity loss by all departments and agencies responsible for biodiversity-related spending. There is potentially a significant threat to the ecosystem services that underpin other activities which are supported by government policy, including notably agriculture, forestry, fishing, water and tourism.

The NBER makes plain the extent of current biodiversity spending in these sectors, much of which is directed at support for more sustainable practice, subsidies or the protection of biodiversity, rather than being *reinvestment* in natural capital. Only 2-4% of biodiversity expenditure between 2010-2015 was linked to capital investment. In this regard, it is worth noting that all the aforementioned factors contributing to global biodiversity loss are present in Ireland too, for example agricultural intensification, peat cutting, habitat fragmentation due to built

development infrastructure, eutrophication of surface waters and over-fishing, some of which are supported and enabled by the state.

The NBER and a FNA can be used to explore new sources of biodiversity finance. These sources, include, amongst others, payments for ecosystem services (PES), biodiversity offsets in response to new development, and finance linked to carbon storage or sequestration. Some of these measures may conform to the status-quo of sectoral biodiversity-related spending by government departments, but could also tie in with the activities or agencies such as the Office of Public Works (OPW) or utilities such as Irish Water. The NBER can also have a role in identifying the effectiveness of these measures and the potential for their improved design and targeting. This argument does not, however, omit the need for new funding and dedicated state funding to directly strengthen and enhance Ireland's biodiversity through the budgets of the NPWS and related heritage agencies, by strengthening the capacity of NGOs, and engaging and cultivating investment by the private sector.

National Biodiversity Action Plan Objectives	Expenditure 2010-2015	
1. Mainstream biodiversity in the decision-making process	€ 5,284,189	0.4 %
2. Substantially strengthen the knowledge base for conservation	€ 57,578,271	3.9 %
3. Increase awareness and appreciation of biodiversity	€ 65,706,352	4.4 %
4. Conserve and restore biodiversity in the wider countryside	€ 1,176,708,022	78 %
5. Conserve and restore biodiversity in the marine environment	€ 4,542,786	0.3 %
6. Expand and improve on the management of protected areas and species	€ 184,024,485	12 %

TABLE 1. NBER: NATIONAL EXPENDITURE ON NBAP OBJECTIVES

CBD Aichi targets	Expenditure 2010-2015	
Target 1: Awareness increased	€ 69,212,671	4.6%
Target 2: Biodiversity values integrated	€ 2,518,285	0.2%
Target 4: Sustainable production and consumption	€ 2,498,072	0.2%
Target 5: Habitat loss halved or reduced	€ 27,104,707	1.8%
Target 6: Sustainable management of marine living resources	€ 4,759,974	0.3%
Target 7: Sustainable agriculture, aquaculture and forestry	€ 1,043,148,487	69.8%
Target 8: Pollution reduced	€ 328,777	0.0%
Target 9: Invasive alien species prevented and controlled	€ 5,581,246	0.4%
Target 12. Extinction prevented	€ 35,069,087	2.3%
Target 10: Pressures on vulnerable ecosystems reduced	€ 365,205	0.0%
Target 11: Protected areas increased and improved	€ 111,017,784	7.4%
Target 13: Genetic diversity maintained	€ 12,534,284	0.8%
Target 14: Ecosystems and essential services safeguarded	€ 147,024	0.0%
Target 15: Ecosystems restored and resilience enhanced	€ 122,886,352	8.2%
Target 17: NBSAPs adopted as policy instrument	€ 1,364,196	0.1%
Target 19: Knowledge improved, shared and applied	€ 56,132,604	3.8%

TABLE 2. NBER: NATIONAL EXPENDITURE ON CBD AICHI TARGETS

1. INTRODUCTION

Despite continuing habitat destruction and loss of biodiversity there remains a short-fall in funding available for biodiversity conservation (McCarthy. et al. 2012; Butchart et al. 2010; Shaffer et al. 2002).

> *"The need for conservation funding always exceed available resources. It is also seldom clear whether limited funds are directed at the greatest needs or investment to maximise conservation gains"* (Zavaleta et al. 2008:1477).

Lack of finance is considered to be a key cause of recent failures to meet the Convention on Biological Diversity's (CBD) targets to halt biodiversity loss by 2010. The prevalence of underfunding, referred to as the '*biodiversity funding gap',* is widely acknowledged as a major impediment to effective global biodiversity conservation (Waldron et al. 2013; Feger & Pirard 2011; Secretariat of the Convention on Biological Diversity 2014; Djoghlaf & Dodds n.d.; Global Environment Facility 2012). For the UN and international conservation organisations, the mobilisation of additional resources for conservation is a critical and continual priority to ensure the implementation of multilateral biodiversity agreements and national targets (James et al. 1999; James et al. 2001; Waldron et al. 2013; Bruner et al. 2004; Evans et al. 2012; Feger & Pirard 2011; IUCN 2010; CBD 2016; McCarthy, et al. 2012).

Bridging the finance gap represents a major and urgent global challenge (Balmford & Whitten 2003; Secretariat of the Convention on Biological Diversity 2014). However, national and international studies tracking the quantity, allocation and distribution of conservation finance remain scarce and our understanding of the effectiveness of financial flows for conservation is limited.

Finance has always been a part of the text of the CBD, and all parties are asked to provide financial support and incentives for national activities to achieve the objectives of the Convention (Parker et al. 2012). Since the Convention entered into force, the decisions of its Conference of the Parties (COP) have repeatedly emphasised that a lack of available finance remains a primary obstacle to achieving the CBD's objectives (Parker et al. 2012; Waldron et al. 2013; Tittensor et al. 2014; McCarthy, et al. 2012).

Global estimates of conservation finance suggest that current expenditure is around $50-52 billion US per yr (Parker et al. 2012; Huwyler et al., 2015), while the finance needed to fulfil conservation targets is thought to be around $300bn US dollars per yr, a funding shortfall of some 83%.

In response to financial shortfalls, the CBD adopted a Resource Mobilisation Strategy at COP 11, which introduced a number of key financial targets and actions for resource mobilisation by parties *(for the full text see Appendix 1.*):

1. The **doubling of biodiversity-related financial resource** flows to developing countries, maintained until at least 2020.
2. The **mobilisation of domestic resources** from all sources **to reduce the gap between identified needs and available resources at domestic level**, for effectively implementing by 2020 Parties' national biodiversity strategies and action plans.
3. **Reporting on domestic biodiversity expenditure**, biodiversity funding needs, gaps and priorities, by 2015, to improve the robustness of the baseline.
4. **Preparation of national financial plans** for biodiversity.

The CBD Resource Mobilisation Decision not only introduced financial targets to encourage the generation of additional finance, but also initiated financial reporting and planning requirements as a key approach to ensure a strategic and systematic approach to the mobilisation of resources.

One of the key innovations of the CBD Resources Mobilisation Strategy was the introduction of financial reporting requirements for biodiversity conservation. Historically, biodiversity-related

expenditure has not been tracked or analysed, and the information which does exist is varied in its focus and approach (e.g. James et al. 2001; Waldron et al. 2013; Brockington & Scholfield 2010). Financial reporting requirements highlight that "*before you can up-scale you need to look at how finance is currently being spent*" (Parker et al. 2012:28), emphasising the need for a much more systematic and planned approach to finance in the biodiversity sector. (BIOFIN 2016; Medarova-Bergstrom et al. 2015; CBD 2012). Domestic financial reporting requirements introduced by the CBD are for the first time encouraging the scrutiny of existing financial flows for biodiversity conservation. Through financial reporting it will be possible to establish a baseline understanding of biodiversity expenditure, and assessment of the sources and magnitudes of finance flows for the conservation of biodiversity (IUCN, 2012).

Financial reporting and tracking of expenditure on biodiversity conservation, either nationally or internationally, poses a new and substantial challenge for parties to the convention. The CBD may have initiated requirements to report on conservation finance, however there is no set methodological approach to accompany reporting requirements Biodiversity conservation is supported by a wide range of institutions, including government agencies, bilateral donors, multi-lateral banks, nongovernment organisation, for profit business enterprises and private foundations. Lerner et al. (2007) have highlighted the difficulties in obtaining detailed estimates and the data needed to determine expenditure and its sources, and issues with disentangling complex combinations of public and private investment.

To tackle the challenge posed by financial reporting the UNDP established the Biodiversity Finance Initiative, also known as BIOFIN, to deliver a new methodological framework to enable the identification, development and implementation of optimal evidence-based finance plans and solutions (BIOFIN 2016). The BIOFIN (2014; 2016) resources and workbooks provide some of the first international guidance for undertaking a financial reporting, including NBERs, FNAs and the Strategic Financial Plans for conservation (see BIOFIN, 2016). Thus far, BIOFIN has largely focused on aiding developing nations to fulfil reporting commitments. Some individual countries (e.g. Switzerland, Germany, India), regions (EU - Medarova-Bergstrom et al. 2015) and researchers (e.g. Waldron et al. 2013; Brockington & Scholfield 2010; Salcido et al. 2009), have developed their own approaches to scrutinise financial flows for conservation. Notably inidividual States, organisations and researchers have adopted quite different methodological assumptions and approaches to tracking biodiversity finance (see Medarova-Bergstrom et al. 2015; CBD 2012).

The process of tracking and scrutinising financial flows for biodiversity conservation, at a national, organisational or regional level, is generally referred to as undertaking a '*Biodiversity Expenditure Review (BER)'*. Alongside fulfiling reporting commitments, *BERs* have a number of reported benefits, including establishing a holistic national picture of biodiversity finance and operating as a means to improve the use of scarce resources (BIOFIN, 2016).

When combined with FNAs, BERs provide a baseline from which to determine funding gaps, identify targets for generating additional finance, to aid the creation of biodiversity finance plans and the mobilisation of additional resources. Furthermore, estimation of expenditure can also be used as *'biodiversity indicators'* to assess government commitments to conservation and progress towards CBD targets (Somper 2011; IUCN 2010). BIOFIN (2016) also suggests that expenditure figures can foster national dialogue on the alignment of policies and practices with national biodiversity objectives, and the effectiveness and appropriateness of a wide range of existing and potential expenditures.

Tracking biodiversity expenditure is also seen as a key means of exploring how attitudes to biodiversity are changing in different sectors. Biodiversity expenditure can, therefore, be used as one measure of the success of efforts to mainstream biodiversity protection across multiple departments (European Environment Agency 2007; IUCN 2010).

Resource mobilisation and biodiversity finance are thought to be key to the achievement of national

and international objectives to halt the loss of biodiversity. The scrutiny of financial flows for biodiversity, through the measurement and review of biodiversity expenditure, is seen an increasingly important area for the mobilisation of additional resources for conservation and the development of strategic financial plans for conservation financing. As party to the CBD, the Republic of Ireland is also required to fulfil domestic and international financial reporting commitments and to generate additional resources to meeting national and international targets set by the CBD.

However, the process and methodology for undertaking a formal NBER is novel and relatively untested in a developed country context (BIOFIN, 2016; 2017). This report presents the findings of a NBER undertaken for the public and non-profit sectors of the Republic of Ireland for 2010-2015. It presents the methodological approach taken, discusses the results of the review and reflects on the process and value of tracking and analysing biodiversity expenditure.

1.1 Structure of the Report

The report summarizes the findings from a year-long investigation of biodiversity-related expenditure (also referred to as finance, spending or funding). This report presents a number of key insights from the NBER exercise.

The first section briefly runs through the key literature and background to BERs. The second section details the key methodological choices made in undertaking the review. The results of the review are then presented, with an overview of national spending in relation to national and international biodiversity objectives (NBSAP and Aichi) and in-depth sections. The in-depth sector reviews discuss the contributions of major finance actors and expenditure programmes linked to biodiversity conservation, and explore the manner in which these programmes seek to conserve biodiversity. The baseline biodiversity expenditure of the agencies is followed by a discussion of this expenditure to provide a broad information base on spending priorities. The final section contains a discussion of biodiversity expenditure and recommendations on strengthening biodiversity finance coordination and possible avenues for innovation. In-depth reports discussing methodological design and background on biodiversity finance are presented separately.

Glossary of key terms:

Actual Attributed Biodiversity Expenditure: The degree to which an overall expenditure can be counted as a biodiversity expenditure; the degree to which an expenditure promotes the conservation, sustainable use and/or equitable benefits sharing of biodiversity.

Base Financing: Business-as-usual financing in the country from all sources.

Biodiversity: Biological diversity means 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.

Biodiversity Expenditure: Biodiversity-related expenditure is defined as any expenditure, whether by a public or private finance actor that supports the conservation, sustainable use and/or equitable benefits sharing of biodiversity in a given year (BIOFIN, 2016).

Biodiversity Expenditure Review: A systematic review and critical analysis of the amount of biodiversity-related expenditures by key finance actors within a country in order to align expenditures with national goals, and to develop a baseline for past and future biodiversity finance (BIOFIN; 2015, Mexico).

Budget Execution: After the government enacts the budget, this concerns how funds are actually spent to implement the policies, programmes, and projects outlined in the budget

Budget Tagging: A system for consistently identifying types of expenditures (e.g. on Biodiversity) within budgeting systems

Conservation Finance: The practice of raising and managing capital to support, land, and water and resource conservation (Story, 2007: xv).

Current & Capital Spending: current expenditures are continuing expenditures for day-to-day operations e.g. rent, telephone bees, legal fees; Capital expenditures are expenditures made on the intent of creating future benefits e.g. building or expenses to improve business property.

Fiscal Policy: Government financial actions and norms including both revenues, such as taxes, and expenditures.

Gross Domestic Product: An aggregate measure of production equal to the sum of the gross values added of all resident and institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs).

National Biodiversity Action Plans or Strategy: The principal instruments for implementing the Convention on Biological Diversity (CBD) at the national level (Article 6). The Convention requires countries to prepare a national biodiversity strategy (or equivalent instrument) and to ensure that this strategy is mainstreamed into the planning and activities of all those sectors whose activities can have an impact (positive and negative) on biodiversity (CBD).

Non-profit/Not-for-Profit: A non-profit organization (also known as a non-business entity [1]) is an organization that has been formed by a group of people in order "to pursue a common not-for-profit goal", that is, to pursue a Stated goal without the intention of distributing excess revenue to members or leaders

Overall expenditure: The overall total expenditure, whether for biodiversity or other categories, that a finance actor spends in a given year.

Public Spending: General government spending generally consists of central, State and local governments, and social security funds.

System of Environmental Economic Accounting: The internationally agreed standard concepts, definitions, classifications, accounting rules and tables for producing internationally comparable statistics on the environment and its relationship with the economy.

BOX 1. GLOSSARY OF KEY TERMS USED IN THE REPORT

2. CONTEXT: BIODIVERSITY LOSS & CONSERVATION IN IRELAND

2.1 BIODIVERSITY LOSS IN IRELAND

Since the early 2000s, national assessments have shown that Ireland's biodiversity levels are in decline, echoing the broad global trends of biodiversity loss (Lucey & Doris 2001; Fitzpatrick et al. 2010; EPA 2012).

> *"Biodiversity is currently being lost at an unprecedented rate globally, and Ireland is no exception. The decline in biodiversity has been more rapid in the past 50 years than ever before in human history, and human activity is leading to increased extinction rates*" (Notice Nature 2017).

The last EU Habitats Directive report found that out of the 58 listed habitats in Ireland 91% are considered to be '*inadequate'* or '*bad*' status, and only 7-9% considered to be in '*favourable'* status (NPWS, 2013, 2014).

Subsequent reports by the National Parks and Wildlife Service (NPWS), the government body which manages the Irish State's nature conservation responsibilities under the Department for Culture, Heritage and the Gaeltacht, further highlighted that the most pressing concerns are for habitats such as boglands and species-rich grasslands, alongside ongoing declines in heath, upland grassland, lakes, bogs, mires and fens, reefs, dunes, grasslands, heath and scrub habitats. Moreover, the NPWS found that pressures on these habitat shows little signs of abating in the near future (NPWS, 2014).

Alongside protected habitats there are 61 European protected species in Ireland, of which only 53% are thought to be in *'favourable'* conservation status, 20% as *'inadequate,'* 12% as '*bad*' and 16% as '*unknown*' (NPWS, 2013). In 2013, the NPWS reported that some positive progress had been made, and populations of bat, dolphin, and whale species, were thought to be improving, alongside the successful reintroduction of raptors to Ireland. Although the overall number of species in bad status is low, there are a number of species of conservation concern such as the natterjack toad, European eel, lamprey, freshwater pearl mussel, Irish water beetle species, common scoter, black-necked grebe, quail, red-necked phalarope and nightjar (EPA, 2012).

In Ireland, biodiversity decline is being driven not by one single factor, but by a multitude of drivers which are collectively placing biodiversity under increasing pressure. This intensification has resulted in loss of undesignated habitat, but has also contributed to a continuing reduction in the length of river of high water quality status due to eutrophication, together with the contribution from domestic wastewater discharges and inadequate urban wastewater treatment (declining). The legacy of past over and under grazing and of inappropriately sited forestry plantings has also been linked to the damage and degradation of habitats (Bullock et al. 2008; NPWS 2014; Lucey & Doris 2001).

Peatlands are one of the most important habitats in Ireland, but they are also one of the most threatened. The most serious damage to peatlands is being driven by peat extraction, both commercial peat extraction and more informal domestic turf cutting (Renou-Wilson et al. 2011; EPA 2008; Douglas et al., 2008; EPA 2016).

In the marine environment, bottom fishing and general fishing pressure is thought to be adversely affecting the condition of many reef complexes which are sensitive to disturbance and have long recovery times (NPWS 2014).

Changes in land use, urbanisation, road building, infrastructure, and energy development have also encroached on habitats, resulting in increasing pressures on native species alongside fragemention and habitat loss (Lucey & Doris 2001). Pollution, caused largely by intensive agricultural practices, is another prevalent cause of biodiversity loss in Ireland. Around 47% of rivers, 57% of lakes, 44% of transitional waters, 7% of coastal waters and 1% of ground water are thought to be in moderate, poor or bad status (EPA 2016). Finally, invasive species, or non-native species, are also considered a major threat to biodiversity. The number of high impact alien invasive species introduced into Ireland has

increased by 183% from 1961 to 2010 placing additional pressure on already vulnerable native species (O'Flynn et al. 2014).

To provide a comprehensive picture of the current State biodiversity decline and loss, the National Biodiversity Data Centre (NBDC) put together a suite of indicators for Ireland in 2015. Biodiversity indicators are aggregate measures reflecting data from a number of sources to represent the current state of biodiversity in Ireland (Biodiversity Ireland 2017). There are eight main indicator groups which include awareness of biodiversity, the status of biodiversity, threats to biodiversity, measures that safeguard biodiversity, measures that mainstream biodiversity, benefits derived from ecosystem services, impacts on biodiversity outside Ireland, and knowledge of Irish Biodiversity. At present, 60% of indicators show inadequate progress in delivering biodiversity conservation, 32% show progress has been made, and another 8% are uncertain (NBDC 2015:1). Notably, sub-indicators for the '*status of biodiversi*ty' emphasise concerns for invertebrates such as bumble bee and butterfly and for priority habitats (NBDC, 2015; Biodiversity Ireland, 2017).

The overall picture, produced by both the NPWS assessments and the NBDC, indicates a clear need for more concerted action to meet targets to halt biodiversity loss, and a bleak picture for the future of biodiversity in Ireland.

2.2 Biodiversity Conservation Plans, Programmes and Projects

This section briefly outlines the main policies, programs and plans which contribute to the protection of biodiversity in Ireland, alongside other sectoral policies which acknowledge biodiversity conservation priorities.

The State has a crucial role in the protection of biodiversity, setting the framework and goals of biodiversity conservation policies to meet national and international obligations.

The major nature conservation responsibilities and policies are managed by the NPWS, under the Department of Culture, Heritage and Gaeltacht Affairs (DCHG), which looks after national, European and international commitments to nature conservation and protection, including the designation of Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Natural Heritage Areas (NHAs). The NPWS also formulates the major national policies dedicated to biodiversity preservation.

The main policy instrument for biodiversity conservation in Ireland is the **National Biodiversity Action Plan (2017-2021)**. As a party to the CBD and the EU 2020 Biodiversity Strategy, Ireland is obliged to prepare national strategies or action plans periodically to demonstrate achievement and interpretation of the CBD objectives. However, the form and content of these strategies, programmes or plans are at the discretion of the contracting parties and member States.

The 3rd National Biodiversity Action Plan (NBAP) 2017-2021 has as its vision:

> *"That biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally"* (DCHG 2017:3).

The Action Plan sets out national targets for conservation and sustainable use of biodiversity, and commits to 102 actions for conservation under 7 strategic objectives (DCGH, 2017, see Appendix 2. for full list). The seven strategic objecitves include:

1. **Mainstream biodiversity** into decision-making across all sectors;
2. **Strengthen the knowledge base** for conservation, management, and sustainable use of biodiversity;
3. **Increase awareness and appreciation** of biodiversity and ecosystem services;
4. **Conserve and restore biodiversity** and ecosystem services in the **wider countryside**;
5. **Conserve and restore biodiversity** and ecosystem services in the **marine environment**;
6. **Expand and improve** management of **protected areas and species**; and
7. **Strengthen international governance** for biodiversity and ecosystem services.

An interim review of the 2011-2016 plan concluded that out of the 102 actions, 24 have been implemented, 67 are ongoing and 11 require substantial further actions. 60 of the actions are open-ended in nature (National Biodiversity Working Group, 2014). There are reported to have been issues in mainstreaming biodiversity in decision-making process across all sectors, increasing awareness and appreciation of biodiversity and ecosystem services, conservation of biodiversity and ecosystem services in the wider countryside, the expansion and improved management of protected areas (National Biodiversity Working Group 2014).

The NBAP places particular emphasis on the shared responsibility of all government departments for the delivery of the plan. Biodiversity conservation objectives are also broadly related to wider environmental protection policies and regulation which are the remit of the Environmental Protection Agency (EPA) or are more widely linked into policies for sustainable development contained in different sectoral policies. Biodiversity objectives also feature in the policies of the Department of Agriculture Food and Marine (DAFM) – e.g. Foodwise 2025; Food Harvest 2020; the Forest Service – e.g. Forest, Products and People; and the DAFM marine division – e.g. Our Ocean Wealth.

3. EXISTING PRACTICE AND GUIDANCE: BIODIVERSITY EXPENDITURE REVIEWS

A Biodiversity Expenditure Review can be defined as:

> "*A systematic review and critical analysis of the amount of biodiversity-related expenditures by key finance actors within a country, in order to align expenditures with national goals, and to develop a baseline for past and future biodiversity finance*" (BIOFIN; 2016).

'Biodiversity Expenditure Review' (BER) is a recently adopted term which can be used to describe studies which identify, record and analyse biodiversity-related expenditure on a national, organisational or sectoral scale (BIOFIN, 2016). The primary objective of a BER is to provide key information for biodiversity conservation by exploring who spends, how much, on what, and how effective this expenditure is? However, it is important to highlight from the outset that the inclusion of an activity, programme or scheme within a BER does not imply evidence of the eventual delivery of biodiversity benefits, but rather simply represents a flow of finance.

Undertaking a BER is linked to a wide range of potential benefits. Primarily, BERs are undertaken as a means to capture a holistic picture of biodiversity financing, to understand what sorts of measures are being financed and what extent they relate to conservation efforts (BIOFIN 2016; UNDP 2015; Shlalkhanova 2015; Medarova-Bergstrom et al. 2014; Salcido et al. 2009). Therefore, BERs are chiefly used to give a clear picture of spending year on year, and to compare spending arising from different sources (IUCN, 2010).

By developing a clear baseline, or portrait, of biodiversity financing, the results of a BER can be used to inform more fiscally strategic approaches to conservation (Lerner et al. 2007; Underwood et al. 2008; Bode et al. 2008). The outputs of BERs can also be used as biodiversity indicators (IUCN 2010), and to understand how attitudes to biodiversity are changing in different sectors (European Environment Agency 2007; IUCN 2010).

The estimation of biodiversity expenditures on international, national, local and sectoral levels are also seen as important starting points for dialogue and discussion on biodiversity conservation (BIOFIN 2016). BERs can help by fostering national dialogue about the alignment of expenditure on policies and practices with national biodiversity and development objectives, and discussion of the effectiveness and appropriateness of a wide range of existing and potential expenditures, both public and private, harmful or beneficial to biodiversity.

Although BERs are a relatively novel technique for the conservation sector, they are conceptually related to Public Expenditure Reviews (PERs) which have a long history of use for public spending and funding (IUCN 2010). The common scope of PERs is to determine (a) where does the money come from, (b) where does the money go? (c) what does it buy? (d) how could spending be improved? PERs can focus on one agency or look at a whole sector. There are also options to explore different types of expenditure such as personnel expenditure or operating expenditure. Common features of PERs include analysis of levels and trends in spending, disaggregation of spending by type of activity and determination of linkages to policy priorities, fiscal decentralisation and sources of revenues (Markandya et al. 2006). PERs have been used to highlight funding gaps, emphasise new sources of revenue, the means to reduce overall administrative costs, to demonstrate underspend and increase budgets (Markandya et al. 2006).

BERs belong to a category of expenditure reviews focusing on the environment (IIED, World Bank, 2008; Mendoza, 2013), also referred to as Public Environmental Expenditure Reviews (PEERs) (BIOFIN 2016). PEERs provide some of the most important experiences to-date for conducting BERs. Through undertaking PEERs, countries such as Madagascar have been able to highlight the financing gap for protected areas and the dependence on aid. In Mozambique a PEER highlighted the weak links between environmental policy and budgets. In the Ukraine, PEERs have been used to rationalise different funds to reduce overall administration cost, and in Colombia and Tasmania to provide justification for greater

funding. PEERs are also used to contribute to policy reforms especially when mismatches between spending and priorities are observed.

However, experiences with undertaking PEERs also highlight issues with the articulation of '*environmental expenditure'.* Similarly, climate-change related expenditure reviews have struggled with establishing sufficient definition of climate adaption (e.g. the Philippines Climate Public Expenditure and Institutional Review). These issues are equally likely to affect the definition of biodiversity expenditure in BERs. A PEER undertaken by the Philippines in 2012 identifies a number of constraints in conducting PEERs, including the (a) absence of a definition for public environmental expenditures; (b) fragmented information on environmental expenditures; (c) embedded or hidden environmental domains for budgeting and financial reporting; (d) undefined links to environmental improvements; and (e) diffuse links to poverty outcomes.

To summarise, a BER is used to describe the process of critically reviewing and analysing biodiversity-related spending rather than an established methodological approach. As an emerging field, there is at present no internationally agreed methodology or best practice for undertaking a NBER, nor an agreed definition of what constitutes '*biodiversity expenditure'*. Existing experience of PEERs indicates that estimating environmental expenditure has not been a straightforward exercise, and there are likely to be considerable challenges in undertaking a NBER for Ireland.

At present, spending on the conservation of biodiversity and its sustainable use is rarely specified or '*tagged*' in either public or private sector accounts.[1] Moreover, biodiversity related expenditure, much like climate finance, is often located in multiple sectors, and consequently there are lots of potentially grey areas in identifying and accounting for such expenditure (IUCN, 2012). However, there is a growing body of international practice (e.g. BIOFIN, 2016; Medarova-Bergstrom et al. 2014) which highlight a number of key decisions for designing and undertaking a BER, and have been used in this report to inform the methodological development of the NBER for Ireland.

[1] *An exception being the landscape and biodiveristy decline tag in the CSOs Environmental Subsidies and Transfers Account*.

4. METHODOLOGY: TRACKING BIODIVERSITY EXPENDITURE

This section provides an overview of the key methodological choices, parameters and approach taken for the NBER for Ireland, covering the 2010-2015 time period, with reference to the growing body of international practice.

The methodological approach taken draws on the framework developed by the Biodiveristy Finance Initiative (BIOFIN, 2014; 2016), the CBD Resource Mobilisation and Financial Reporting Discussions (Secretariat of the Convention on Biological Diversity 2016), and the European Biodiversity Tracking and Proofing Agenda (Medarova-Bergstrom et al. 2014). Careful consideration has also been given to individual approaches taken by other States, particulary BER type studies undertaken by other members of the EU to ensure comparability, along with academic studies of biodiversity-related aid or NGO expenditure (e.g. (Castro & Locker 2000; Hickey & Pimm 2011; Salcido et al. 2009; Waldron et al. 2013; Holmes et al. 2012).

4.1 EXPENDITURE REVIEW PHASES

In undertaking the NBER a number of sequential phases took place:

4.1.1 DEFINING THE SCOPE, SCALE AND PARAMETERS OF THE REVIEW

The initial phase of the NBER focused on defining the scope, scale and main parameters of the review and developing an approach to tagging and recording expenditure against conservation priorities. Within this phase there were four main considerations:

- **Defining 'biodiversity expenditure**' - One of the key considerations in undertaking a BER is establishing a working definition of '*biodiversity expenditure*' to help determine what expenditure should be counted or deemed relevant for inclusion in the review, and to differentiate from more general environmental expenditure.
- **Accounting for direct and indirect expenditure** - Biodiversity expenditure derives from multiple sources, and can be directly or indirectly relevant for conservation. A key consideration for BERs is how to take account of these different degrees of relevance through the use of *coefficients* to weight expenditure.
- **Tagging expenditure** – Expenditure can contribute to very different activities or actions, and seek to conserve biodiversity through different strategies. Establishing an approach to categorising or tagging biodiversity expenditure against national and international objectives is central to the value and analysis component of the NBER.

4.1.2 DATA COLLECTION

- **Identifying relevant financial actors and agents**: Based on the definition of biodiversity expenditure, policy reviews and discussion with key stakeholders, a list of key target financial actors and agencies was drawn up as key areas for investigation and data collection.
- **Consultation** - One to one meetings, consultations and focus group discussions were used to check the list of relevant schemes, programmes and financial agents and request expenditure data.
- **Data collection –** Data collection took place through a number of different strategies and sources including: appropriation accounts, departmental annual reports, meetings with departmental staff and agencies, along with reference to databases and repositories organisations such as Charities Regulators and Companies Registration Office (CRO).

4.1.3 DATA ANALYSIS

- **Data organisation:** The range of expenditure data collected was consolidated into a single excel data tool, the BIOFIN BER data tool, as a central repository for the data with appropriate level of resolution with capacity for future recording of expenditure onto 2025.
- **Attribute Coefficients & Tags**: Each expenditure line included in the review was assessed for relevance and tagged against national and international objectives. As far as possible, input from scheme or project experts was taken into consideration in the attributing relevance and tagging expenditure.
- **Expenditure & Effectiveness Review**: The data tool was used to analyse the data in terms of the national picture, different sectors, public/non-profit to provide an in-depth portrait of biodiversity expenditure across Ireland.

4.2 Guiding Principles and Assumptions

In undertaking a NBER for Ireland there were a number of initial parameters and factors which have played a key part in the methodological design of the review.

Domestic Spending: The focus of the NBER is soley on domestic expenditure rather than aid sent to other countries. Therefore, Official Development Assistance (ODA) distributed by Irish Aid has been excluded from the BER, as have the contributions made by the State to various international conventions related to biodiversity conservation (such as the CBD or the CITES convention).

Time-period: The period between 2010-2015 was chosen to ensure that financial data would still be available, and that the review time period would be relevant to the creation of future policy and practice. Ideally, a more extensive review would have take place covering 2006-2016, but was not feasible due to time and resource constraints. It must be noted that a significant influence on public finance during the study period was the economic crisis between 2008-2011 and the cyclical 7 year EU funding programmes for the agriculture and marine sectors. These factors should be born in mind when reflecting on the results of the review.

Public & Non-profit spending: Globally, the largest source of finance for biodiversity conseration is public spending, including central government, regional or local municipal contributions (Parker et al. 2012). Where possible the NBER covers charitable (non-profit) foundations and NGOs to provide a comprehensive assessment. However, a full examination of the private sector was beyond the time and resources available for study.

Disaggregated Programmatic-level Data: In undertaking the NBER, every effort was made to identify and disaggregate expenditure data as far as practicable. Programmatic data is necessary to collect meaningful information, enable analysis and follow international best practice outlined in BIOFIN (2014; 2016) and Medovara-Bergstrom et al (2014). The aspiration of the review was to collect expenditure data at the programmatic, project or scheme level. However, in a few cases this degree of resolution was not possible or practical, particularly for agencies such as the Sea-Fisheries Protection Agency and some non-profit organisations. In these cases, overall agency data has had to be used instead.

Confidence & Consistency: Data reported in NBER has been derived from a variety of sources (personal communication and surveys, annual reports, financial reviews, accounts data). Consequently, all identified expenditure should be considered as estimates. As far as possible, the inclusion of expenditure should be undertaken in a consistent and transparent manner, and data provided by personal contact has been cross referenced against other available sources. For some years, programmatic expenditure data is missing or unavailable. In these cases, it has been necessary to estimate expenditure for single years based on average expenditure levels for 2010-2015 under that programme.

Conservative Approach: A conservative approach has generally been followed to attribute spending to biodiversity conservation to avoid incorrectly attributing expenditure or overestimating expenditure.

4.3 Defining the Scope and Scale of the Review

As highlighted in Section 4.1, three key parameters defined the NBER methodology. Firstly, the definition of '*biodiversity expenditure'* adopted for the study which defines the scope and scale of the study. Secondly, the approach taken to categorising or tagging expenditure against national and international conservation objectives. Thirdly, the identification of the proportion of each programme or activities' expenditure that is attributable to biodiversity based on their relevance (direct or indirect) for conservation. These key areas are discussed further in this section.

4.3.1 Defining Biodiversity Expenditure

One of the most important steps in any BER is the definition of what constitutes '*biodiversity expenditure'*. This definition establishes what should, and should not, be included in the review and thereby outlines the scope and overarching framework for the BER. However, at present there is no formal internationally accepted definition of '*biodiversity expenditure'*. Moreover, the term biodiversity also has considerable scope for interpretation and variation in meaning. Therefore, in defining biodiversity expenditure for the NBER there is scope for interpretation and tailoring to the Irish context (BIOFIN, 2016).

In defining biodiversity expenditure, the majority of NBERs make reference to activities which contribute to the three objectives of the CBD: (1) the conservation of biological diversity, (2) sustainable use and management of biodiversity, and (3) the fair and equitable sharing of the benefit of genetic resources. Reference to the CBD objectives leaves considerable scope for the inclusion of a range of activities under the broad heading of '*sustainable use'*. An alternative, more simplistic, approach has been taken by BIOFINs who define biodiversity expenditure as:

> *"Any expenditure whose purpose is to have a positive impact or to reduce or eliminate pressures on biodiversity, broadly defined*" (BIOFIN, 2016:p147).

By emphasising purpose, BIOFIN's definition provides an additional categorisation for inclusion linked to intentionality, but this definition is also highly dependent on the assessor's opinion on what counts as a '*positive action for biodiversity'*.

A notable feature of both the BIOFIN and the CBD definitions is that they allow for the inclusion of activities which are directly and indirectly beneficial to biodiversity conservation, rather than being restrictive. The BIOFIN workbook (2016) also highlights that in developing a definition of biodiversity expenditure reference needs to be made to national biodiversity action plans and priorities.

This study is the first review of biodiversity expenditure conducted for Ireland, consequently it attempts to establish a broad cross section of biodiversity-related spending which can be further refined and reflected upon in the future. To ensure a definition which is sufficiently flexible for future refinement, the BIOFIN (2016) definition has been the used as the key inspiration for the Irish NBER:

Irish National Biodiversity Expenditure Review 'Biodiversity expenditure'

Expenditure related directly to the objectives of the CBD and the Irish NBSAP, or that which can reasonably be expected to, directly or indirectly, have a positive effect on the conservation of biodiversity.

Including, but not limited to, actions to:

- ***Mainstream biodiversity*** *and encourage sustainable use;*
- ***Improve knowledge of biodiversity;***
- ***Improve public and professional awareness*** *;*
- ***Conserve and restore*** *ecosystems, habitats or species (terrestrial and marine);*
  - ***Protect and maintain*** *habitats or species; or,*
  - ***Enhance biodiversity*** *through policy development, implementation and enforcement.*

This definition has been adapted from BIOFIN (2016) and the CBD RMS (2014) to reflect the Irish context.

The definition adopted for the Irish NBER is on a tentative basis and should be considered open to future review and revised.

4.3.2 Attributing Direct and Indirect Biodiversity Expenditure

One implication of the inclusion of both direct and indirect actions for biodiversity conservation within the definition of biodiversity expenditure is that the NBER will cover a range of schemes, programmes or projects with different degrees of relevance for the biodiversity conservation. Trends in international practice suggest that expenditures with different degrees of relevance for policy objectives need to be acknowledged using coefficients, to differentially weight and attribute only a representative proportion of expenditure (BIOFIN 2016; Medarova-Bergstrom et al. 2014;

Secretariat of the Convention on Biological Diversity 2016). The inclusion of only a proportion of some programmes or scheme expenditure using coefficients is based on two factors: (1) consideration of their relevance for conservation, and (2) consideration of the intention behind the expenditure.

The inclusion of only a proportion of expenditure based on relevance and intention reflects the OECD Rio Markers methodology (Box.2) which was developed to track Official Development Assistance (ODA) against policy objectives, and distinguishes between expenditure using two tiers: (I) *primary purpose or direct* spending on biodiversity, and (II) *significant purpose or indirect* spending. This distinction is important as only direct expenditures, which have conservation as their primary purpose, are counted at 100%, and only a proportion of indirect or 'significant' objective expenditures (e.g. 40%) are included.

The Rio Markers methodology has been employed to differentiate between primary purpose biodiversity expenditure and significant purpose biodiversity expenditure in the EU Biodiversity Tracking Methodology (Medarova-Bergstrom et al. 2014). The two distinctions are relatively easily made but results in quite a binary distinction between primary and significant purpose expenditure.

Alongside the two stepped Rio-Markers approach, approaches with more coefficients have also been developed by individual countries and organisations, with a series of coefficients ranging from 0-100% (e.g. the Swiss biodiversity factor Swiss Federal Office for the Environment, 2012). These stepped approaches provide a more nuanced approach to distinguishing between the relevance of different programmes for biodiversity conservation, but are also likely to introduce debate, a greater degree of subjectivity and possibly reduced transparency. In response, a standardised approach to coefficients has recently been developed by BIOFIN (2016) (shown in Figure. 1). This uses a six step approach, 0, 5, 25, 50, 75, 100% coefficients, attributed to distinct definitions of biodiversity relevance.

For Ireland, this stepped approach was considered to be the most appropriate to acknowledge a range of degrees of relevance for different programmes. The coefficients outlined in the BIOFIN methodology (2016) were used as the main point of reference (shown in Figure 2), and adapted to the Irish context.

The attribution of a coefficient to expenditure was based on a close assessment of the program objectives and remit (BIOFIN, 2016), along with (where possible) discussions with experts in that sector or field. Coefficients can also be assigned based on ratios or feedback from surveys, such as personnel surveys to determine how much time is spent on biodiversity related work.

OECD RIO MARKERS

Primary Purpose: Expenditure where conservation of biodiversity is the principal or core purpose, and can be seen as dedicated support for conservation *('principle' 'primary' Rio Marker 2*).

Significant Purpose: Expenditure where conservation of biodiversity is one of a number of objectives, or where a component is related to biodiversity conservation, often linked to sustainable use of biodiversity in relevant sectors (*'significant', 'secondary' 'Rio Marker 1*').

BOX. 2 OECD RIO MARKERS METHODOLOGY

Coefficient / Atrribution to Biodiversity Expenditure	"Complete" 100%	"Very High" 75-90% (Target 80%)	"Medium" 25-75% (Target 50%)	"Low but significant" 5 - 25% (20%)	"marginal" 1 - 5% (2%)	"none or immeasurable" 0%
Definitions	Principal Intent of Organisation / Activity is to accomplish one of three CBD objectives: Biodiversity Conservation, Sustainable Use, Access and Benefit Sharing	Main intent of Organisation / Activity is at least one of the CBD objectives coupled to a lessor degree with other related / supportive intents (i.e. climate change, watershed maintenance, fisheries production sustainability)	One intent of Organisation / Activity is at least one of the CBD Objectives or Aichi Targets coupled with other - non biodiversity related intents / actions in balanced proportion	Intent primarily for non-biodiversity related activities but have a stated intent for positive BD impacts	small BD impacts expected from much larger non-BD programs with at least safeguards in place.	None or immeasurable intent or positive impact on BD
Relation to RIO Markers	RIO Marker 2	RIO Marker 1				RIO Marker 0

FIGURE 1. BIOFIN COEFFICIENTS FOR BIODIVERSITY EXPENDITURE (SOURCE: BIOFIN 2016)

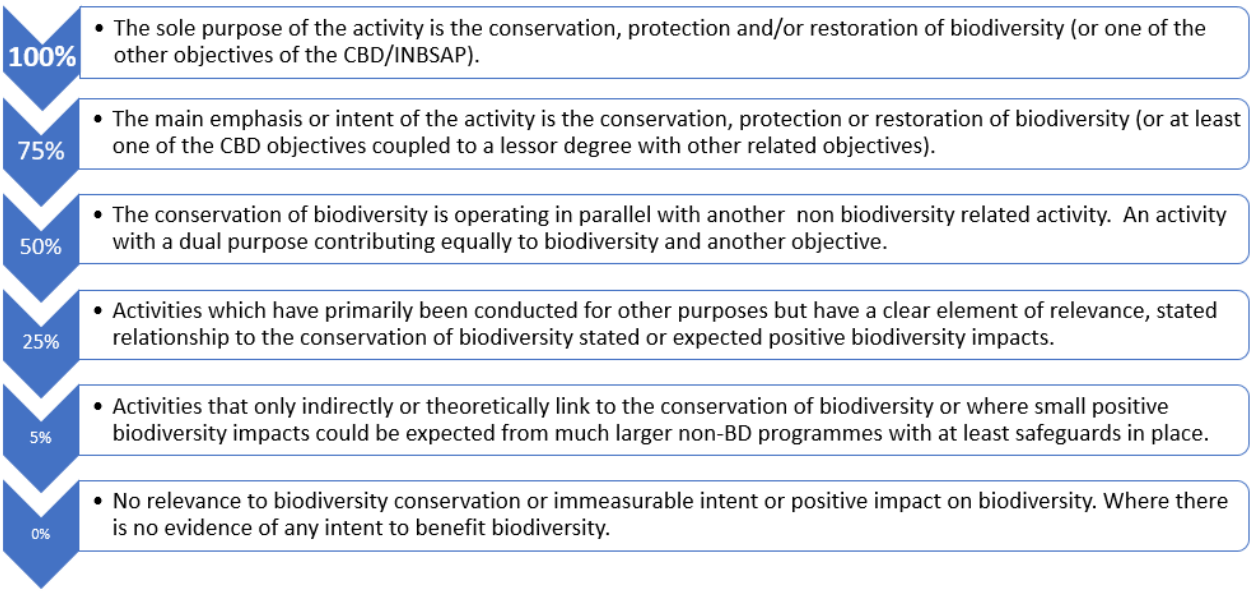


FIGURE 2. COEFFICIENTS APPLIED FOR THE IRISH NBER

4.3.3 Tagging and Categorising Biodiversity Expenditure

Alongside assigning coefficients, another key component of the BER methodology is the tagging, or categorising, of expenditure to enable analysis.

Tagging enables expenditure to be recorded against different national and international biodiversity targets, allowing NBERs to track and record how exactly funding is contributing to the conservation of biodiversity. For the CBD, a key priority for financial reporting is to track how parties are financing the 2020 Aichi targets, the main international targets set by the CBD (see Appendix 3.) to stem the loss of biodiversity, and the tracking of spending against National Biodiversity Action Plan objectives or targets (as shown in Section 2.2), to assess national performance and accountability for meeting these targets.

Arguably, it is also important to recognise that tagging expenditure against targets can attribute an intentionally or specificity which is not always apparent from the spending. Therefore, it can also be useful to examine expenditure in more neutral terms, as conservation actions, rather than contributing to specific objectives (Salafsky et al. 2008). The IUCN Conservation Actions Classification System was developed as a standardised understanding of actions taken to try to conserve biodiversity, using practical and neutral terms such as site or area management, ecosystem or natural system restoration (see IUCN Red List 2017). BIOFIN (2016) have also developed a new categorisation of biodiversity expenditure which is more activity based.

A wide range of national and international objectives were tagged in the Irish expenditure database, including the National Biodiversity Action Plan objectives, the BIOFIN categories, the Aichi targets, Sustainable Development goals, and the System of Environmental and economic accounting categories. Based on the IUCN (2017) a neutral classification system was also developed to allow ease of understanding and analysis of the expenditure data (as shown below) it divides expenditure into a series of actions based on different ways of engaging with biodiversity conservation:

- Awareness, Education and Engagement
- Habitat & or species protection or management; Habitats & or species restoration, reintroduction or recovery
- Sustainable Use
- Research & Survey
- Policy, Plans and Enforcement

These actions follow the categorisation outline in the IUCN finance indicators review (IUCN, 2010). The expenditure was also tagged against the System of Economic and Environmental Accounting (SEEA), tagging system to ensure compatibility with the Irish Central Statistics Office (CSO).

4.4 Data Collection

4.4.1 Identification of relevant agencies and financial actors

Relevant actors were identified through a review of the policies and programmes of as many public-sector agencies as possible, and in discussion with the NPWS. Departments with only a marginal potential relevance were contacted to check for possible relevant schemes which might have been missed in the policy review.

4.4.2 Data Collection and Processing

A variety of data sources, both primary and secondary, were used to estimate and establish biodiversity expenditure for the NBER.

National Budget Documents: from the accounts of the public services (Appropriations Accounts) published by the Office of the Comptroller and Auditor General, contain budget data for key biodiversity-related departments such as the Department of Agriculture, Food and the Marine (DAFM), the Office of Public Works (OPW) and the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs (DAHRRG) etc.

Departmental/Agency/NGO Annual Reports: Many departments, agencies and NGOs make their annual reports or annual returns, or

grant funding freely available online or through request.

DEPARTMENTAL REQUESTS OR CONTACTS**:** Personnel communication and data request through departmental contacts was used to track down expenditure. Surveys were used to gather expenditure estimations and data where annual report data did not have sufficient resolution.

CENTRAL STATISTICS OFFICE: A number of modules produced by the CSO, such as the Environmental Subsidies and Transfers module, provide detailed programmatic level data which are of relevance to the BER.

DEPARTMENT OF FINANCE/DEPARTMENT OF PUBLIC EXPENDITURE REVIEW: *WhereYourMoneyGoes.ie* website provides important sources of financial data on departmental expenditure break down from 2017 to 2007.

THE CHARITIES REGULATOR & THE COMPANIES REGISTRATION OFFICE (CRO): The Charities Regulator provides expenditure for non-profits for 2015, whilst the CRO can provide more historic annual returns data for non-profits which are registered as companies limited by guarantee.

For each piece of expenditure data collected, additional information was also established including the source, recipient, and domain of biodiversity. Along with expenditure data related to biodiversity, additional figures collected included national and department budgets (budgetary allocation), and, if possible, allocations alongside expenditure to measure effectiveness. Data collected was compiled first into individual departments or organisations (based on the executing agency) and then brought together using the BIOFIN data tool, an Excel spreadsheet model which enables the classification of the data against various objectives along with the allocation of coefficients and deflators. This database then formed the basic source of information for analysis, and a means of continually recording biodiversity expenditure in the future.

4.5 METHODOLOGICAL CHALLENGES AND LIMITATIONS

There are a number of limitations of the BER methodology which must be acknowledged in outlining the methodological design.

- The absence of a standard definition of both biodiversity and biodiversity expenditure means there is an inherent difficulty in attributing biodiversity expenditure and defining the scope of BERs. This review has taken a relatively flexible approach as the first exploratory study of biodiversity expenditure in Ireland, but employed a series of coefficients to distinguish between direct and indirect expenditure. A stricter definition could be adopted in the future and less directly relevant programmes could be removed.
- Ideally the review would have also captured allocation as well as expenditure, however this has proved difficult at the programmatic level and only overall budgets data at the department level was captured.
- Participation of agencies has varied considerably, with different degrees of willingness to engage with the review and collaborate.
- There were particular difficulties in obtaining detailed data, tracking its sources back to 2010 given the historic nature of the data, and also issues with disentangling complex combinations of public and private investment.
- Time to generate data and the demand on the resources of departmental and NGO staff has been considerable in some cases.
- Consistency and double counting issues are also issues particularly for NGOs and smaller agencies such as the IFI or NBDC.
- Levels of certainty have also been an issue with problems of conflicting data between the CSO and government departments due to differences in reporting approaches.

5. Overview of the Government Budget and Expenditure Process

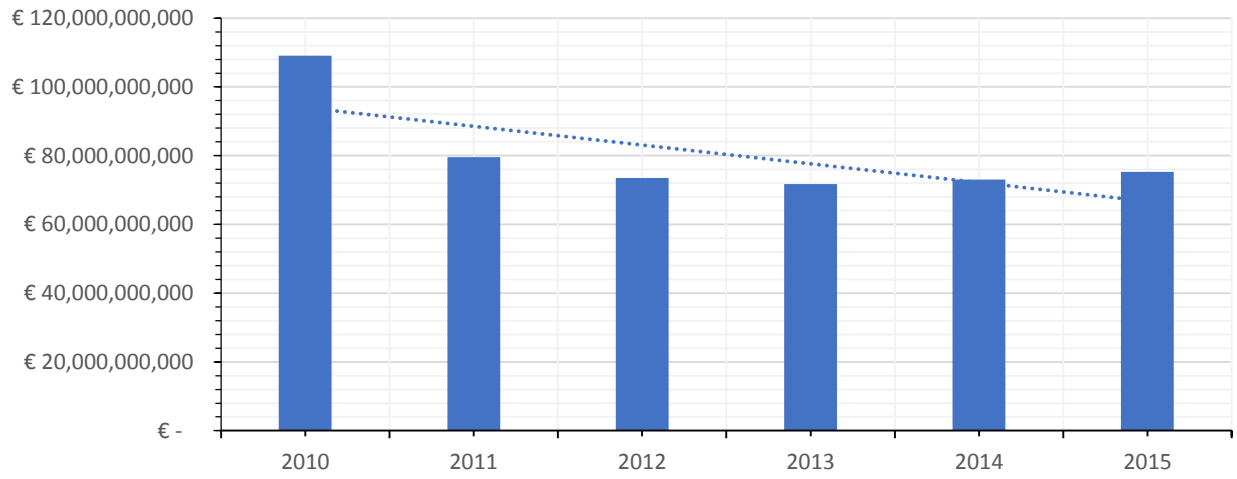
In Ireland, funding for each government agency is allocated through an annual process of raising, allocating and authorising resources. The national budgetary process is governed by the executive government which has a primary authority in budgetary matters and the financial year runs from January to December. Government funding allocation follows a budgetary cycle of identifying funding needs and constraints, and then the planning and management of expenditure programmes. While the Oireachtas (the Irish Parliament) can debate and amend tax legislation it has little sway in practice over expenditure proposals, and does not vote on expenditure until after the start of the financial year. The National Budgetary process in Ireland is laid out through a series of principles and financial management procedures in the Irish constitution (Box. 3).

For the 2010-2015 period, the total budget and expenditure for each fiscal year is shown in Graph 1. Government spending was on an average €80.3 billion per year, and showed a change of -31% over the 6 year period between 2010 and 2015, due largely to the influence of the 2008-2011 recession. The information for these figures has been obtained from the Department of Public Expenditure Review and Reform (Whereyourmoneygoes.ie) and the Office of the Comptroller appropriation accounts. The budget includes central and local government budget expenditure.

National Budgetary Principles & Financial Management Procedures

- **All State revenues accrue to a single fund** (the "Central Fund") and all allocations from this fund must be governed by law.
- Each year, **the government brings forward estimates of expenditures** and receipts, and presents these estimates to Dáil Éireann for consideration.
- The **government alone has the authority to move forward legislative proposals which affect the public purse**, such as budget-related proposals.
- The **Oireachtas alone may implement these proposals in law**; and in budget-related elected by the people) has pre-eminence over the Seanad.
- "**Financial Resolutions"** (whereby the Dáil adopts budgetary measures for the year on an interim, provisional basis in advance of legislation) **must in general be effected in legislation within the same year**.
- The **Comptroller and Auditor General (supreme audit institution) audits public accounts and reports** to the Dáil.

Box 3. National Budgetary Principles & Financial Management Procedures



Graph 1. Ireland's Government Expenditure 2010-2015

6. National Expenditure on Biodiversity Conservation

This section presents an overview of national expenditure, directly and indirectly related to biodiversity conservation, including expenditure from Government Departments, local government, Semi-State organisations, non-profit organisations and the private-sector.

Total national expenditure on biodiversity conservation is estimated to have amounted to **€1.49 billion** over the 6-year period between 2010 and 2015, with an **average annual expenditure** of **€250 million**. An additional €1.506 billion is estimated to have been spent by the government on more general environmental services and protection activities.

National biodiversity-related expenditure showed considerable annual variation over the study period (see Graphs 2 & 3) with differences in the order of €100 million over the 6-year period. For instance, biodiversity expenditure hit a high of €366 million in 2012 and a low of €139 million in 2013.

Government expenditure relating to biodiversity conservation was found to represent, on average approximately 0.31% of total government expenditure and 0.13% of GDP between 2010 and 2015. In addition, biodiversity expenditure was estimated to account for less than 1% of total voluntary sector expenditure across Ireland.

A comparison between Irish domestic expenditure and that of other states is difficult due to the differences in the review methodologies adopted, particularly due to variations in the definition of *'biodiversity expenditure'*. Looking at other countries which have applied similar variations of the BIOFIN methodology shows that biodiversity expenditure was estimated to account for:

- 0.43% of GDP in Thailand 2010-2015.
- 0.1% of GDP in Kazakhstan 2008-2014.
- 0.08% of GDP in the Philippines 2008-2013.

To further put the Irish figures into context, the IUCN has called for all OECD countries to contribute at least 0.3% of their GDP for biodiversity conservation compared to average 0.13% GDP that Ireland currently spends.

6.1 Core Expenditure Agencies and Revenue Sources

Expenditure on biodiversity conservation in Ireland is primarily the domain of the State. Of this expenditure, 96.6% was estimated to be distributed through State-led organisations, compared to only 1.2% delivered through local government, 1.3% by non-profit organisations or NGOs, 0.8% by Semi-State companies, and 0.1% by private companies (see Table 3). Caution must be used in quoting these figures, as it must be acknowledged that there was only limited data available to calculate local government expenditure, and the private sector expenditure included in this review extends only to match funding provided for conservation projects. Therefore, expenditure in these areas is likely to have been underestimated.

There are two core revenue sources for biodiversity finance in Ireland, State funding (central and local government) and EU funding. State funding was estimated to be the source of 55% of the total biodiversity-related expenditure between 2010-2015. Government sources are also estimated to provide on average 77% of income for environmental NGOs. The EU was the source of an estimated 42% of the revenue for biodiversity expenditure. This was mainly realised through the European Agricultural Fund for Rural Development (EAFRD), with smaller amount distributed through the European Maritime and Fisheries Fund (EMFF, previously EFF), EU LIFE and INTERREG programmes) (see Table. 4).

DEPARTMENT/AGENCY/ORGANISATION	EXPENDITURE	
Department of Agriculture, Food and the Marine	**€ 1160 million**	**79.5%**
Agriculture	*€ 1100 million*	*75%*
Forestry	*€ 45.8 million*	*3.1%*
Marine	*€ 12.7 million*	*0.9%*
Department of Culture, Heritage, and Gaeltacht Affairs	**€ 143 million**	**9.9%**
National Parks & Wildlife	*€ 134 Million*	*9.1%*
Heritage Council	*€ 5 million*	*0.8%*
Department of Housing, Planning and Local Government	**€ 17.3 million**	**1.2%**
Department of Communication, Climate and Environment	**€ 4.87 million**	**0.3%**
Department of Transport, Tourism and Sport	**€ 0.3 million**	**0.02%**
Office of Public Works	**€ 13.1 million**	**0.9%**
Inland Fisheries Ireland	**€ 107 million**	**7.6%**
EPA	**€ 6.31 million**	**0.4%**
Semi-State Companies	**€ 11.6 million**	**0.8%**
Rural Development Companies	**€ 2.98 million**	**0.2%**
	€ 1459 million	

TABLE. 3 NATIONAL BIODIVERSITY EXPENDITURE BY GOVERNMENT DEPARTMENT & AGENCIES

Revenue for biodiversity expenditure was also sourced from private sector co-financing of projects (0.7%) and non-profit organisations (1.2%). Along with additional government revenue sources through Semi-State organisations (0.8%), the collection of licencing and hunting fees (0.2%), and the Environment Fund 0.2% supported by plastic bag and landfill levies (see Table. 4).

The main sector delivering biodiversity-related expenditure is agriculture, which is linked to 75% of total expenditure between 2010-2015. The natural heritage sector accounts for an additional 9.9%, Fisheries 7.6% and Forestry 3.1%. All other sectors contribute less than 3%.

State-led biodiversity expenditure is directed by three core departments and agencies. The foremost, as noted above, is the agricultural supports of the Department of Agriculture, Food and the Marine (DAFM). In comparison, the NPWS delivered 9% of the total expenditure, and Inland Fisheries Ireland 7.6%. Other contributing, but more peripheral bodies agencies, included the Forest Service (3.1%), Local Government Administration (1.2%), Office of Public Works (OPW) (0.9%), Semi-State companies (0.8%) and the EPA (0.4%) (Tables.3 & 4).

6.2 EXPENDITURE DISTRIBUTION AND ALLOCATION

6.2.1 EXPENDITURE TYPES AND BIODIVERSITY DOMAINS

Financial flows for biodiversity conservation can be used to fund a wide range of different actions and expense types. Basic analysis of common expenses units indicates that biodiversity expenditure in Ireland falls into five categories: subsidies or reimbursements, operational or maintenance costs, salaries or personnel costs, grants or specific programmatic funding, and capital expenses or investment.

Notably, 80% of Irish national biodiversity-related expenditure is classed as subsidies, 10% as operational costs, 6% as salaries, and a further 4% as grants and capital expenses. The dominance of subsidies, operational expenses and salaries indicates that an estimated 94-96% of biodiversity-related finance is classified as a current expenditure, and spent on every-day running and maintenance costs. Only 6% has been classified as

expenditure on capital investment in biodiversity conservation. This suggests that very little of total biodiversity expenditure is linked to the capital elements of conservation needed to halt biodiversity decline, such as land purchase, remediation of former drained wetlands and other investment in habitat restoration. The cost of such actions typically exceeds the maintenance of existing habitats.

BIODIVERSITY EXPENDITURE SOURCES 2010-2015	
EU (EAFRD, EMFF, LIFE)	€ 629.4 million
STATE & LOCAL GOVERNMENT	€ 831.7 million
NON-PROFIT	€ 18.634 million
PRIVATE COMPANIES	€ 10.789 million
LICENCING & HUNTING FEES	€ 2.59 million
ENVIRONMENT FUND	€ 2.27 million

TABLE. 4 NATIONAL REVENUE SOURCES FOR BIODIVERSITY

Domain	Total Expenditure 2010-2015	
MARINE	€ 19,671,006	1.3%
TERRESTRIAL	€ 1,349,840,046	90.3%
FRESHWATER	€ 125,157,703	8.4%
PROTECTED AREAS	*€ 184 million*	*12.6%*

TABLE 5. EXPENDITURE BY BIODIVERSITY DOMAIN

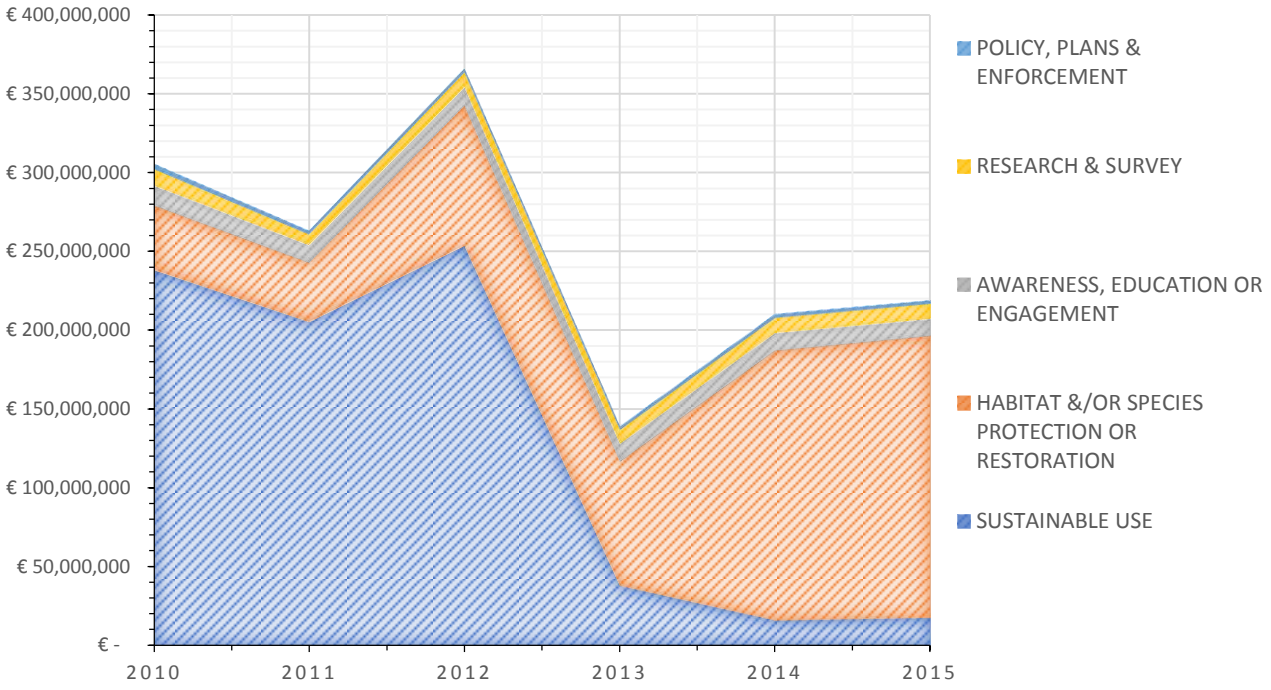
Assessing the distribution of expenditure against broad biodiversity domains indicates that 90.3% is estimated to have been spent on the conservation of terrestrial biodiversity, contributing mainly to agricultural lands, but including the conservation of uplands and mountains, some grasslands and, urban areas, as well as the protection of some specific species (Table 5). An additional 8.4% can be linked to terrestrial freshwater systems including streams, rivers and lakes. However, only 1.3% of expenditure over the 6-year study period can be linked to the conservation of marine biodiversity. Furthermore, out of total expenditure only €184 million between 2010-2015 can be confidently linked to protected sites and species.

6.2.2 CONSERVATION ACTIONS, NATIONAL AND INTERNATIONAL BIODIVERSITY TARGETS

National biodiversity expenditure has been tagged to try to track, identify and assess how finance has be used to contribute to different conservation actions, national objectives and international targets.

A framework of neutral actions for conservation (see section 4.3.3) has been used to establish an initial understanding of how expenditure was being employed to conserve biodiversity across Ireland. Biodiversity expenditure was matched against six categories of action for conservation: (1) Awareness, education or engagement; (2) Habitat &/or species protection, restoration, management or recovery; (3) Sustainable use or environmental friendly production; (4) Research & Survey; and (6) Policy, plans and enforcement, as set out in Section 4.3.3. A sub-classification system has also been employed and expenditure linked to 42 individual conservation actions, ranging from site management to the creation of biodiversity publications or funding of appeals.

Two main areas of action for conservation were funded between 2010-2015 in Ireland. Of these, 51% of national biodiversity expenditure can be attributed to actions in the sustainable use category. For instance, environmentally friendly production and management, sustainable farming or stock management. This spend coincides with agricultural expenditure such as agri-environment schemes. Another 40% of expenditure can be attributed to actions for habitat and/or species protection or restoration, such as site management or purchase, species reintroduction or invasive species removal. Notably, there is a clear trend towards increased spending on habitat & species protection towards 2015. A full breakdown in shown in Graphs 2 & 3.



GRAPH 2. EXPENDITURE BY CONSERVATION ACTION

Tagging domestic expenditure against national biodiversity objectives (NBAP) and international targets (CBD Aichi) is critical to understanding how Ireland is contributing to commitments to halt biodiversity decline. This review found that conservation finance in Ireland contributes to all seven NBAP objectives, and at least sixteen of the nineteen CBD Aichi targets.

The Irish National Biodiversity Objectives are set out in the 2017-2021 Irish National Biodiversity Action Plan. The majority of biodiversity expenditure has been classified as contributing to two of the seven NBAP objectives, as shown in Table 6 and Graph 3 and which reflect the main areas for conservation identified above.

Namely, the tagging exercise found that 78.7% of total national biodiversity expenditure between 2010-2015 [€1,176 billion] was related to one NBAP objective - '*objective 4, to conserve and restore biodiversity and ecosystems in the wider countryside*'. The high proportion of expenditure on objective 4 was the product of the wide range of actions encompassed by this objective, from sustainable management to efforts to reduce pressure on biodiversity from pollution or harmful invasive species, and in-situ or ex-situ genetic conservation.

Alongside, objective 4 the other main expenditure was on '*objective 6 to expand and improve on the management of protected areas and species'* which received 12.3% [€184 million] of biodiversity related funding. While much smaller proportions 3.4% and 4.4% were linked to *objectives 2 to strengthen the knowledge basis* and *objective 3 to increase awareness,* and only 0.4% on *objective 1 to mainstream biodiversity in the decision making.*

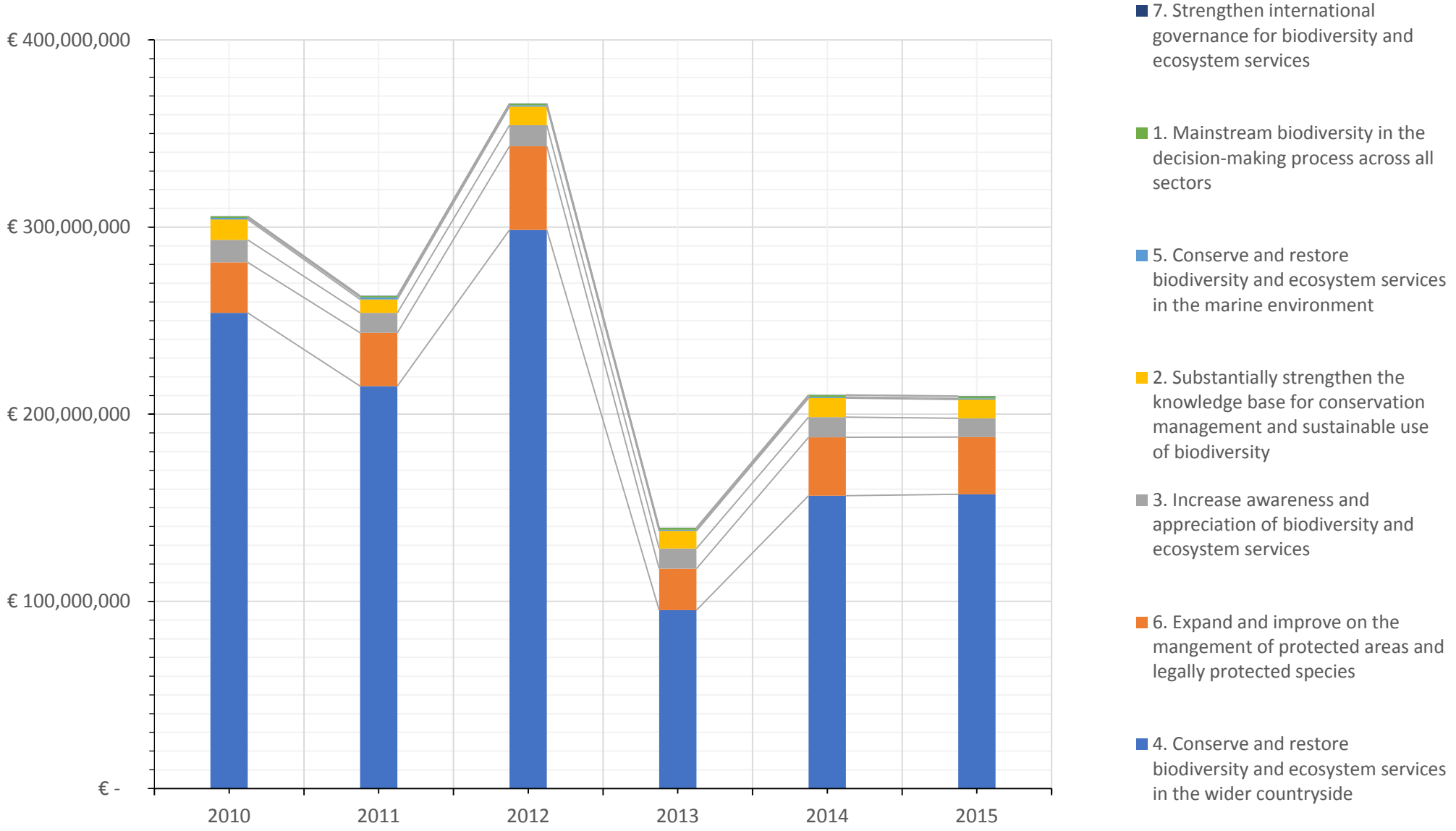
National Biodiversity Action Plan Objectives	2010-2015 Total Expenditure	
1. Mainstream biodiversity in the decision-making process	€ 5,284,189	0.4 %
2. Substantially strengthen the knowledge base for conservation	**€ 57,578,271**	**3.9 %**
3. Increase awareness and appreciation of biodiversity	**€ 65,706,352**	**4.4 %**
4. Conserve and restore biodiversity in the wider countryside	**€ 1,176,708,022**	**78 %**
5. Conserve and restore biodiversity in the marine environment	€ 4,542,786	0.3 %
6. Expand and improve on the management of protected areas and species	**€ 184,024,485**	**12 %**

TABLE 6. NATIONAL EXPENDITURE ON NBAP OBJECTIVES

Similarly, tagging biodiversity expenditure against the nineteen CBD Aichi targets also emphasises that the majority of biodiversity expenditure contributes to just a few targets (Table.7). It confirms that 69.8% of Irish biodiversity expenditure is linked to '*Target 7. Sustainable agriculture, aquaculture and forestry',* with lesser amount coinciding with *'Target 11. Protected areas increased and improved'* (7.4%), and *'Target 15. Ecosystems restored and resilient'* (8.2%). Reasonable proportions of expenditure were also linked to Aichi Target 1 on increasing awareness, 4.6%, and Target 19 to improve knowledge 3.8%, showing similar distribution to the NBAP objectives 2 and 3.

Aichi Targets		Total Expenditure 2010-2015	
Target 1: Awareness increased	€	**69,212,671**	4.6%
Target 2: Biodiversity values integrated	€	**2,518,285**	0.2%
Target 4: Sustainable production and consumption	€	**2,498,072**	0.2%
Target 5: Habitat loss halved or reduced	€	**27,104,707**	1.8%
Target 6: Sustainable management of marine living resources	€	**4,759,974**	0.3%
Target 7: Sustainable agriculture, aquaculture and forestry	€	**1,043,148,487**	69.8%
Target 8: Pollution reduced	€	**328,777**	0.0%
Target 9: Invasive alien species prevented and controlled	€	**5,581,246**	0.4%
Target 12. Extinction prevented	€	**35,069,087**	2.3%
Target 10: Pressures on vulnerable ecosystems reduced	€	**365,205**	0.0%
Target 11: Protected areas increased and improved	€	**111,017,784**	7.4%
Target 13: Genetic diversity maintained	€	**12,534,284**	0.8%
Target 14: Ecosystems and essential services safeguarded	€	**147,024**	0.0%
Target 15: Ecosystems restored and resilience enhanced	€	**122,886,352**	8.2%
Target 17: NBSAPs adopted as policy instrument	€	**1,364,196**	0.1%
Target 19: Knowledge improved, shared and applied	€	**56,132,604**	3.8%

TABLE 7. NATIONAL EXPENDITURE ON THE CBD AICHI TARGETS



GRAPH 3. NATIONAL EXPENDITURE ON NATIONAL BIODIVERSITY ACTION PLAN OBJECTIVES

7. Sectoral Expenditure on Biodiversity Conservation

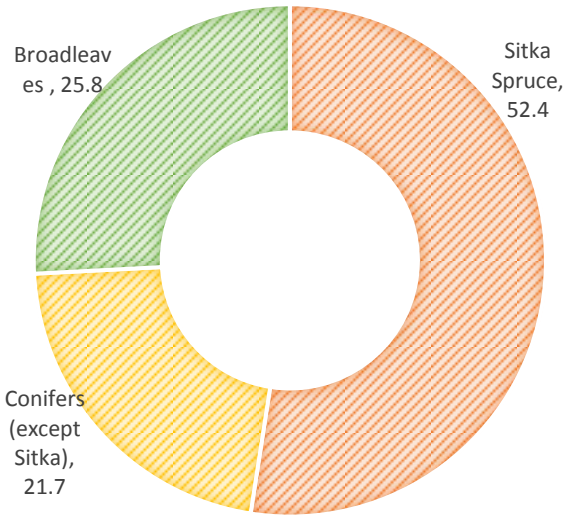
7.1 Forestry

7.1.1 Forestry Sector Overview

As a result of historical forest clearances, Ireland is one of the least forested countries in Europe with only approximately 85-100,000 ha of remaining native woodland habitat. Afforestation in Ireland is supported by exchequer funded grant payments, distributed by the Forestry Service. In 2016, forests of all kinds were estimated to cover some 10.5% of the total land area in Ireland [731,000 hectares] (DAFM, 2012). 84% of this forest estate has been planted for commercial timber, approximately 75% of this consists of conifers and 25% of broadleaved species (DAFM, 2016, 2012). Commercial plantations cover some 473,000 hectares and consist largely of non-native coniferous species, such as Sitka Spruce and Lodgepole Pine which prosper in Ireland's temperate maritime climate. Sitka is the single most common species, covering 52.4% of the forest area (DAFM, 2016), however many forests have a mixed species composition (Graph 4; DAFM, 2016).

The majority of the Irish forest estate [54.1%] is publically owned and managed by a State-owned company – Coillte, which operates in forestry, land-based businesses and added-value processing operations. Coillte was established as a private limited company under the Forestry Act 1988 its company's shareholders are the Minister for Finance and the Minister for Agriculture and Food. However, most new planting is at present being undertaken by private forestry companies and landowners (DAFM, 2016).

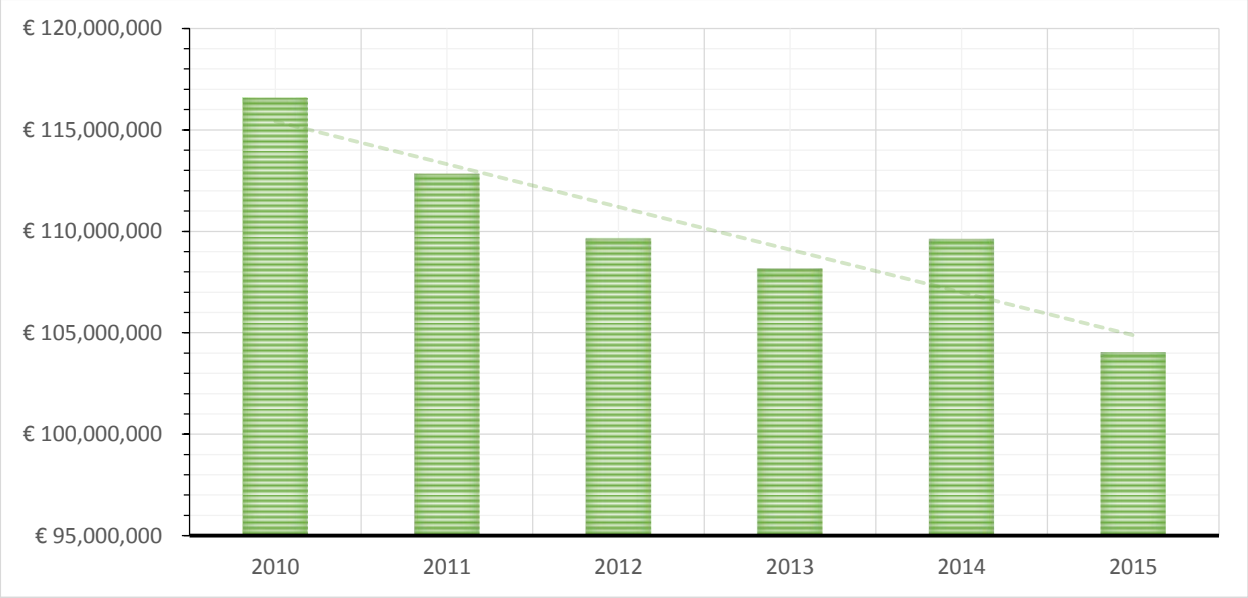
Afforestation is supported by the State through a variety of different exchequer funded schemes which provide grant aid to landowners and farmers, these include: The Afforestation Grants and Premiums Scheme, the Woodland Improvement Scheme, the Native Woodland Scheme, and the Forest Roads Scheme (Forest Service, 2015). Between 2010-2015 the Forest Service had an annual average budget of €110 million (see Graph 5.), accounting for approximately 7-8% of the total Department of Agriculture, Food & Marine (DAFM) budget. The Afforestation grants and premiums scheme is the largest scheme administered and distributes on average €17.5 million per year to farmers and landowners.



Graph 4. Tree Species Composition in Ireland

Afforestation in Ireland is now thought to be progressing at one of the fastest rates in Europe (An Taisce 2016). The Irish Government's forestry grants and policy support (Forest Service 2015, DAFM FoodWise 2025 and Food Harvest 2020) has contributed to an increase in forest land cover from less than 1% to approximately 11% in the 40 years (EPA, 2007). This trend is likely to continue, as the DAFM policy (e.g. FoodWise 2025; Forests, People and Products 2014) has committed to an annual programme of afforestation and forest expansion, supporting an increase in annual 'sustainable' afforestation level by 15,000 ha to 2021.

A recent report by An Taisce (2017) estimates that government support could lead to an increase in forest cover from 11% to 18% by 2046. However, recent trends in forestry also suggest that there has also been an increase in plantings of broadleaf species to 23% (2002-10), supported by premium grant payments and a range of schemes for broadleaf or native planting.



GRAPH 5. TOTAL FOREST SERVICE EXPENDITURE 2010-2015

7.1.2 FORESTRY SCHEMES RELATED TO BIODIVERSITY CONSERVATION

The biodiversity value of commercial forestry plantations is known to vary considerably (EPA, 2006). The dominance of a single species Sitka spruce in commercial plantations has resulted in areas of mono-culture with potentially very low biodiversity value (An Taisce, 2017). Another key problem forestry has been location, as afforestation has historically occurred in inappropriate areas for biodiversity conservation resulting in a loss or increased pressure on some of the most threatened species and habitats in Ireland (including peatland, grassland, wetland and coastal habitats) (Renou-Wilson et al. 2011; NPWS 2014). Forest plantations are also seen as augmenting predator numbers in formerly open landscapes, with effects on ground nesting birds in particular. Consequently, forestry is listed as a pressure on SACs and SPAs in Ireland in the 2013 Article 17 report[2] (NPWS, 2013, 2014

DAFM (2015:5) aims to "*promote economic, social and environmentally sustainable farming, fishing and forestry*", consequently the conservation of biodiversity is now included as key priority for the forestry programmes. Within the current forestry strategy, there are now a number of programmes and schemes which can be related, to different extents, to the conservation of biodiversity.

NATIVE WOODLAND SCHEME (CONSERVATION & ESTABLISHMENT)

The ***NATIVE WOODLAND SCHEME*** **(NWS)** is the key biodiversity measure for the Forest Service. The NWS promotes the appropriate restoration and protection of Ireland's native woodland resource and associated biodiversity, along with also supporting other secondary public and private good outputs such as landscape, water quality, and carbon storage. The scheme has an overriding ecological focus which prioritises sites of high ecological significance, but also supports the realisation of wider ecosystem functions and services. The Scheme provides two sets of incentives for forest owners, namely Element 1 ***CONSERVATION*** and Element 2 ***ESTABLISHMENT***.

NWS CONSERVATION - Element 1 focuses on the conservation and enhancement of remaining native woodland stock, through actions such as

[2] *"Forestry is not listed as one of the key threats to protected habitats or annex species in the National Parks and Wildlife Service Report "The Status of EU Protected Habitat and Species in Ireland", but is identified as a pressure on both. Forestry does, however, have the potential to adversely impact on protected species such as the Freshwater Pearl Mussel and the Hen Harrier, and on important habitats such as active raised bogs and blanket bogs, and species rich wet grassland particularly with regard to direct pressures from inappropriate forest operations, as well as habitat alteration and fragmentation" (DAFM, 2015).*

the removal of non-native trees species from existing woodlands, good silvicultural management, and the use of fencing to protect trees from deer. The NWS Conservation element is thought to have protected 2542 ha between 2000 and 2011.

NWS ESTABLISHMENT - Element 2 represents new planting of native species on open greenfield sites, and has resulted in the planting of over 1,053 hectares of new native woodland between 2000-2011.

Both schemes allow for output of wood products, including thinning, where this is compatible with biodiversity. However, it is expected that the Conservation element will not result in felling, while Establishment element will increase the area of native woodland for both biodiversity/amenity and sustainable forestry.

NEIGHBOURWOOD SCHEME (ESTABLISHMENT, ENHANCEMENT, FACILITIES)

The ***NEIGHBOURWOOD SCHEME*** supports the development of new woodlands for public use and amenity on green field sites, linked to public access and enjoyment of woodlands. The focus of this scheme is on amenity and communities rather than biodiversity *per se*, although environmental education and access to nature is an important consideration. The scheme funds three different elements: establishment, ***ESTABLISHMENT, ENHANCEMENT*** and ***FACILITIES.***

ESTABLISHMENT **-** Supports the development of new woodlands for public use. The conservation of biodiversity is not the primary aim of this afforestation. However most the new Neighbourwoods will consist largely of broadleaves or mixed and include between 30%-15% of their area as Areas of Biodiversity Enhancement. However, there is policy support for the greater integration of native species into the Neighbourwood scheme.

ENHANCEMENT - Supports the silvicultural enhancement of existing woodland as Neighbourwoods to allow recreation and community use of woodlands. Actions funded including protection from threats such as invasive species.

FACILITIES - Supports the installation and upgrade of appropriate recreational facilities within a Neighbourwood area. Facilities enable access to, and enjoyment of, the woodland by the general community, such as footpaths, signage, way markers, car-parking, seating and picnic table.

CHALARA: RECONSTITUTION OF WOODLANDS SCHEME

Ash is a native Irish tree species. In recent years, a reconstitution scheme has been necessary to combat Chalara (Ash Dieback) which was first found in Ireland in 2012. The main purpose of the reconstitution scheme is the compensation of commercial woodland owners for lost income and to manage the spread of the disease. The reconstitution scheme supports the reforesting of ash plantations by supporting the removal and destruction of trees and leaf litter affected by the disease and the reconstitution of the forests to prevent reinfections. The eradication campaign is directed at protecting commercial ash plantations, but can also be linked to general protection of Ireland's native ash population by slowing the spread of the disease in both commercial and non-commercial woodlands.

FOREST REPRODUCTIVE GENETIC MATERIAL (SEED & STAND)

The Seed & Stand scheme facilitates the management and conservation of ancient woodland oak stands registered in the Forest Reproductive Material category. The scheme is linked to improving the quality and productivity of any forest plantation through enhancements to the genetic quality of the seed and reproductive material used during establishment and thereby the resilience, productivity and quality of Irish forests and conserving their genetic diversity.

COFORD PROGRAMME

The ***COFORD*** programme funds a range of research projects, a number of which are related to the conservation of biodiversity including projects to value the ecosystem services of forest, monitor and assess critical biomass removal or the impact of forest practices on vulnerable or endangered species. Only the research projects relevant to biodiversity have been included in the review.

AFFORESTATION GRANTS & PREMIUMS

The ***AFFORESTATION GRANTS AND PREMIUMS*** scheme (AGP) is the main scheme for grant aiding commercial forestry and provides capital grants and annual premiums for afforestation. Higher grant levels are available for broadleaves, especially oak and beech, although this is largely to cover the higher cost of establishment. There are a number of cross compliance condition linked to the grant payments and under the scheme all plantings larger than 10ha must include a mix of at least 10% broadleaves and 15% of the plantations area must qualify as Areas of Biodiversity Enhancement (ABEs) (DAFM, 2015). ABEs are defined as areas suitable for planting where the potential for commercial forest crop is foregone, and are instead managed for biodiversity. ABEs comprise open spaces and retained habitats, and are aimed at encouraging the development of diverse habitats, native flora and fauna, and biodiversity.

FOREST ENVIRONMENTAL PROTECTION SCHEME

The ***FOREST ENVIRONMENTAL PROTECTION SCHEME*** (FEPS) aimed to encourage high nature value forestry on farms participating in the REPS, through the adoption of measures such as increasing biodiversity, protecting water quality and providing habitats for wildlife in addition to producing high quality timber crop. FEPS was introduced in 2007, now closed, in response to criticism that afforestation grants and premiums conflicted with agriculture. The scheme aimed to enable a high-quality timber crop to be produced alongside environmental protection and biodiversity conservation.

WOODLAND IMPROVEMENT SCHEME

The ***WOODLAND IMPROVEMENT SCHEME*** (Element 1) (WI) aims to enhance woodlands by supporting forest holders for the works associated with tending and thinning of broadleaf forests planted post-1980 under grant aided afforestation schemes. The WI scheme facilitates the enhancement of the environment associated with thinning and tending operations and aims to stimulate investment in the improvement, protection and development of broadleaf woodlands for a range of functions, including: healthy tree growth, landscape improvement, biodiversity enhancement, soil protection and water protection. Many of the activities, including control of invasive species and encouragement of regeneration, can also benefit biodiversity, but these are intended more from the perspective of productivity. The grant rates are higher for broadleaves than for conifers, although from a forestry perspective, these broadleaves will include non-natives or monoculture plantings.

7.1.3 FORESTRY SCHEMES: COEFFICIENTS AND CATEGORISATION

Many of the Forest Service schemes could potentially be related to more than one category of conservation actions. For instance, expenditure on the Afforestation Grants and Premiums scheme is connected to the maintenance of ABEs which could justifiably be classified as an action for sustainable use or habitat protection & management. Equally, in relation to the CBD Aichi targets the **Native Woodland Scheme** could be classified as either habitat protection or ecosystem restoration and enhancement. Classifications have been made based on the main focus of schemes, but the close relation and overlap is acknowledged.

In attributing biodiversity expenditure through coefficients the key deciding factors are the main focus of these schemes and their relevance for biodiversity conservation. For example, the primary focus of the Chalara scheme is on commercial income forgone, and, therefore, has been attributed at 25%, whereas the **Neighbourwood scheme** (facilities) focus is split more evenly between recreation and engagement with nature and has therefore been attributed at 50%. A full list of the percentages and categorisation applied are shown below in Table 8.

Programme	Categorisation	AICIHI	NBAP	%
Afforestation Grants & Premiums Scheme	**Sustainable Use**	7	4	25
Native Woodland Scheme (Conservation)	**Restoration & Reintroduction**	5	4	100
Native Woodland Scheme (Establishment)	**Restoration & Reintroduction**	15	4	100
Neighbourwood Scheme (Afforestation)	**Protection & Management**	14	4	25
Neighbourwood Scheme (Enhancement)	**Restoration & Reintroduction**	15	4	25
Neighbourwood Scheme (Facilities)	**Awareness**	1	3	50
Chalara Reconstitution of Woodlands	**Restoration & Reintroduction**	4	9	25
Coford Programme	**Research & Survey**	19	2	100
Forest Reproductive Genetic Material	**Genetic Conservation**	13	4	75
Forest Environmental Protection Scheme	**Sustainable Use**	7	4	50
Woodland Improvement Scheme	**Restoration & Reintroduction**	7	4	25

Table 8. Forestry Programmes: Categorisation and Coefficients Applied

7.1.4 Forestry - Expenditure on biodiversity conservation

Forest Service expenditure related to biodiversity conservation totalled €45.8 million between 2010-2015, equal to an average of around €7.6 million per year. Biodiversity-related expenditure accounted for 12% of total annual Forest Service expenditure in 2010 but had declined to 4% by 2015, with a decline on average of some -1.2% per year (see Graph 6.). In total, biodiversity-related expenditure by the Forest Service declined by €9.1 million between 2010-2015, from a high of €13.7 in 2010 to €4.5 million in 2015.

Over the 6-year study period the main source of forest expenditure on biodiversity conservation was the Afforestation Grants and Premiums scheme, through the cross compliance conditions and set aside of ABES [€26 million], followed by FEPS [€10 million] and the Native Woodland Scheme [€6 million] (see Graph 7.).

The decline in expenditure from 2010-2015 is linked to variation in the amount of expenditure under a number of programmes. Notably a loss of funding available for conservation through the closure of the Forest Environmental Protection Scheme (FEPS) in 2015, which led to a reduction in spending related to conservation from €5.7 million in 2010 to just €3,109 by 2015. A decline in general payments made under the AGP scheme also caused a reduction in biodiversity related expenditure from €6.1 to €3.8 million from 2010 to 2015. While funding for the Native Woodland Scheme crashed in 2015.

Biodiversity-related expenditure by the Forest Service contributed to a number of different actions for biodiversity conservation (Graph 8.) and objectives of the National Biodiversity Action Plan.

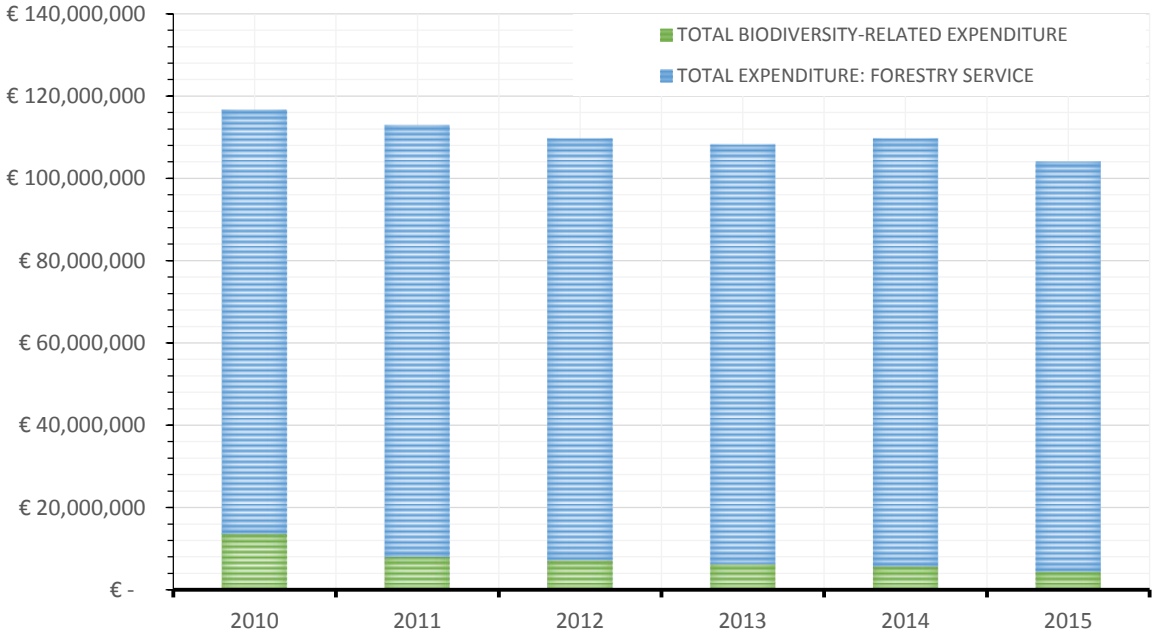
The primary actions funded by Forest Service expenditure was *'Sustainable use: Environmentally friendly production and management of timber resources*', accounting for on average 80% of annual biodiversity expenditure from 2010-2015. For the Forest Service, sustainable use includes actions such as the protection of Areas of Biological Enhancements and their management, the planting of broadleaf species, and the thinning and tending of species, and high nature value afforestation. Expenditure on actions for sustainable use was derived from programmes such as the AGP scheme, Woodland Improvement Scheme and FEPS.

The second main conservation action funded by the Forestry Service was habitat protection and restoration, accounting for between 8%-23% of expenditure annually from 2010-2015. Actions under this categorisation include site restoration through the removal of invasive species or habitat creation through the planting of native species.

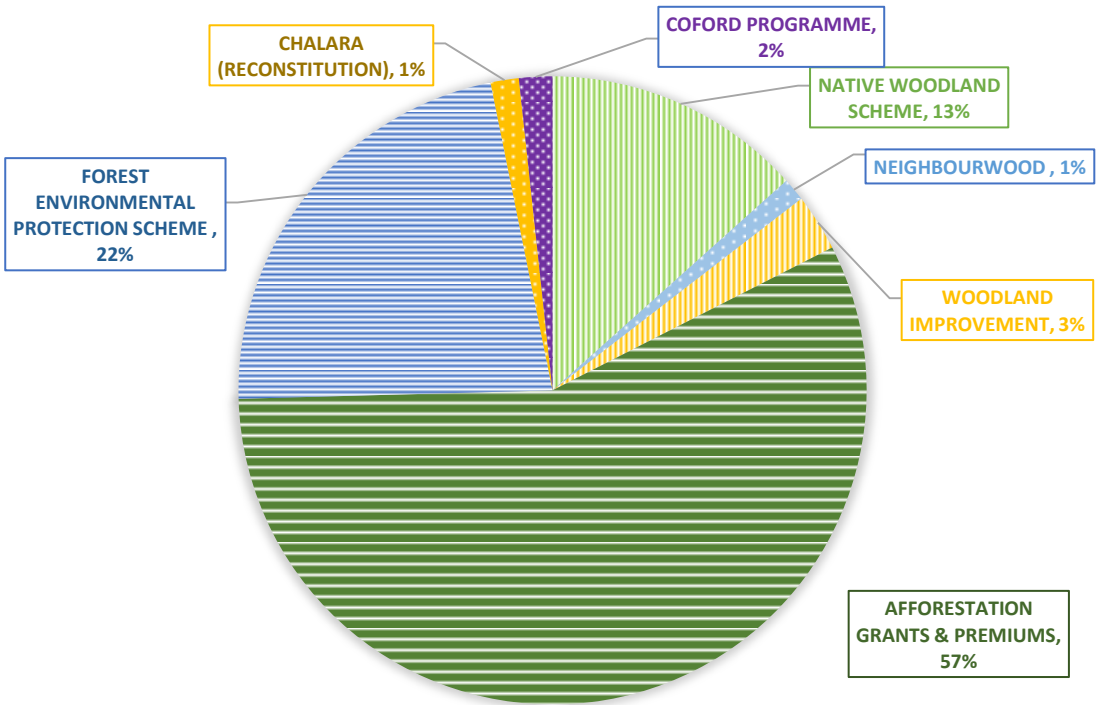
Small amounts of expenditure were directed at biodiversity awareness through the Neighbourwood facilities scheme, which facilitates access to nature, along with research and survey work through the COFORD programme.

Translating these actions into the objectives of the National Biodiversity Action Plan (NBAP) indicates

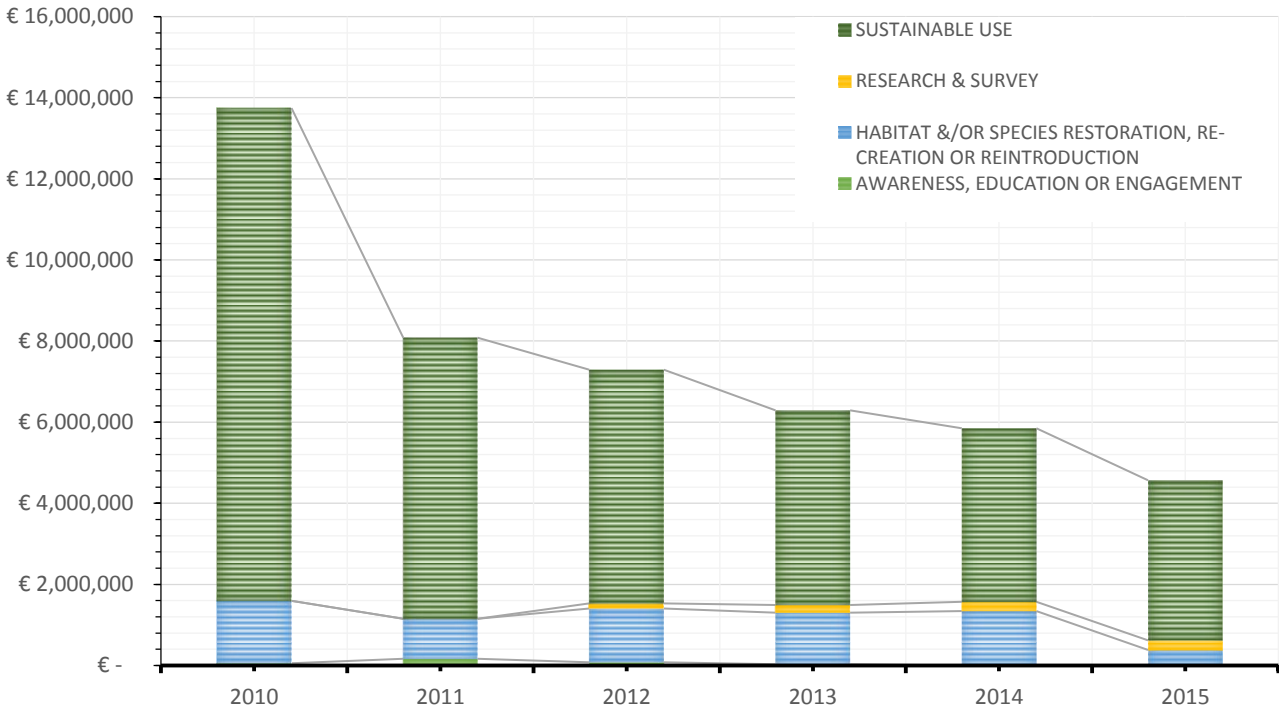
that the Forest Service contributed between €13.7-4.5 million per year to '*objective 4. Conservation and restoration of biodiversity and ecosystem services'*. This accounts for annually some 84-99% of total biodiversity related expenditure by the Forest Service. Objective 4 encompasses both conservation actions for sustainable use and habitat &/or species protection or restoration, outlined in the previous paragraph. Much smaller amounts of expenditure are linked to NBAP objective 3 [awareness] and objective 2 [increasing the knowledge base for conservation], between €50-250,000 (accounting for only 0.6-4% of expenditure).



GRAPH 6. FORESTRY BIODIVERSITY SPEND & TOTAL FORESTRY SERVICE SPEND



GRAPH 7. FORESTRY EXPENDITURE SOURCES BIODIVERSITY (2010-2015)



GRAPH 8. FORESTRY SPEND ON DIFFERENT CONSERVATION ACTIONS

7.1.5 Effectiveness of Forestry Spending on Biodiversity

There is evidence that conifer planting can add to habitat diversity and contribute positively to biodiversity (Irwin et al 2013). The resurgence of the pine-marten population is largely attributed to forestry plantations (O'Mahony 2014). Furthermore, considerable emphasis in forestry policy (Forests, Products and People, DAFM, 2014) has been placed on addressing historic problems and to protect both the timber resource and biodiversity.

However, historically commercial plantations have often been grown as a monoculture and consequently are generally not of high biodiversity value (EPA, 2006). A proportion of plantations have replaced (and still are replacing) semi-natural habitat or low intensity agricultural land of higher biodiversity value. While plantations can contribute positively to biodiversity when young, mature and a closed canopy can also have a detrimental impact on the distribution of raptors, and the decline in hen harrier numbers has been partly attributed to coniferous forestry.

Commercial forestry has also contributed to an increase in the non-native sika deer population whose numbers have had a very damaging effect both on commercial forestry, through browsing, and on the regeneration of native trees (Purser, 2012). Coniferous forestry can also harbour predator species such as foxes which are believed to have impacted adversely on the breeding performance of curlews in upland areas. Moreover, some invasive plant species such as rhododendron are thought to have expanded their range within the cover of conifer plantations.

The review shows that the majority of conservation spending by the Forest Service was linked actions to encourage the sustainable use of forests, with much smaller proportions linked to direct efforts habitat/species protection, restoration and recovery. The majority of sustainable use expenditure derives from the inclusion of small proportions of expenditure, 5-25%, from large general programmes, such as the Afforestation Grants and Premiums scheme and the Woodland Improvement Scheme, Chalara Reconstitution of Woodlands Scheme. These programmes are primarily aimed at supporting increases in the Irish timber estate, however they

also include actions to enhance the biodiversity value of commercial plantations through compliance conditions such as the preservation of 15% set asides as Areas of Biological Enhancement (ABEs) and the 10% broadleaves rule. Additionally, to reduce the risk of acidity, sedimentation and over-shadowing, which could have negative impacts on water quality and salmonid populations, planting is no longer permitted within 10-25 metres of a watercourse depending on slope and soils.

Compliance conditions and ABEs represent a clear step in the right direction for forestry policy. However there are questions regarding their effectiveness and how they can be maximised to best benefit biodiversity conservation. Interviews conducted alongside the collection of expenditure data highlighted that although 10% broadleaved component may be planted through AGP scheme they are not required to be planted in the most effective locations for biodiversity. This suggests the need to think more strategically about how this policy can be made to work for biodiversity. Landscape-level planning of broadleaved planting could be one way to enhance the effectiveness of this policy by providing a strategic framework through which to think about the best locations to create the '*biggest bang for your buck*'.

Alongside sustainable use the NWS is the Forest Service's dedicated instrument for the conservation of native species. The NWS has generally been well received and reportedly helped to bring together foresters and ecologists. However, there have been logistical and practical problems with the effectiveness of the scheme. For example, payments for new applications under this scheme were suspended as a result of the economic recession, consequently the NBAP targets of 15,000 ha of native woodland by 2012 was not achieved. The negative impacts of the loss of the funding for the NWS scheme was accompanied by a loss of skilled and accredited NWS professionals.

Despite problems with funding flows, the Conservation Element of the NWS has contributed to improved management of 2,550 hectares between 2008-2012. Improved management includes the removal of rhododendron and other non-native species, such as woodland cherry laurel, and thereby a reduction in the detrimental impact on native woodlands, especially on their capacity to regenerate. Riparian woodland and ancient or old woodlands, or plantings beside these, have been especially favoured for the NWS.

7.1.6 Forestry Future Funding Sources and Challenges

> *"Native woodlands contribute between €100 million and €140 million to the Irish economy annually, with considerable potential to provide additional value, particularly in relation to water quality, wood production and recreation"* (Bullock et al. 2014).

Additional funding for biodiversity conservation in the forestry sector could be sourced through payments for ecosystem services type schemes, and the use of co-benefits to leverage additional funding from areas such as carbon, water quality, flooding and health and wellbeing benefits. This area is already being investigated by the DAFM and Woodlands of Ireland, who have particularly focused on water quality as an area for additional finance for native woodland planting - in the form of the Woodlands for Water program proposals. Ecosystem services have the potential to make native woodland planting much more economically attractive, if the right beneficiaries can be found to buy or invest in these services and the sufficient data can be established to fully evidence services.

Alongside ecosystem services and co-benefits the public sector could help to further maximise their existing schemes for conservation benefits. For example, successful pre-existing programmes such as the Neighbourwood Scheme could be a platform from the promotion of conservation benefits. However, there are continual issues with funding for forestry reportedly distorting the expectations of landowners who cannot earn a similar income from agri-environment schemes. Consequently, civil servants also reported that there are some instances where GLAS schemes have subsequently been undermined by the granting of forestry applications for the same area.

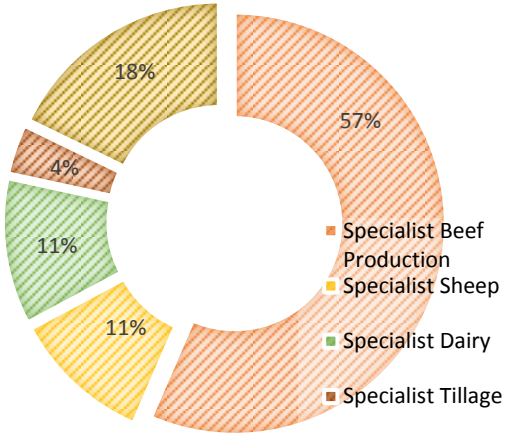
7.2 Agriculture

7.2.1 Agricultural Sector Overview

Agricultural practices shape Ireland's countryside and landscapes. Agriculture is the dominant land use in Ireland, out of a total land area of 6.9 million ha some 4.5 million ha (67%) are devoted to agricultural use (EPA 2012; Lucey & Doris 2001). 81% of agricultural land area is used for grass (pasture, hay, and silage), 9% for rough grazing, and 8% for crops production (Teagsac 2017; Graph 9). The Irish agricultural sector is predominantly grass based, linked to beef and milk production which account for around 60% of agricultural output.

The agri-food sector in Ireland is reported to contribute approximately €24 billion annually to the national economy, with primary agriculture, forestry and fishing linked to 1.8% of GDP (Teagsac, 2017). Although the contribution of Agriculture to the Irish economy has declined since the 1970s in recent years, the agricultural sector has experienced signs of recovery. Against the context of domestic and global recession, the Irish food and drink export grew strongly from 2010-2014. Additional trends in the structure of the agricultural sector include a decline in the number of holdings, a move towards larger farms, a decline in labour force employed, specialisation, and growth in part-time farming, these trends echoing EU wide developments. At a national level, there has been specialisation towards beef and dairy and a reduction in the area under tillage.

DAMF administers agriculture supports for production, environmental protection and rural development, through farming subsidies and grants circumscribed by EU market policies and sourced from the exchequer and the EU. The EU Common Agricultural Policy (CAP) Pillar I supports farmers through direct payments (Basic Payment Scheme previously the Single Payment Scheme), co-funded by the European Agriculture Guarantee Fund (EAGF), in order to achieve sustainable food production, the preservation of the environment and rural development. CAP Pillar 1 direct payments accounted for on average 75% of farm income on average in 2016 (Teagasc, 2017). Alongside the BPS, the Rural Development Programme (CAP Pillar II), co-funded by the European Agricultural Fund for Rural Development (EAFRD), is designed to improve the quality of life and economic well-being of people living in rural areas. CAP Pillar II is linked to financial assistance towards investments in rural development, environmental protection and market support measures, and includes a variety of schemes from compensatory allowance for disadvantaged areas to agri-environment schemes. CAP Pillar I and II operate on a 7-year cycle, the current programme runs from 2014-2020 and the previous period 2007-2013.



GRAPH. 9 Agriculture Sector Overview

During the 2010-2015 period covered by this study the agricultural supports administered by DAFM had a Total Gross Voted Spend of €7.09 billion, a yearly annual average expenditure of €1.18 billion. Agriculture accounted for on average 87% of the Total Gross Voted Budget of DAFM over the 2010-2015 period. The exchequer co-finances EU CAP pillar I and II programmes. Total funding received from the EU under CAP was estimated to be €8.9 billion, with an average of €1.49 billion reviewed per year. CAP funding fluctuated considerably over the study period, peaking in 2011 and 2012. These funding trends reflect the cyclical nature of EU funding programmes and the dates when the actual claims were made to EU funds, rather than long term trends or actual payment year to farmer. Funding also varied due to the timing of the introduction of new schemes with new

schemes launching in 2015, such as the GLAS agri-environment scheme.

The DAFM Food Wise 2025 strategy outlines a target to increase outputs from the agricultural sector, including an increase in the value of primary production by 65% to almost €10 billion (DAFM, 2015). Food Wise also signals a clear intent to support ongoing expansion of the agri-food sector, including the expansion of the Irish grass-fed livestock agriculture (DAFM, 2014; DAFM 2015), focusing on '*sustainable intensification*' which refers to maximising production efficiency whilst minimising impacts on the environment and declines in biodiversity. Since the 2000s, there has been a particular focus on green or environmentally friendly production by DAFM. Organic, or '*conservation grade*', production is seen by some as a green opportunity for the Irish agri-food sector to gain market access as an attractive ethical concept for consumers.

7.2.2 Agricultural Schemes and Measures Related to Biodiversity Conservation

Changes in agricultural landscapes and practices are thought to be closely linked to declines in biodiversity, particularly populations of bird species and pollinator species in Ireland (NPWS 2014; Bullock et al. 2008). Past and present agriculture policy and EU agricultural subsidies have incentivised land clearance and reclamation for conversion into agricultural use causing the loss of habitats. While agricultural intensification is linked to the damage and degradation of habitats (Bullock et al. 2008; NPWS 2013, 2014; Lucey & Doris 2001).

However, current agricultural policy, Food Wise 2025 (DAFM, 2015), also acknowledges the need to conserve biodiversity, and identifies the loss of biodiversity and the failure to protect the environment as a key threat to the national agri-food context. Furthermore, Food Wise 2025 recognises that a significant increase in food production cannot be considered in isolation from its environmental impact, with a specific emphasis on the depletion of natural resources and the potential impact on climate change. Since the early 1990s, agriculture has been involved in a number of schemes and practices which aim, in a variety of ways, to encourage biodiversity conservation and more generally facilitate environmentally protection.

Agri-Environment Schemes

Agri-environment Schemes (AES) are generally understood as measures which provide payments to farmers who subscribe to environmental commitments related to the preservation of the environment and maintenance of the countryside. AES can also be understood as examples of payments for ecosystem services (PES) as they compensate farmers for adopting environmentally friendly farming techniques beyond legal obligations.

AES are one of the key European policy mechanisms for the protection of biodiversity and are financed through CAP Pillar II, and can include actions such as:

- Management of low-intensity pasture systems,
- Integrated farm management and organic agriculture,
- Preservation of landscape features, or
- Set aside of land for biodiversity.

Since 1992 the application of AES programs has been compulsory for EU Member States under CAP Pillar II, although participation is voluntary for farmers. Therefore, AES form part of each EU members Rural Development Programme, and payments under agri-environment schemes cover the additional costs and income foregone resulting from the commitments.

A range of AES have been undertaken by the DAFM since the 1990s including:

- Rural Environmental Protection Scheme (REPS) (2007-2010),
- Agri-Environment Options Scheme (AEOS) (2010+-2013,
- Green Low-Carbon Agri-Environment Scheme (2015+).

Rural Environmental Protection Scheme

The **Rural Environmental Protection Scheme**, more commonly referred to as REPS was one of the first AES developed by DAFM in 1993-4, and operated through 4 different iterations (REPS 1-4). REPS was widely adopted with some 60,000

participants when it closed to new applicants in 2009 (Fahey 2010; Finn 2010). Although closed to new participants payments to existing participants continued through to 2015.

REPS had three stated objectives: (1) establish farming practices and production methods, which reflect the increasing concern for conservation, landscape protection and wider environmental problems, (2) to protect wildlife habitats and endangered species of flora and fauna, and (3) to produce quality food in an extensive and environmentally friendly manner. REPS also provided financial contribution to farm incomes, particularly smaller landowning and farms in marginal areas. A key feature of REPS is that it operated on a *'whole farm'* approach which required participants to implement measures across their entire holding, and covered both designated Natura 2000 sites and non-designated sites (Finn 2010; ADAS 2016).

REPS addressed multiple environmental objectives, but the distribution of payments across those objectives was unequal and changed over time. There were 11 core management measures or actions which could be funded under REPS, including: farm nutrient or grassland management plans, the protection of wildlife habitats, protection and maintenance of water courses, retention of wildlife habitats, maintenance of farm and field boundaries, the protection of features of biodiversity, historical or archaeological interest, and restrictions on the use of herbicides and pesticides (see Finn et al. 2010). A variety of the measures under REPS can be linked to terrestrial and aquatic wildlife. Notably the emphasis of REPS changed through the life of the scheme, and Finn (2010) highlights that REPS 4 (initiated 2007) was considerably more focused on biodiversity conservation than REPS 1.

Agri-Environment Options Scheme

The **Agri-Environment Options Scheme (AEOS),** the successor to REPS, was introduced in 2010 and ran for three annual funding cycles until the end of the EAFRD 2007-2013 program. AEOS was a much more targeted scheme than REPS, and focused on three objectives (1) the conservation and promotion of biodiversity as a primary focus, (2) encouraging water management and water quality measures (secondary focus), and (3) combating climate change (to a lesser extent/thirdly). AEOS funded specific actions, but required farmers to focus on one of the three objectives listed above. AEOS was also specifically targeted at Natura 2000 sites, and aimed to contribute to positive environmental management of these sites to ensure implementation of the EU Birds and Habitats directive, alongside the Water Framework Directive.

AEOS ran from 2010-2015 with priority being given to those farm holdings in areas of greatest importance in terms of biodiversity and water quality. Natura and commonage farmers were required to manage their land in a specified manner, but otherwise applicants could choose from a list of options such as:

- Grassland/arable field margins,
- Tree planting/management,
- Traditional hay meadows
- Species rich grassland,
- Rare breeds,
- Traditional orchards,
- Wild bird cover,
- Hedgerows
- Dry stone walls,
- Riparian margins,
- Preventing bovine access to watercourses,
- Trailing shoe slurry spreading, or
- Minimum tillage.

Like its predecessor, AEOS is also linked to the continuation of farming and financial contributions to farm incomes. Notably AEOS had a much smaller budget than REPS, and required applicants to compete for available funding.

Green Low-carbon Agri-environment Scheme

The **Green, Low-Carbon, Agri-Environment Scheme (GLAS)** (2014-2020), is the successor to AEOS and is currently operational. GLAS is designed to encourage farming to take place in an environmentally and climate-friendly manner. It is action-orientated, rather than a '*whole farm',* and similarly to AEOS linked the issues of climate change mitigation, water quality and the preservation of priority habitats and species. GLAS

is primarily targeted at the conservation of biodiversity and aims to aid the conservation of endangered species and habitats, but includes a growing focus on tackling climate change and water quality.

GLAS funds specific actions such as:

- Management of orchards, hedgerows, bat and bird boxes,
- Preservation of traditional hay meadows and low-input pastures,
- Retaining of carbon stocks in soils through field margins,
- Habitat preservation and practice such as minimum tillage.

In general, GLAS follows on from the approach set by AEOS and promotes agricultural actions which introduce or continue to apply agricultural production methods compatible with the protection of the environment, water quality, the landscape and its features, endangered species of flora and fauna and climate change mitigation.

Organic Farming Scheme

The Organic Farming Scheme (OFS) incentivises the production of organic food to meet market demand. It supports organic environmentally friendly production methods in accordance with standards which enable farming to co-exist with other systems, sustain soil fertility and protect the environment, wildlife and non-renewable resources. Organic standards are controlled by the EC regulations and national regulations, e.g. European Council Regulation (EEC) No. 834/2007 as amended, which is backed up by Statutory Instruments Nos. 112 of 2004 and 698 of 2007. In general, the objective of the OFS is understood as to both deliver enhanced environmental and animal welfare benefits, and to encourage producers to respond to the market demand for organically produced food. Funding for organic farming was previously part of the REPS scheme, but in 2007 the OFS became a stand-alone scheme. An additional OFS capital grants scheme provides grant aid for organic farmers to invest in infrastructure.

National Genetic Conservation Strategy

A National Genetic Conservation Strategy for animal genetic resources was published in 2013 by DAFM. This is a DAFM grant aid scheme which funds projects to identify, inventory, and conserve threatened genetic resources in Ireland.

Burren programme

The Burren Programme is a local AES type programme to conserve and support the heritage, environment and farm communities of the Burren in the west of Ireland. The Burren Farming for Conservation Programme (BFCP) was initiated in 2010, building directly on the experience of the highly successful and innovative BurrenLIFE Project (2005-2010) and has subsequently been replaced by the Burren Programme, funded under the current RDP. The Burren Programme is distinct from other AES as it operates a performance or results based approach to payments rather than a prescriptive action based payment, and it also co-funds capital actions by the farmers to support the delivery of results. DAFM has responsibility for payments issued to farmers under the Programme.

Basic Payment Scheme (Single farm payment)

The Basic Payment Scheme (BPS) (the Single Farm Payment Scheme until 2013) contributes to supporting and stabilising farmers' income through a basic payment per hectare, and thereby ensuring food supply and the economic viability of farms. The BPS also provides public goods as recipients are required to keep their holdings in Good Agricultural and Environmental Condition (GAEC) and comply with Statutory Management Requirements (SMRs), which include the maintenance of landscape features such as hedgerows. Non-compliance can lead to sanctions and loss of income. From 2013, all farmers eligible for payments under the BPS are also subject to '*greening*' requirements, such as the maintenance of Ecological Focus Areas (EFA). However, these requirements do not affect a high proportion of farmers in Ireland, and changes in management largely affect the arable/tillage sector in Ireland (e.g. IFA 2017).

Areas of Natural Constraint

Areas of Natural Constraint, previously Less Favourable Area, payments provide compensatory allowances for disadvantaged areas to encourage continued agriculture. By enabling the continuation of agriculture in these disadvantages areas the scheme aims to not only deliver farmer income but also maintain viable rural society and countryside, promote sustainable farming, and environmental protection. These schemes also support continued farming in High Nature Value Areas and the prevention of land abandonment.

National Genetic Conservation Strategy

Modern food production systems favour specialisation in a small number of animal breeds and plant species, to the exclusion of many others. The erosion of plant and animal diversity that results, may pose future risks to food security and genetic conservation is also a central aspiration of Conservation on Biological Diversity. The National Genetic Conservation strategy covers measures to conserve genetic resources for food and agriculture in Ireland through grant funding of projects supporting the conservation and sustainable use of genetic resources for food and agriculture. A diverse range of projects are funded, from hands-on conservation initiatives, raising awareness and education of the general public of the importance of genetic resources, and research.

7.2.3 Agriculture Schemes: Coefficients and Categorisation

Many of the agricultural schemes described above could be linked to two categories of action for biodiversity conservation, (1) sustainable use through environmentally friendly practices and production, or (2) habitat &/or species protection and management via site area enhancement and restoration. In categorising the AES included in this review, a distinction has been made between REPS, vs. AEOS and GLAS. REPS has been categorised as action for sustainable use, and grouped with scheme such as the Less Favourable Areas and Organic Farming Scheme, whilst AEOS and GLAS have been categorised as habitat &/or species protection or management. The rationale for this distinction is based on the whole-farm approach taken by REPS in comparison to the much more targeted payments for specific site management actions for biodiversity and habitat in AEOS and GLAS. The categorisation of the Organic Farming Scheme is also challenging and has been based on the main emphasis or purpose provided in the scheme's descriptions as '*sustainable use'*.

The relevance of agricultural schemes to the conservation of biodiversity varies considerably. The schemes d highest relevance for biodiversity conservation include agri-environment schemes (REPS, AEOS, & GLAS) and the scheme to conserve genetic resources. Biodiversity is stated as a primary focus of agri-environment schemes, REPS, AEOS and GLAS, as is evident from around two-thirds of their measures (Finn & O'Hullachain 2012). However, biodiversity conservation is not the only objective of these schemes which are also designed to achieve water quality improvement and the mitigation of climate change, along with contributing to farm incomes. In recognition that biodiversity conservation is a significant but not sole purpose of AES a 75% coefficient has been applied. Equally, the conservation of genetic material (access and benefit sharing) is one of the three core objectives of the CBD, consequently the National Genetic Conservation Strategy has been attributed at 75% to acknowledge the contribution towards biodiversity alongside agri-food security benefits.

While the Organic Farming Scheme (OFS) is not explicitly linked to the conservation of biodiversity, the OFS does involve the application of environmental friendly principles to the benefit of biodiversity and the wider objectives of environment protection, alongside food produce standards and quality. Consequently, a 50% coefficient has been applied to acknowledge the split purpose of the OFS.

The inclusion of the Basic Payment Scheme and compensatory payments for Less Favoured Areas [also referred to as Disadvantages Areas or Areas of Natural Constraint] is a more open question. A 5% coefficient could be applied to the Less Favoured Areas scheme on the basis that it contributes to the continuation of farming in high nature value areas. However, as Medarova-Bergstrom et al. (2014) highlights there are "*no*

explicit biodiversity objectives, rather the objective is 'to promote the sustainable development of agriculture in areas of natural constraints'". The LFA helps to prevent land abandonment, and the maintenance of management regimes which can be beneficial for biodiversity, estimates of the proportion of spending in high nature value areas were not available. Consequently, a 0% coefficient has been applied. However, this could be revised in the future.

Whether a percentage of expenditure under the Basic Payment Scheme (BPS) should be included in as biodiversity expenditure is another question. Biodiversity does not feature as one of the main objectives of the Basic Payment Scheme (BPS). However, participants in the BPS are required to comply with a series of conditions through the SMRs and GAECs. The SMRs contains only two objectives (out of 13) linked to the conservation of biodiversity. GAEC requires the maintenance of landscape features, (GACE 7), where they are already present, which would provide some protection of biodiversity and habitat features such as hedgerows and field margins. Furthermore, the CAP Pillar I reform in 2013 introduced a 'greening payment' linking 30% of BPS payments for certain farmers to greening obligations, such as the maintenance of Ecological Focus Areas. However, in the Irish context it has been highlighted that: "*the vast majority of farmers will not have to make any changes to their current farming practices to meet greening obligations*" (IFA, 2017).

There is an argument for the inclusion of a small proportion of expenditure under the BPS/LFA schemes as biodiversity expenditure, based on their contribution to the protection and retention of landscape features e.g. hedgerows. However, the benefits provided by these measures are difficult to quantify and confirm. Furthermore, the EU methodology for Tracking Biodiversity Expenditure in the EU budget (Medarova-Bergstrom et al. 2014) highlights that the inclusion of expenditure under the BPS is difficult. Concluding that, fundamentally, the BPS does not have specific biodiversity objectives and the contributions of cross-compliance conditions are complex. At present a 0% coefficient has been applied to correspond with the EU approach. However, if the potential benefits of cross compliance are to be acknowledged, a 5% marker could be applied in the future to the BPS, and 25% to greening payments if the proportion of spending linked to greening can be determined by DAFM.

PROGRAMME	CATEGORISATION	NBAP	AICHI	%
RURAL ENVIRONMENT PROTECTION SCHEME	SUSTAINABLE USE	6/4	7/11	75
AGRI-ENVIRONMENT OPTIONS SCHEME	PROTECTION OR MANAGEMENT	6/4	7/11	75
GREEN-LOW-CARBON AGRI-ENVIRONMENT SCHEME	PROTECTION OR MANAGEMENT	6/4	7/11	75
BURREN FARMING FOR CONSERVATION	PROTECTION OR MANAGEMENT	6	11	75
ORGANIC FARMING SCHEME	SUSTAINABLE USE/POLLUTION	4	7	50
LESS FAVOURED AREAS (AREAS NATURAL CONSTRAINT)	-	-	-	0
NATIONAL GENETIC CONSERVATION STRATEGY	GENETIC CONSERVATION	4	13	75
BASIC FARM PAYMENT SCHEME	-	-	-	0

TABLE 9. COEFFICIENTS AND CLASSIFICATION FOR AGRICULTURAL SCHEMES

7.2.4 AGRICULTURE - EXPENDITURE ON BIODIVERSITY CONSERVATION

Over the 6-year period between 2010-2015 **the agricultural component of DAFM is estimated to have spent around €1.109 billion on biodiversity related activities**, with an **average expenditure of €184 million per year**. Agricultural expenditure is derived from both the Irish exchequer and EU funding, via EAGF and EAFRD programme funding. Combined funding programmes has an approximate split of 70:30 between the EU and exchequer. Expenditure related to biodiversity is estimated to account for 7% of the total agricultural supports of over €15 billion between 2010-2015 (Graph 10.).

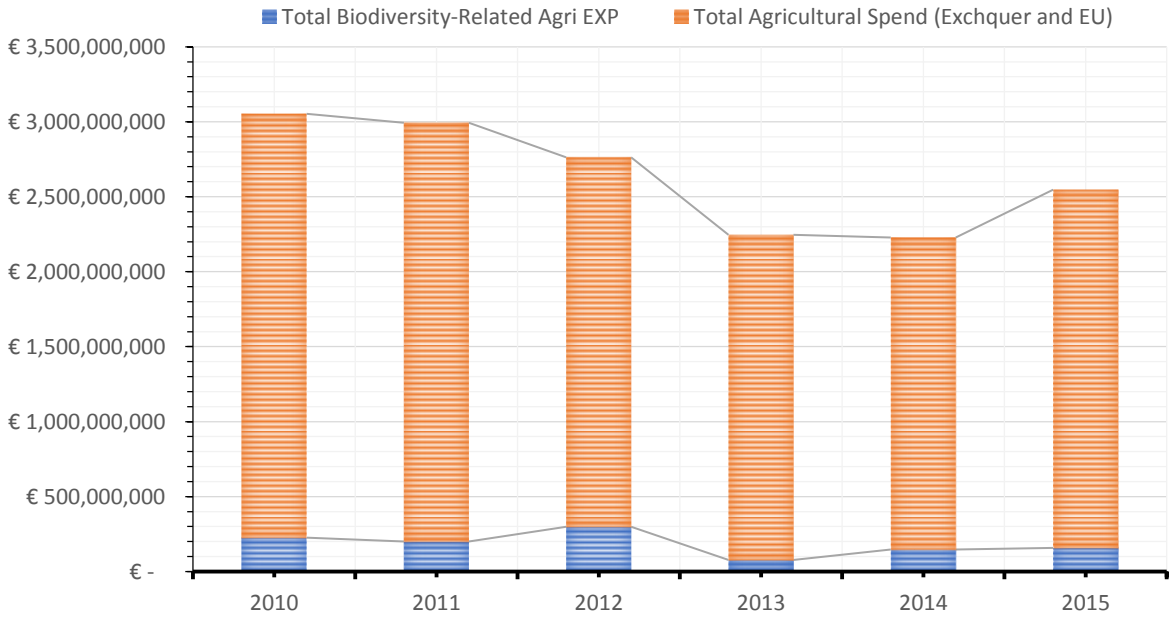
Analysis at the annual level shows that total DAFM agricultural expenditure on biodiversity declined

between 2010 and 2014 (a reduction of -34% over 5 years), before bouncing back by 7% in 2015 *Graph 12, 13, 14). This trend in expenditure can be linked to three causes, firstly the legacy of the 2008 economic crisis which led to a programme of public expenditure reduction and review. Secondly the cyclical nature of EU funding under the CAP which means that the time-period covered by the review accounts for the end of the 2007-2013 funding cycle and the initiation of the 2014-2020 causing an artificial drop in expenditure. Thirdly, the delay between expenditure and the reclaim of funds from the EU.

Biodiversity-related expenditure showed considerable variability over the 2010-2015 period, which is primarily though to be due to the shift in EU CAP funding cycle, with an overall reduction of only -3% comparing 2010 and 2015 directly. Peak spending in 2012 corresponds to overlapping spending on both the REPS and AEOS schemes (Graph 14.). However, REPS was rolled back by 2013-2014 leading to low funding claims in 2013, whilst new programmes such as GLAS were under development by 2015. After 2012, REPS spending declined sharply whilst AEOS did not reach peak spend until 2014 and 2015. However, AEOS had considerably less participants and budget than REPS, and, therefore, expenditure under AEOS remained at figures far below the peak spending under REPS.

Notably, there have been a number of issues with the delivery of payments to farmers under AEOS and GLAS schemes. 25% of the participants in the AEOS 3 scheme, initiated May 2013, had not received payments by early 2014, while 70% of 2016 GLAS scheme remained unpaid in May 2017.

Despite REPS formally closing to new applicants in 2009, over the review period REPS was still the major expenditure on biodiversity delivered by DAFM, accounting for 65% of total expenditure (Graph 11 & 14.). REPS delivered almost twice the amount of finance as its successor AEOS, with high levels of farmer participation and budget. AEOS was the second major source of finance for conservation, providing some 33% of the spend on biodiversity, although AEOS was considerably smaller in scale that REPS. The Organic Farming Scheme is the only other notable source of funding and provided low-level support at 1.2% of total spend, and the initiation of GLAS in 2015 began to contribute towards biodiversity expenditure.



GRAPH 10. BIODIVERSITY EXPENDITURE AS PROPORTION OF TOTAL EXPENDITURE AGRICULTURE

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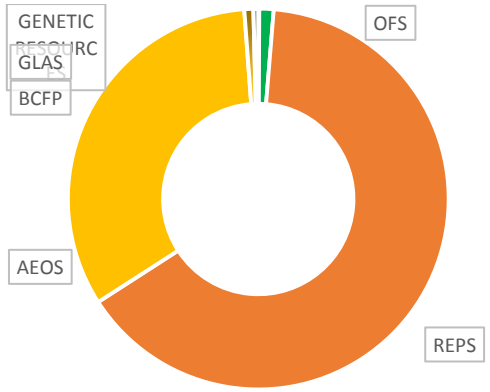


GRAPH 11. AGRICUTLURAL EXPENDITURE SOURCES FOR BIODIVERISTY CONSERVATION

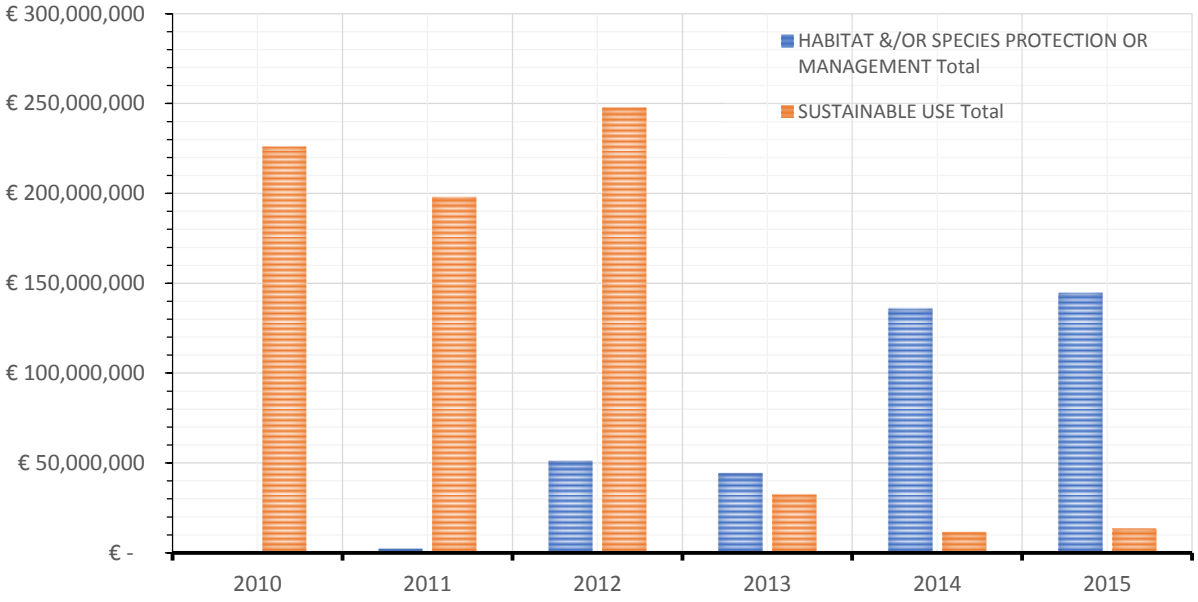
Expenditure on biodiversity through agricultural supports administered by DAFM is categorised as contributing to two separate actions for biodiversity conservation: sustainable use through environmentally friendly agricultural production and management, and habitats &/or species protection through specific site or area management actions (Graph 12.).

Sustainable use was the main conservation action funded by agriculture, and received some €730 million between 2010-2015. Both REPS and the OFS are classified as actions for sustainable use based on their contribution to whole farm management and their spatially-untargeted nature. By funding sustainable use, DAFM finances actions to reduce the intensity of farming, environmentally-favourable farming, environment planning, and actions such as the maintenance of field buffer strips, and reduced use of pesticides and nutrient management (see ADAS, 2016).

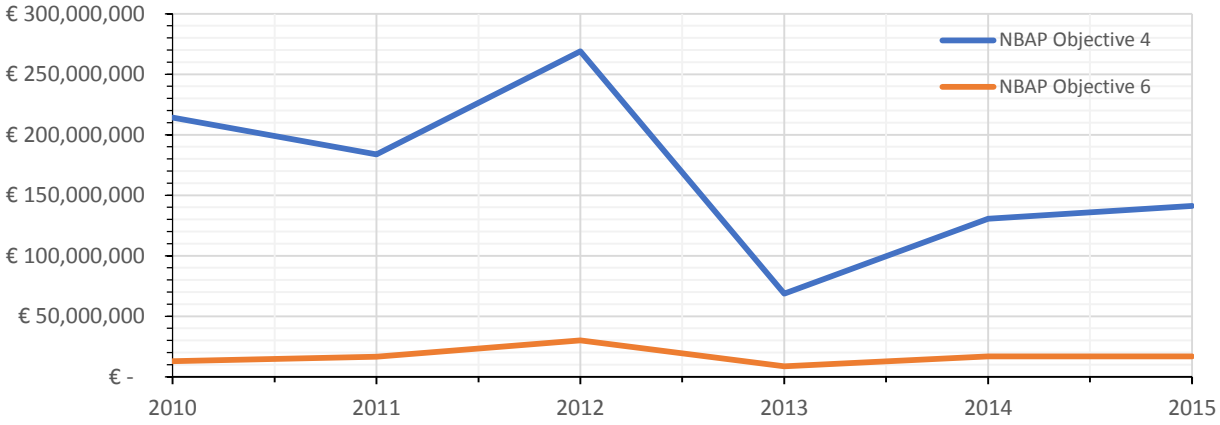
Expenditure on habitat &/or species protection through site or area management actions received around €379 million between 2010-2015. This categorisation accounts for targeted site actions funded through AEOS, GLAS, the BFCP, and the Genetic Resource grants. Through this expenditure, the agricultural support under DAFM contributed to a range of actions such as invasive scrub removal, appropriate grazing regimes, preservation of traditional hay meadows, minimum tillage to preserve soil, wild bird cover, planting of new hedgerows, arable margins, sustainable management of endangered species habitats, bird and bat box, and riparian margin creation.

Graph 12 shows how the proportion of expenditure on these two different actions for conservation changed considerably between 2010-2015, with a reduction in sustainable use spending (as a result of the closure of REPS) and an increase in specific site and area management protection spending towards 2015 (through increasing expenditure under AEOS and GLAS schemes). The trend towards specific actions for species is likely to continue through GLAS and increased funding for targeted action under the **Locally-Led Agri-Environment** measures for freshwater pearl mussel and hen harrier, and increased spending under the BCFP.

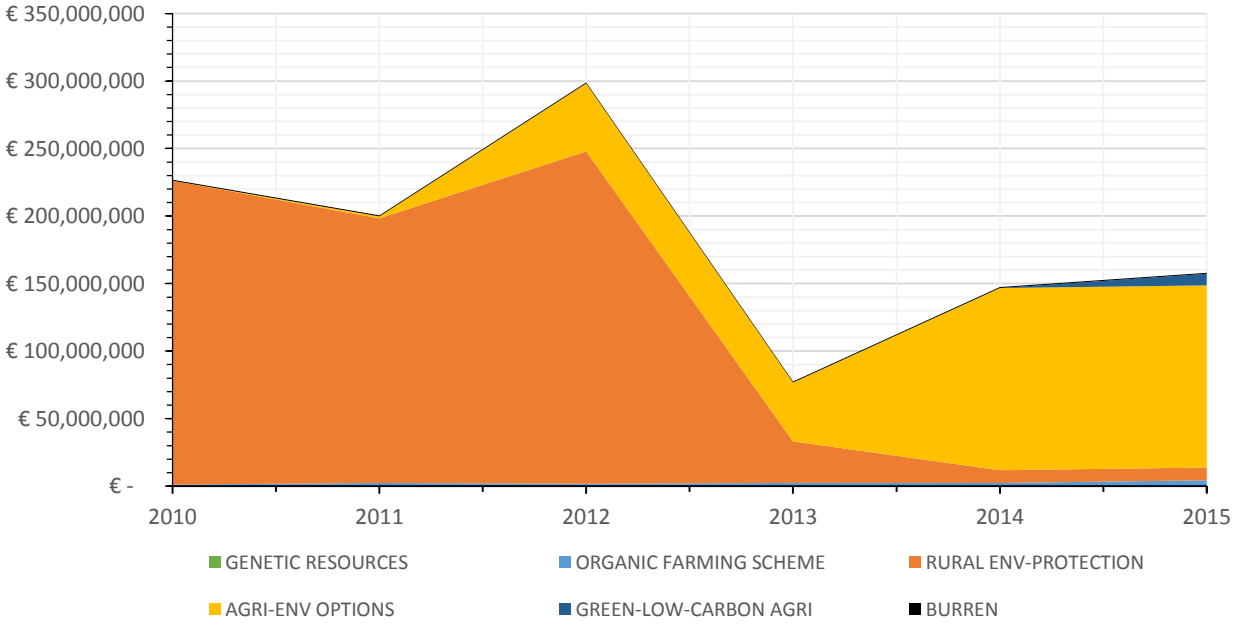
In relation to the objectives of the NBAP, agricultural spending (Graph 13.) was mainly found to contribute towards to *'objective 4 to conserve and restore biodiversity in the wider countryside'*, specifically sub target 4.1 to ensure that '*agricultural, rural development, forestry and peatland policies and strategies achieve net benefits for biodiversity and ecosystem services'* which accounts for €1.001 billion of the biodiversity spend between 2010-2015. However, REPS, AEOS and GLAS, all also contribute to farming on designated Natura 2000 sites whilst funding under the Burren Programme is primarily linked to the maintenance of the Burren SACs. Therefore, agricultural spend must also be recognised as contributing around €101 million towards NBAP *'objective 6 to expand and improve of the management of protected areas*'. These divisions are also apparent in the classification spending in terms of the Aichi Targets.



GRAPH 12. AGRICULTURAL EXPENDITURE ON CONSERVATION ACTIONS FOR BIODIVERSITY



GRAPH 13. AGRICULTURAL EXPENDITURE ON NBAP OBJECTIVES



GRAPH 14. PROGRAMMATIC BIODIVERSITY EXPENDITURE BY AGRICULTURE

The expenditure data presented in this section has been obtained from a variety of different sources, primarily from civil servants in DAFM. Where possible data has been cross checked against DAFM annual reports, CSO data and government appropriation accounts held by the Office of the Comptroller and Auditor.

The collection of agriculture data proved to be particularly problematic. A key problem was the contradictory data reported through different sources for individual years. Differences in the expenditure amounts reported were largely found to be a result of the different reporting of the distribution of claims made to the EU rather than actual payments made to farmers. This was a particular problem for the REPS and AEOS schemes. To achieve the degree of disaggregation of the REPS and AEOS schemes, and to differentiate between wider countryside expenditure and protected sites, required the use of expenditure based on claims to the EU as recorded by DAFM rather than CSO data. However no claim was made to the EU for 2014 for AEOS, the use of this data made the scheme look artificially reduced and therefore, the spend for 2014 and 2015 has been aggregated and split evenly over these two years.

7.2.5 Effectiveness of Agriculture Spending on Biodiversity

Although agricultural support is the major source of biodiversity expenditure in Ireland, the effectiveness of some of the biodiversity-related measures financed through agricultural support has been the subject of debate, in particular the agri-environmental schemes (AES) which deliver 99% of the biodiversity-related spend from agriculture.

AES are one of the key conservation strategies for the EU and the highest single element of biodiversity conservation expenditure in Europe. Consequently, there is a considerable body of literature which reflects on the effectiveness of AES as a tool for biodiversity conservation (Batáry et al. 2015; Kleijn & Sutherland 2003). A common conclusion of this research has been that the broad-based non-targeted agri-environment schemes have not adequately conserved biodiversity (e.g. Kleijn & Sutherland 2003; Feehan et al. 2005). Early studies by both Kleijn and Sutherland (2003) and Mattison & Norris (2005) suggested that AES tend only to result in a moderate increase in species richness or abundance of common species in farmland areas. However, since the mid-2000s, AES have become significantly more targeted, and a meta-analysis completed by Batáry et al. (2015) finds that there has been a general increase in farmland biodiversity in response to AES. Batáry et al (2015) concludes that *"the European experience is that AES can be effective for conserving wildlife on farmland, but they are expensive and need to be carefully designed and targeted".*

AES can vary considerably in their design, quality, and effectiveness as conservation tools (Mattison & Norris, 2005). In this Irish context, REPS was the longest running AES and has been the subject of the most reviews of its performance. However, it must be acknowledged that the studies available are still relatively few in number and there is an absence of pre-REPS comparative baseline data.

There have been 3 major reviews of REPS including: Finn and O'Huallachain (2010); Indecon (2010); and ADAS (2016). None of these review studies indicate a strong or clear relationship between REPS and increased biodiversity levels.

> "*Higher level indicators of biodiversity (bird abundances, bird species richness and vegetation species richness) generally show little or no difference between REPS and non-REPS measures, [rather] functional indicators of biodiversity such as invertebrate and below-ground species richness, generally show that REPS had a positive effect*" (ADAS, 2016:3).

Although studies have shown greater density and habitat availability on REPS farm, they have been unable to link REPS to key biodiversity indicators such as species abundance.

However, improvement in functional indicators do suggests some positive improvement, and REPS has also been linked to lower pressure on biodiversity through reductions in stocking densities and over-grazing (Renou-Wilson et al. 2011). Moreover, REPS was thought to have

additional benefits through improved knowledge and awareness amongst farmers of the environmental impact of farming systems and processes (ADAS, 2016). There is more evidence to link REPS farms with general increases in environmental quality, including improved soil and water quality, a lowering of nitrate leaching and carbon emission, although this finding may also be the result of the nitrates action programme.

Existing reviews highlight a number of issues with REPS in terms of the delivery of biodiversity conservation. Firstly, Finn & O'Hullachain (2012) suggest that the lack of links between REPS and biodiversity improvements is a result of the scheme's design focus on quantity over quality, and the adoption of the whole-farm approach. Secondly, ADAS (2016) report that as a result of the elective approach the measures actually taken up were often not the most optimal ones for local biodiversity and habitat type, as the options included several measures of little or no benefit to biodiversity. Moreover, the limited measures available meant that in some contexts REPS was considered inflexible and contained management options which could even be unsuitable or irrelevant for certain species (ADAS 2016). Much of the research gathered through these reviews is reported to have already been factored into the design of GLAS and Locally-Led Agri-Environment Scheme under EIPs.

In response to these evaluations, AEOS, the successor to REPS, took a more targeted approach focusing on part-farm actions. However, AEOS had a much smaller budget and scope as a result of the 2008-11 economic crisis in Ireland, and uncertainty in the availability of DAFM funds. ADAS (2016) highlights that due to the short-lived nature of the AEOS relatively little research has been undertaken specifically on AEOS to further our understanding of the effectiveness of this scheme biodiversity conservation. One limited study undertaken by Ó hUallacháin et al. (2016) suggests that certain treatments and management options under AEOS may be more effective than others for species richness improvements, and highlights the need for research into prescriptions for certain management options to enhance biodiversity.

What is evident is that AEOS was relatively small-scale and short-lived (2010-2014). As a payment scheme, AEOS suffered from a severe backlog in payments in 2012/2013, with delays of up to 16 month for payments. GLAS was only initiated in 2015 but its design reflects the need for more targeted schemes and a much greater focus on biodiversity.

One of the most highly lauded Irish AES is the Burren Farming for Conservation Programme (BCFP) (now the Burren Programme under the RDP). The BCFP was initiated through a LIFE scheme in 2005 and initially covered the Burren SAC (now expanded). The BCFP was designed with a results-based approach and provides payments to farmers on the basis of results achieved by scoring farm field habitat quality, not just for the actions taken. Under the BCFP, a higher score results in higher payments (ADAS, 2016). The performance-based approach taken by the BCFP has been able to demonstrate a consistent increase in habitat quality and improved biodiversity of participating farms since 2005 (Dunford 2016). The BCFP was also thought to be particularly successful as it was locally-led, designed in partnership with local farmers ensuring scheme buy-in. In contrast to REPS and AEOS, the on-farm actions taken to enhance biodiversity were also tailored to each farm rather than through a set of prescribed management actions. The scheme has also been praised for its cost-efficiency having a public administration cost of 12%, which is 3% lower that the EU average (McGurn and Moran, 2013).

The success of the Burren Programme has resulted in a call for the rolling out of results-based and bottom up approaches more broadly, which is now being piloted through the Results Based Agri-environmental Payments (RBAPS) in County Leitrim and the Shannon Callows. The Burren Programme has also been part of the inspiration for Locally-led Agri-environment Schemes or EIPs by DAFM (ADAS, 2016). However, a long standing and remaining critique of Irish AES is the lack of focus of conserving wider areas of non-designated high nature value (HNV) farmed environments, research in this area is now being carried out (Heritage Council 2010; Matin et al. 2016).

However, it may be that a locally-led approach and results based payment scheme may not work well in some locations due to potential incompatibility between the objectives of farming and conservation. Finally, a major synthesis of EU entry-level schemes (Keenleyside et al. 2011) highlighted the need for all AES to be consciously designed to incentivise the most environmentally beneficial options (ADAS, 2016).

Reviewing the effectiveness of expenditure of AES, based on the limited available evidence, suggests that the benefits of REPS and AEOS, as the largest share of expenditure, have possibly been marginal for biodiversity or unmeasurable. Moreover, DAFM's current focuses on agricultural intensification (Food Wise 2025) promotes an increase in the national livestock numbers, crop areas and fertilisers, which is likely to clash with contribution to improve the Irish environment. ADAS (2016) argues that the improvements gained through AES may be outweighed by potential increase in livestock numbers, crop areas and fertiliser to make intensification targets. However, the advent of results based locally-led and more targeted schemes suggest the effectiveness of agricultural spend is at least likely to improve in the future, although these schemes remain of significantly smaller scale than their predecessors.

In addition, academic research interviews carried out alongside expenditure data collection highlighted a number of areas which were thought to limit the effectiveness of agricultural spending for conservation. Firstly, one key point made by participants was the continued division between departments responsible for the management of agri-environment schemes (DAFM) and the department with the highest level of biodiversity expertise (DCHG – NPWS). Although NPWS are engaged in the design and prescription of agri-environment schemes such as GLAS, this division may still mean that there is a lack of direct biodiversity expertise and input into the most significant national areas of biodiversity expenditure. Secondly, a frequent concern was that of timescale, with an emphasis that the current 5-7-year timeframe for AES is simply too short to be particularly effective, and there is a need for much more continual schemes and furthermore that more effort needs to be made to build flexibility into these schemes. A third point made was issues with lack of take up. REPS achieved participation of some 60,000 farmers, however this number has not been achieved since and there were concern of poor attitude towards these AES which needs to be remedied to ensure uptake and participation.

7.2.6 Agriculture Future Funding Sources and Challenges

Discussion of future spending sources and challenges highlighted that additional agricultural funding sources for biodiversity conservation could come from a number of sources including Results-Based Agri-Environment Schemes (currently being piloted RBAPS project), Locally-Led Agri-Environment measures or EIPS (currently being rolled out by DAFM), High Nature Value Farming, and the development of new payments for ecosystem service type schemes linked to climate change, flooding or water quality.

Although many of these schemes hold promise to increase budgets for biodiversity conservation they are also challenging and potentially problematic. The success of the Burren Programme has led to increased interest in locally led and results based AES. However, a number of civil servants and NGOs also highlighted that there could be issues with the transferability of the Burren model.

The RBAPS project has been investigating the transferability of the Burren model to other conservation areas in Ireland. The RBAPS project has already highlighted that results based approaches potentially suffer from the perception of budgetary uncertainty about how much of the budget will need to be spent due to the performance based nature of the scheme. Moreover, results based schemes may have a higher initial administrative cost (in the development of indicators and score cards) than prescriptive based AES. However, results based approaches can also have enormous potential not just to deliver more biodiversity gain but as a communication tools to try to change farmers' perceptions of biodiversity. Furthermore, there is also uncertainty about how Brexit could shape the future of agri-environment schemes.

7.3 Marine

7.3.1 Marine Sector Overview

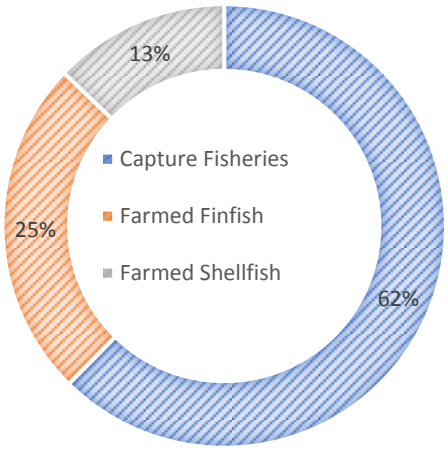
The Irish marine territory covers an area of some 880,000km^2, an area more than 10 times larger than Irelands' landmass, with an accompanying coastline of over 7,500km^2 (Marine Institute 2017). Ireland's marine area contains a range of habitats from deep offshore waters to shallow continental plateaux and extensive inshore waters, which together support a high diversity of ecosystems and species. This area is not only extensive and diverse, but also highly productive, generating a wealth of natural capital (EPA, 2008; Norton et al. 2016).

Ireland's marine areas support three main economic activities: (1) maritime transport and shipping; (2) seafood (aquaculture and fisheries) and bio-resources; and (3) marine tourism and leisure (Marine Institute 2017). A much wider range of activities also take place on a smaller scale, such as renewable ocean energy production, oil and gas extraction and the marine bio-tech industries. The Irish marine fisheries and seafood sector is the main focus for this review, which is predominantly concentrated on the West coast of Ireland, along with key harbours and ports in the South and East coasts.

€ billion	2012	2014	% Δ	2016	% Δ
GVA	€1.2	€1.5	19%	€1.8	20%
GDP	0.8%	0.8%		0.9%	
Turnover	€4.7	€4.6	2%	€5.7	23%

Table 10. Blue Economy Key Figures &Trends (SEMRU 2017:p6)

In terms of economic value, the main components of the sea-food and fisheries sector are: capture fisheries 62%, farmed finfish 25%, and farmed shellfish 13% (Graph 15.). In volume, this amounted to some 325,000 tonnes in 2016 (BIM 2016). Looking at overall contribution to the Irish economy, the marine sector is reported to have contributed €1.8bn in 2016, a rise from €1.2 billion in 2010 (SEMRU 2017). The wild capture fisheries are themselves a component of marine biodiversity while the farmed sector is dependent to a varying extent on good environmental quality, including biodiversity. Both sectors have the capacity to impact negatively on biodiversity if not properly managed.



Graph 15. Irish Seafood & Fisheries Sector Overview

Ireland's wild capture fisheries are themselves a component of marine biodiversity while the farmed sector is dependent to a good environmental quality including, to a varying extent, biodiversity. Both sectors have the capacity to impact negatively on biodiversity if not properly managed.

The marine fisheries and sea-food sector is supported by the EU Structural Funds and by government through the European Maritime Fisheries Fund (EMFF) Operational Programme (2014-2020), previously the European Fisheries Fund Operational Programme 2007-2013. The Operational Programme is administered through three main organisations (1) Bord Iascaigh Mhara (BIM) – seafood development agency, (2) the Marine Institute (MI) – marine research and science, and (3) the Sea-Fisheries Protection Authority (SFPA) - seafood safety and sea-fisheries protection. The aim of the EMFF is to deliver the objectives of the Common Fisheries Policy (CFP) and integrated marine policy.

Within the current 2014-2020 funding cycle the EMFF Operational Programme (launched 2016) for Ireland has an allocated budget of €240 million, an increase on the €66 million budget of the previous EFF operational programme for 2007-2013. The EMFF, and its predecessor, aim to provide a high-level programme of support measures for fisheries, aquaculture, seafood

processing (100% EU funded), data collection (80% EU funded), enforcement of sea-fisheries law (90% EU funded), Local Action Groups, and Integrated Maritime Policy (DAFM, 2015). For the 2014-2020 programme, the EU allocated Ireland €147 million while a further €90 million was allocated by the Irish exchequer (DAFM 2015). The majority of schemes and programmes under the EMFF were funded 50:50 with the exception of those highlighted above.

GRAPH 16. MARINE SECTOR EXPENDITURE 2010-2015

Over the 2010-2015 period, the Total Gross Voted Expenditure for the above three main marine organisations was estimated to be €454 million as shown in Graph 16, with an average annual spend of €75 million, these figures include the funding received from the EFF, EMFF, administration costs and staff pay. Based on receipts for appropriation in aid received, it is estimated (from appropriations in aid receipts) that the DAFM claimed around €43 million from the EU during this period towards marine and fisheries programme. These marine agencies together accounted for on average 6% of the DAFM expenditure 2010-2015.

Between 2010-2015 the blue-economy, the collective term used for economic activities in the marine areas, performed well with an overall growth of 9% (SEMRU 2017), the seafood sector in particular grew significantly by some 70%. The blue-economy is seen as a significant factor in the Irish economic recovery (SEMRU 2017), and the DAFM agri-food strategies highlight the potential for considerable expansion in the Irish fishing industry to exploit global market demand for seafood (Food Wise 2025, DAFM, 2015). Expansion is a key aspiration for the Integrated Marine Plan which targets a doubling of the value of the blue economy to 2.4% of GDP by 2030, and aims to increase the turnover from our ocean economy to exceed €6.4bn by 2020.

Together with expansion plans, there is now an increasing focus on sustainable or environmentally friendly stock management in agri-food industry strategy and policy. Equally, the Marine Strategy Framework Directive (MSFD) requires EU Member States to achieve or maintain Good Environmental Status (GES) in their marine waters by 2020. There are also plans to enable the development of Marine Protected Areas in Ireland through the publication of the Maritime Area and Foreshore (amendment) Bill.

7.3.2 Marine Schemes and Agencies Related to Biodiversity Conservation

Overexploitation, the depletion of ecosystem and fish stocks beyond the point of recovery, and damaging/destructive fishing practices, such as bottom trawling, present a threat to marine ecosystems and species world-wide. Fish populations are themselves an element of biodiversity. Irish fish stocks have been heavily exploited in the past. However, while 75% of stocks were being harvested beyond safe biological limits ten years ago (EPA, 2008), this has now reduced to an estimated 26% of stocks (EPA, 2016). Key examples of past overexploitation include herring, mackerel and the cod and whiting fisheries which were regarded to be in a state of collapse (EPA, 2008). Fishing pressure is also thought to have adversely affected the condition of many sea bed habitats and reef complexes with the latter being particularly sensitive to disturbance and having a poor capacity for recovery (NPWS, 2014; DAHG, 2014). However, this situation has been improving with stocks of several species in parts of the Irish Sea and Celtic Sea rising above maximum sustainable yield. The number of sustainably fished stocks has increased. Steps taken under the CFP to reduce discards and fishing pressure including bottom trawling. In the Celtic Sea the overall biomass of commercial fish and shellfish stocks has now increased.

Although the fisheries sector in Europe has contributed to past biodiversity losses, the sector also has the potential to help reverse these losses. Ocean sustainability is a widespread public concern in Europe and the need to adapt fisheries management policies has been clearly acknowledged and promoted in the CFP, which aims to end overfishing throughout Europe by 2020 at the latest. The transformation to more sustainable modes of fishing is a key challenge to mitigate or reverse the consequence of biodiversity loss in the European context.

The need for sustainable exploitation is recognised in Ireland's Integrated Marine Plan, which contains three goals, one of which is to achieve '*healthy ecosystems*' to provide both monetary and non-monetary goods and services (Our Ocean Wealth 2012). To achieve this goal, the Marine Plan identifies the need to protect and conserve marine biodiversity, manage living and non-living resources sustainably, and implement and comply with environmental legislation. Furthermore, a key concept is the adoption of ecosystem-based marine planning and management. Similarly, the National Strategic Plan for Sustainable Aquaculture Development (2015) acknowledges the need for the *"protection of biodiversity within and outside protected areas*", and commits to the control of invasive species, benefits for biodiversity and monitoring.

Between 2010-2015, a number of schemes funded under the 2010-2015 EFF and EMFF Operational Programmes have relevance to the conservation of biodiversity by promoting more sustainable fishing. These schemes have been operated through the MI, BIM and the SFPA.

Fisheries, Seafood & Aquaculture Development Schemes (BIM)

Seafood environmental management systems & certification

The Seafood Environmental Management Systems and Certification (SEMSC) has a number of different objectives:

- To encourage responsible fishing,
- To reduce impacts on the marine environment,
- To improve fish quality and hygiene, and
- To improve crew safety.

The scheme has three main components (1) grant assistance linked to capital investment on ships, (2) administration and certification and development works undertaken by BIM, and (3) the Environmental Management System (EMS) Programme Assistance. The SEMSC grant aid scheme enables members of the Irish seafood industry to meet international accredited environmental and food safety standards in wild capture fisheries and farming. Grant aid is provided towards capital investment in improved fish quality and hygiene investment, good fish handling, fuel efficiencies, crew safety and responsible fishing practice such as the purchase of chemical spill kits, or the development of EMS plans. The management of the SEMSC programme is undertaken by BIM which develops sea-food

standards, administers grants and checks certification.

CELTIC SEA-HERRING STOCK REBUILDING & MANAGEMENT PROGRAMME

The Celtic Sea Herring Stock Rebuilding and Management Programme focuses on stock rebuilding and sustainable management programme to help the Irish fishery sector achieve Marine Stewardship Council Sustainable Certification to ensure continued market access. The MSC scheme involved the setting up of advisory committee alongside the costs of an 11 month assessment.

RESPONSIBLY SOURCED STANDARDS

Responsibly Sourced Standards (RSS) are a product certification system which ensures that catches have been fished ethically, are of high quality and are traceable. The RSS is closely linked to consumer confidence and enables access to markets. The RSS scheme has two main elements (1) fishing vessel standards (such as detailing responsible catching and handling), and (2) onshore handling and quality standards (e.g. good product handling, quality and traceability), of which the first element contributes to the protection of stocks. The scheme is also closely linked to the implementation of SEMSC

DISCARD REDUCTION & GEAR SELECTIVITY TRIALS

Between 2010-2015, BIM funded experimental trials and pilot programmes investigating improved gear selectivity to reduced discards and unwanted catch in preparation for the introduction of the landing obligations in 2019. For example, the '*Velvet crab catch reduction pilot'* was an experimental scheme looking at the use of escape gaps to reduce capture of crabs under market size, and ensure a sustainable stock. Another experimental scheme assessed gear selectivity & catchability in the Shrimp Fishery by testing different types of shrimp pot and on board grading to improve the selectivity. A number of trials have also been undertaken on commercial vessels to test selective fishing gears in relation to cod discard reduction.

OBSERVER PROGRAMME FOR MARINE MAMMAL BY-CATCH REDUCTION RESEARCH & DEPREDATION

Incidental capture in fishing gear is a key issue for marine mammal population and fisheries.

- The *Observer Programme* monitors the interaction between fisheries (such as gillnet or pelagic fisheries) and cetaceans, and explores opportunities to reduce by-catch.
- The '*Environmental management of seal-depredation and by-catch in inshore fisheries'* project was a pilot which surveyed the level of interactions between seals and fisheries, determined the economic impact of depredation and explored potential mitigation measures.
- The '*Environmental management of tuna fisheries*' tagged Albacore tuna with satellite tags and tested acoustic deterrent devices to reduce marine mammal bycatch in this fishery.

V-NOTCHING OF LOBSTERS (INSHORE FISHERIES CONSERVATION SCHEME)

The primary intention of the v-notching of berried lobsters is to protect a given amount of spawning potential that will improve recruitment and ultimately fishery yields. Fishermen are compensated for donating lobsters to the scheme. Both DAFM and the Inshore-Fisheries Forums have been involved with this initiative.

NATURA 2000 COMPLIANCE: IMPACT STUDIES AND SURVEYS

BIM has carried out a number of surveys of Natura 2000 sites to facilitate appropriate assessment, such as for mussel fisheries, and to explore the impact of fishing gear on Natura 2000 sites. These studies are carried out to ensure compliance with the EU Birds and Habitats Directives and enable fishing activities to take place.

RECYCLING OF REDUNDANT FISHING GEAR

Marine litter has a direct ecological impact on wildlife, including mortality, and an economic impact on beaches, harbours and the fishing industry. Discarded fishing gear can be a cause of "ghost fishing". The Recycling of Redundant Fishing Gear scheme consists of payments made to fishing cooperatives for net returns and for the preparation of nets for recycling.

Organic Aquaculture

Grant aid is available to cover organic certification to encourage conventional producers to move to organic production and participate in EU eco-management and audit schemes. Organic aquaculture is described as a holistic method for farming marine species in line with organic principles – in that it is avoids the use of pesticides, encourages farming in consideration of naturally occurring ecosystems, and reduces harmful impacts on the environment.

Data collection & Science (Marine Institute)

EMFF Biodiversity Scheme

The EMFF Biodiversity Scheme (2014-2020) provides support for the compliance of fisheries and aquaculture with the Habitats and Birds Directive and the MSFD, through acquisition and analysis of data on fisheries and aquaculture. Broadly, the scheme is linked to the undertaking of EIA, surveys and appropriate assessment to ensure that protected sites are safeguarded from economic activities. As a contribution to this scheme, the MI has been running a pilot programme whereby GPS tracking units are installed on fishing boats operating in particular fisheries (i.e. scallop, razor clam) where there is the potential for impacts on marine NATURA 2000 sites. The GPS tracks the interaction of fishing boats with sensitive habitats.

Marine Strategy Framework Directive/ Water Framework Directive (Marine Component)

Between 2010-2015 funding was provided to undertake an initial assessment of the current environmental status of Ireland's marine waters, and the socio-economic analysis of human activities in these waters, as required by the MSFD. The scheme also established a monitoring programme for ongoing assessment and progress review. The MSFD aims to protect the resource base upon which marine related economic and social activities depend. A similar programme of work was also undertaken for the marine component (coastal waters and transitional estuaries) of the Water Framework Directive (WFD) to determine ecological status, and to protect and enhance both ecological and chemical quality of estuaries and coastal waters.

Common Fisheries Policy (CFP) Data

The Common Fisheries Policy (CFP) data scheme is linked to the provision of timely and accurate fisheries advice on the resource base which underpins the management framework of the CFP, including inshore fish stock, key commercial fish and shellfish stock around Ireland. The overall aim of fisheries data collection and science is to provide information to managers on the state and life cycle of fish stocks and to highlight stocks in vulnerable condition. This information feeds into the decision-making process. Fisheries science, economic, social and political considerations all have an impact on final management decisions.

Marine Research Programme (Ship-Time Programme)

The Marine Institute operates the national marine research vessels (RV Celtic Explorer and RV Celtic Voyager) and associated research infrastructure. The Marine Research Ship Time Programme includes the training of undergraduate and postgraduate students for ship based training. Alongside training this programme includes research time as well on various marine biodiversity studies.

Enforcement & compliance (SFPA)

Sea Fisheries Protection Authority

The SFPA works to detect and deter non-compliance with sea-fisheries and seafood legislation linked to stock sustainability and economic prosperity, food and crew safety, compliance with laws and regulations, and environmental restrictions. This involves the development of compliance requirements, implementation of targeted information programmes and workshops, prosecution of illegal fishing and food safety breeches.

7.3.3 Marine Schemes: Coefficients and Categorisations

Many of the marine schemes described above could be linked to two different categorisations, (1) sustainable use through environmentally friendly practices and production, environmental standards or sustainable resources management,

or (2) habitat &/or species protection and management via species protection, population management or site enhancement and management. The v-notching of lobsters scheme and the management of Celtic Sea Herring populations could be classified as either sustainable use or species protection. However, the categorisation has been based on the main focus of these schemes to ensure continued sustainable harvesting and stock management rather than species protection.

Although the focus on wild fisheries is commercial, these species are also a component of marine biodiversity and dependent on a functioning ecosystem. However, only a few marine schemes have been ascribed as being of high relevance for conservation (see Table 11). The Observer Programme for Marine Mammals, the Environmental Management of Seal Depredation and the Marine Research Ship-Time Programme. The high relevance of these schemes is due to their main focus being on biodiversity. For the Observer Programme a primary objective is to reduce by-catch and impact, the seal depredation project aimed to reduce conflicts between seals and fishermen, and the Marine Research Ship-Time Programme focuses largely on biodiversity impact and only those relevant projects have been included. However, even these schemes have other minor priorities and objectives linked to economic benefits such as reducing depredation of fish catch by marine mammals, or providing information on the sustainable exploitation of fish stocks. Therefore, biodiversity is not designated as their sole focus and a 75% coefficient has been applied.

A large number of marine schemes have been classified as having moderate relevance for conservation (50%) based on their split objectives. This categorisation includes experimental schemes and pilots research for discard reduction and gear selectivity, studies on Natura 2000 impacts such as the EMFF biodiversity schemes, monitoring and survey work liked to the MSFD and WFD, and the Organic Aquaculture Scheme. The schemes were all found to focus strongly on both marine conservation and sustainable economic productivity. For example, discard reduction pilots are linked to the best marketable catch and also to sustaining ecosystems and reducing impacts linked to discards. Equally, compliance surveys and impacts studies on Natura 2000 sites are not just linked to ensuring protection of these sites but also to enabling economic activities to take place. Likewise, the MSFD is seen as having human environmental objectives in terms of safe water quality as well as ecological objectives.

In contrast, low relevance schemes have been designated 25% based on their primary purpose clearly being an objective other than the conservation of biodiversity, or on their minimal relevance for conservation. For example, the rebuilding of Celtic Sea Herring Stock and the v-notching of lobsters is undertaken in order to ensure sustainable stocks for future exploitation. These schemes are also likely to have incidental benefits by maintaining marine ecosystems.

A 5% marker has been applied to schemes which only have a theoretical or potential benefit for biodiversity, including Seafood Environmental Management Systems and Responsible Sourcing Standards. Equally, alongside commercial data, the CFP contributes data that is useful for conservation, and which the SFPA can use to enforce environmental standards and protected areas. These are all schemes where the relevance to biodiversity conservation was hard to establish or clearly prove. Their relevance could be updated in the future if more information becomes available on their relevance for conservation.

Programme	Categorisation	AICHI	NBAP	%
Seafood environmental management systems	Sustainable use/Private Sector standards	7	5	5
Celtic Sea-Herring stock rebuilding	Sustainable use/ Sustainable harvesting	6	5	25
Responsibly Sourced Standards	Sustainable use/Private Sector standards	4	5	5
discard reduction & Gear selectivity trials	research & Survey, Applied research	19	2	50
observe programme & By-Catch reduction	research & Survey, Applied research	19	2	75
V-notching of lobsters	Sustainable use/ Sustainable harvesting	6	5	25
Natura 2000 compliance	Policy, plans & enforcement	4	6	50
Recycling of redundant fishing gear	Sustainable use/Env friendly production	8	5	25
Organic Aquaculture	Sustainable use/Env friendly production	7	5	50
Natura Implementation/ Emff Biodiversity	Policy, plans & enforcement	4	6	50
Marine Strategy Framework Directive	Research & Survey;	19	2	50
Water Framework Directive (Marine)	Research & Survey	19	2	50
Common Fisheries Policy Data	Research & Survey	19	2	5
Marine Research Programme (Ship Time)	Research & Survey; applied research	19	2	75
Sea Fisheries Protection Authority	Policy, plans & enforcement,	4	1	5

TABLE.11 COEFFICIENTS AND CATEGORISATION FOR MARINE BIODIVERSITY EXPENDITURE

7.3.4 MARINE - EXPENDITURE ON BIODIVERSITY CONSERVATION

For the 6-year period between **2010-2015 Total Gross Expenditure** related to biodiversity by marine agencies (MI, BIM and SFPA) **was estimated to be €13 million,** with an **average annual spend of €2.2 million** (as shown in Table 12).

€ MILLION	2010	2011	2012	2013	2014	2015
BD-EXP	€ 2.6	€ 2.1	€ 2.4	€ 1.9	€ 2.1	€ 1.9
TOTAL SPEND	€74	€ 73	€ 70	€ 70	€ 73	€ 78
%	*3%*	*3%*	*3%*	*3%*	*3%*	*2%*

TABLE 12. BIODIVERSITY/TOTAL MARINE EXPENDITURE

Marine expenditure on biodiversity-related schemes was found to be on average 3% of the total spend of the three marine public sector agencies, including administration and staff costs. The majority, 69% of this expenditure, comes from programmes run by the MI, 27% from the SFPA and 4% from BIM. Over this 6 year period the main sources of expenditure were the Marine Ship-Time programme (34.4%), the SFPA (26.5%), the MSFD & the WFD (13.2%), the EMFF Biodiversity Scheme (14.5%), and the CFP data programme (7.5%). All other marine schemes and programmes account for less than 1% of total expenditure 2010-2015. Notably, with the exception of the Marine Ship-Time Programme and EMFF Biodiversity Scheme, biodiversity expenditure in the marine public sector is coming from large programmes which are only loosely related to biodiversity (5-25%).

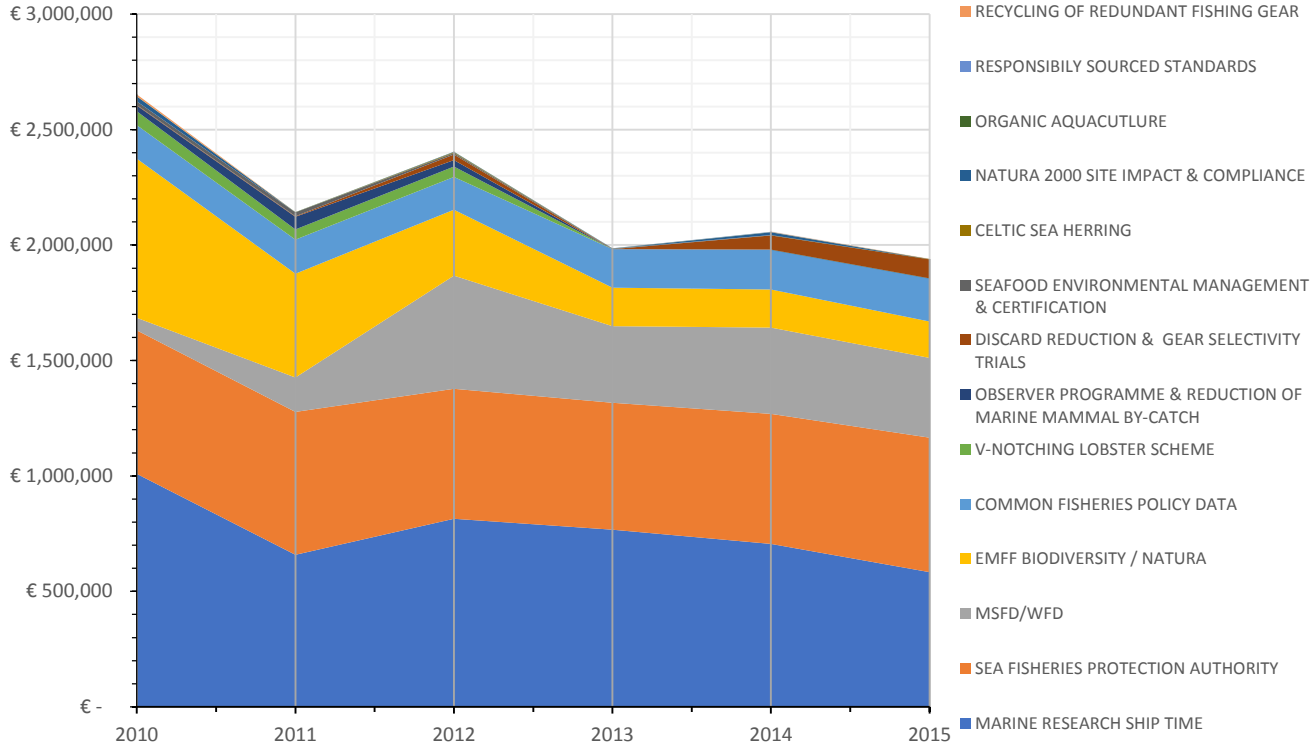
The majority of expenditure by the marine public sector agencies was found to contribute to research and survey efforts, accounting for 57% of total expenditure (Graph 19.). This expenditure derived from applied research linked to the Marine Research Ship-Time Scheme and the general survey, monitoring and mapping work undertaken by the MI through programmes such as the CFP data programme or the MSFD (See Graph 17.). Policy, planning, enforcement actions were also a key component, accounting for 42% of total biodiversity-related expenditure, linked to activities to ensure compliance with Natura 2000 and the CFP through the work of the SFPA and Marine Institute. A much smaller proportion of expenditure, less than 1%, was linked to direct work on sustainable resource management and compliance with environmental standards and codes.

Tagging marine expenditure against NBAP objectives (Graph 18.) shows that the marine agencies of DAFM contributed some €7.5 million between 2010-2015 to NBAP '*objective 2 to substantially strengthen the knowledge base for conservation'*. However, enforcement activities do not map easily on to the NBAP objectives, and for this project have been interpreted as linked to '*objective 1 to mainstream biodiversity in the decision- making process'* with a spend of just over €3.4 million between 2010-2015. Both of these

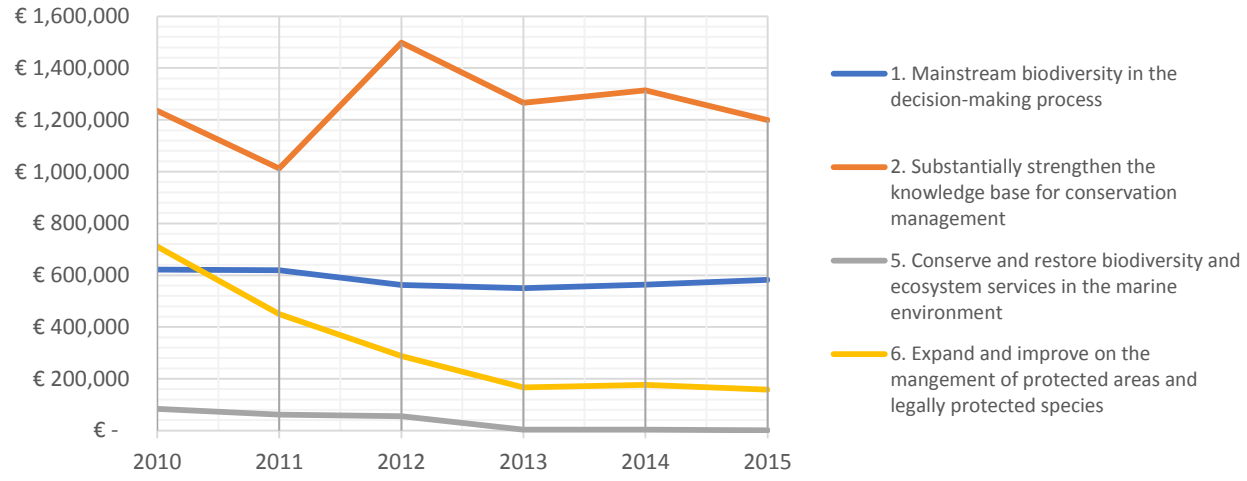
objectives receive high levels of funding (approximately 80%) through the EU EMFF, and in the past through the EFF.

Marine expenditure also contributed towards the protected areas management, NBAP objective 6, (linked to working on compliance with Natura 2000 directive) which received €1.9 million during the 6 years of the study, but shows a marked decline of 78% over the 6-year study. Finally, the marine public sector contributed some €0.2 million towards NBAP *'objective 5. The conservation and restoration of biodiversity and ecosystem services in the marine environment'* through schemes to encourage the uptake of certification, environmental management systems and accreditations, and through conservation approaches such as the lobster v-notching and management of stocks.

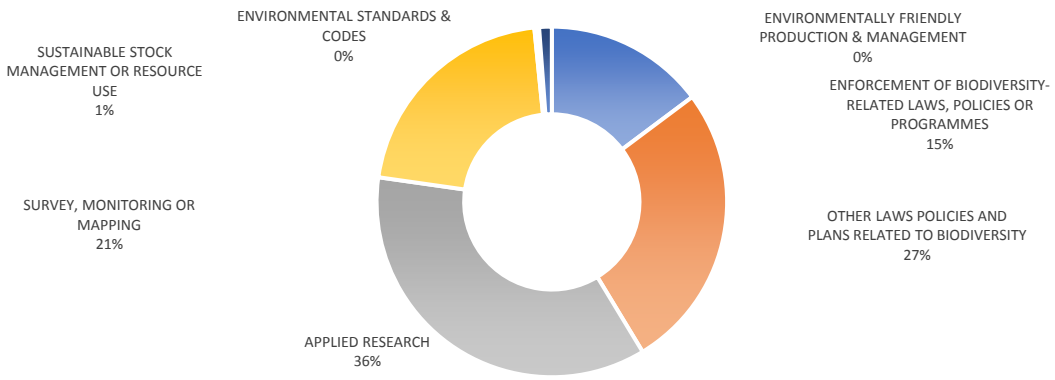
Variations in marine funding are also strongly related to the EMFF funding cycle ending in 2013, and slow initiation of expenditure under the 2014-2020 operational program.



GRAPH 17. MARINE PROGRAMMATIC EXPENDITURE ON BIODIVERSITY CONSERVATION



GRAPH 18. MARINE EXPENDITURE ON NBAP OBJECTIVES



GRAPH 19. MARINE EXPENDITURE ON CONSERVATION ACTIONS 2010-2015

7.3.5 EFFECTIVENESS OF MARINE SPENDING ON BIODIVERSITY

The majority of biodiversity-related expenditure from the marine sector was found to be related to monitoring, assessment and enforcement.

Although the monitoring and collection of data on biodiversity is a critically important aspect of conservation efforts, the effectiveness of data collection programmes can be highly dependent on how this data and research is subsequently used to inform decision-making and actions for conservation. A key component of marine expenditure was on the data collection for the CFP, alongside the enforcement of CFP policies. Although the CFP has struggled to achieve objectives to keep fish stocks at sustainable levels (Cahill 2010), the management of fish stocks is improving Some data collection and monitoring schemes would also appear to have been highly successful. For example, the Marine Mammal Observer (MMO) and By-catch programmes are accredited with providing us with much better information on the state and dynamics of marine mammal by-catch and how to mitigate these impacts.

Enforcement is another key area of conservation related spending by DAFM through the SFPA. Although there have been, shortcomings with national regulations and the frequency and intensity of control and inspections (Cahill (2010); EC, 2008), enforcement has improved since the CFP reform in 2013.. The forthcoming Landing Obligations present a new challenge for enforcement, as they require a drastic change in management and mind-sets. Stakeholder engagement will be crucial to ensure compliance and uptake.

Although only a very small proportion of expenditure was found to be going towards direct actions to conserve biodiversity, the effectiveness of these schemes has received considerable attention in academic literature. One of the longest running schemes the Lobster V-notching schemes which has been found by BIM to have resulted in a more than doubling of numbers of reported lobster and increased juvenile abundance. V-notching is an approach which has been implemented globally and widely recognised in fisheries management (e.g. Acheson et al. 2010). The effectiveness of v-notching has been discussed frequently by the Inshore Fisheries Forums which include a range of stakeholders from the industry and which receive funding from BIM to promote the sustainable management of inshore fisheries.

Schemes such as organic aquaculture have been very successful in terms of take up, with BIM reporting a high level of fish farmer certification in organic schemes and describing Ireland as a world leader in organic aquaculture. Consequently, much of the allocation budget for organic aquaculture certification now reportedly goes unspent.

Uptake is reportedly a key problem in other areas, with some schemes failing to gain sufficient participants to fully distribute funds. Fishermens' participation in the Inshore Fisheries Forums could help in this respect, along with the driver of clear legislation and financial benefits and incentives for participants. Some of the most successful schemes have been

those linked to certification and market access, such as the MCS or EU regulation.

7.3.6 Marine Future Funding Sources and Challenges

Although the marine arm of DAFM has had difficulties in accessing funding during the 2010-2015, at present there is a respectable amount of funding available until 2020. Civil servants highlighted that one of the key problems facing the marine agencies is not the availability of funding but how best to ensure uptake and interest in schemes in order to enable distribution of funding. However, biodiversity objectives are reportedly often at the bottom of the list of priorities and are seen as an option rather than a core or principle objective for funding.

For 2020 onwards there is acknowledgement of the potential need to explore new sources of funding to finance projects. In particular, Horizon 2020, Interreg and LIFE funding, have all been highlighted as potential sources. As with the agricultural sector there is concern about what Brexit and EU reform might bring for funding.

7.4 Natural Heritage

7.4.1 Natural Heritage Sector Overview

The '*protection and preservation of Ireland's heritage (built and natural) and cultural assets'* is the remit of the Department of Culture, Heritage and the Gaeltacht (DCHG) [*previously the Department of Arts, Heritage, Regional, Rural & Gaeltacht Affairs].* Natural heritage in Ireland is protected through a system of national and European legislation including European Protected Areas designations - Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) (see Box 4; Table 13), and through Natural Heritage Areas (NHA) and proposed Natural Heritage Areas (pNHA) for which designation will proceed on a phased basis in the coming years, national and local nature Reserves, alongside national parks and non-designated Ramsar sites. In total almost 10% of the country is considered to be of prime importance for nature conservation (NPWS 2016).

The main State body responsible for natural heritage is the National Parks and Wildlife Service (NPWS). The remit of the NPWS is the conservation of biodiversity, designation and management of protected areas, the implementation of national and international law and conventions related to natural heritage, and the promotion of awareness of biodiversity. The work also includes site designations, site protection, input to agri-environment schemes, implementation of the National Peatlands Strategy, licensing for hunting, oversight of CITES, zoos, falconry and legislation, finance administration, scientific survey, monitoring and advice, and research. The main expenditure divisions of the NPWS are the Parks and Reserves Unit, which manages and maintains State owned national parks and nature reserves, the Science and Biodiversity Unit, linked to conservation planning, survey, monitoring and conservation schemes, and the Peatlands Restoration and Management Unit.

Through its remit for the protection, preservation and enhancement of the national heritage, the Heritage Council also plays an important role in Irish nature conservation and halting biodiversity loss, covering natural alongside cultural and built heritage. As part of this remit, the Heritage Council operates a number of grant programmes which support conservation-related schemes such as conservation planning, restoration and other conservation projects, surveys and monitoring works undertaken by NGOs, county councils, and local organisations, along with providing support for built and cultural heritage. Furthermore, the Heritage Council also initiated the establishment of the National Biodiversity Data Centre (NBDC) in January 2007, which is jointly funded by the Heritage Council and NPWS. The Heritage Council also supplies funding for Heritage Officers and some Biodiversity Officers in local councils.

SACs	*439 [13,500km^2]*
SPAs	*154 [5700km^2]*
SCI	*413*
NHA	*148*
***pNHA**	*630*
***National Parks**	*[87,000ha]*
***Ramsar**	*45*

Table 13. Designates & Non-Designated Sites

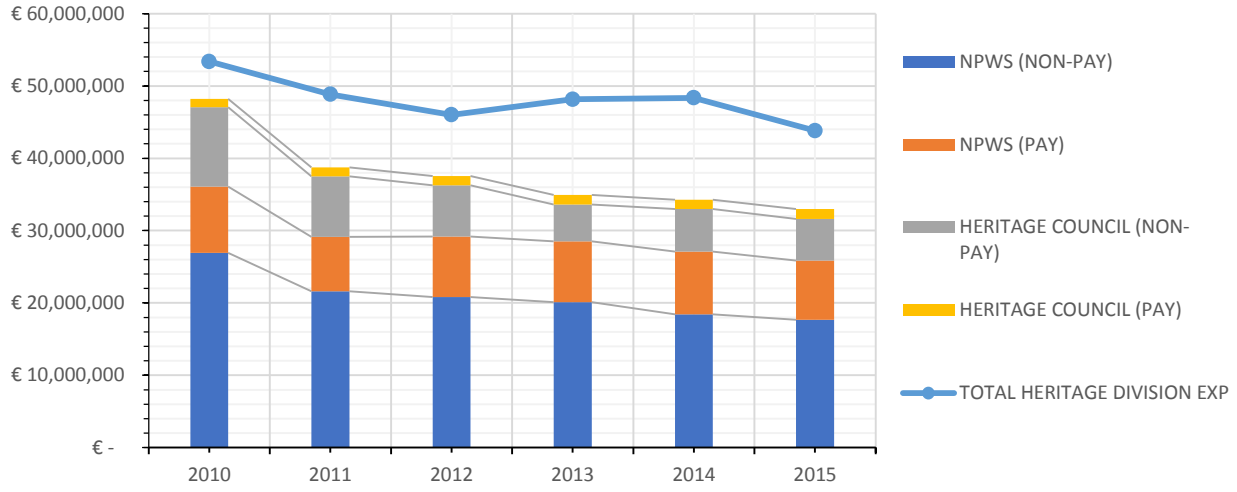
The Heritage Division of DCHG [and its predecessors] is responsible for the promotion and development of Ireland's arts, culture and heritage, including through both the Heritage Council and the NPWS. It had a total spend of €288 million between 2010 to 2015 (as shown in Graph 20.), with an average spend of €48 million per year. Expenditure by the Heritage Division has accounted for approximately 21% of the total spend by DCHG since its establishment in 2011 (Graph 21), over which period expenditure declined from approximately 23% of total spend to 19% of total DCHG spend. Of this, the NPWS Gross Voted expenditure (programme/non-pay) was €96 million over this 6-year period (34% of the total divisional spend), with an average voted spend of €16 million per year. An additional €50 million was spent on NPWS pay from 2010-2015, and €29 million was spent through the Environment Fund to run additional programmes. As shown in Graph 20, total programme expenditure for the NPWS declined by 34% between 2010-2015, from €26

million to €17.6 million, while spending on staff pay is estimated to have declined by 11%.

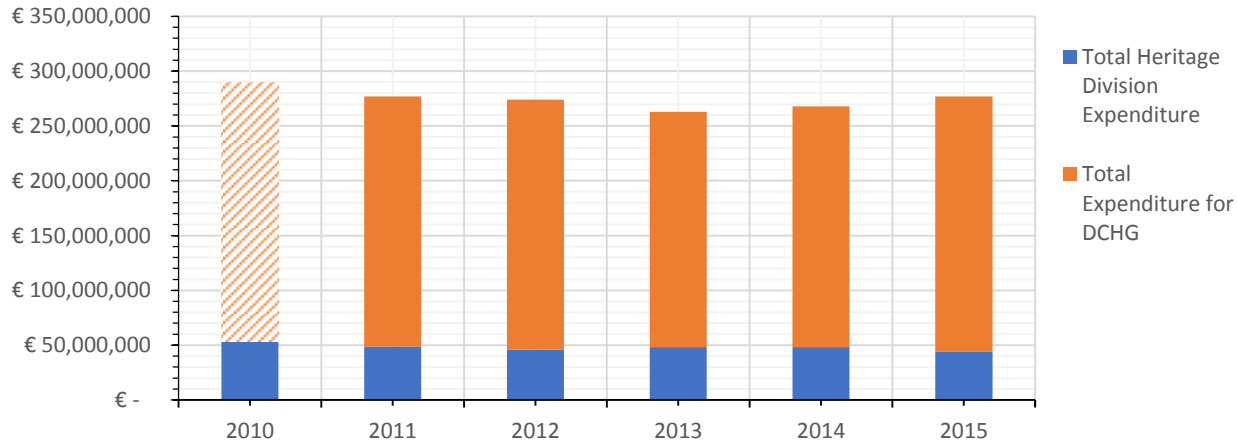
The Heritage Council's Gross Voted Expenditure was €43 million between 2010-2015 with an average spend of €7 million per year. Expenditure on pay was on average € 1.2 million per year with a total spend of €7.6 million between 2010-2015. Expenditure by the Heritage Council also showed a marked decline, dropping by -48% between 2010-2015. This decline is due to the marked reduced income from two core sources, namely core funding from the DCHG (on administration, non-capital and capital) grants declining by -66% and Lottery Funding declining by -51%.

Spending on natural heritage by both the NPWS and the Heritage Council therefore showed a marked decline over the 2010-2015 period, corresponding to wider programme of public expenditure review and reduction. By comparison, overall government spending between 2008-2015 was estimated to have declined by -6.18% (Harvey, 2015), this figure indicates that the cuts made to the NPWS and Heritage Council are approximately 5.5 times and 8 times higher than the average.

Furthermore, the Environment Fund, which is supported by levies on plastic bags and landfill, managed by the Department of Communications, Climate Action and Environment (DCCAE), includes some support for environmental awareness and protection work by the NPWS and Heritage Council. The fund showed a decline in income of an average of -5% per year, with an overall decline of -24% between 2010-2015. Although there are indications from civil servants that the fund is now stabilising, the sustainability of finance for natural heritage remains a key source of concern. Additional funding sources may need to be found to counter this long period of decline in public funding.



GRAPH 20. HERITAGE DIVISION, NPWS & HERITAGE COUNCIL EXPENDITURE



National Conservation Designations in Ireland

The main national designations are as follows:

NHAs: NHAs may be nationally significant ecosystems, protected species locations and natural history sites. They are the basic designation for wildlife in the Republic of Ireland. and were The Wildlife (Amendment) Act 2000 makes legal provision for the designation and protection of NHA. To date, 75 raised bogs have been given legal protection, covering some 23,000 hectares. These raised bogs are located mainly in the midlands. A further 73 blanket bogs, covering 37,000ha, mostly in western areas are also designated as NHAs.

Proposed NHA's (pNHA)s: Some 630 (non-statutory) pNHAs were proposed in 1995 but have not been designated or statutorily protected. Prior to designation, an area proposed as an NHA is subject to limited protection. Proposed NHAs are currently the most extensive conservation sites.

Nature Reserves: Nature Reserves are protected by Ministerial Order, and most are in State ownership.

National Parks: There are six National Parks in the Republic, and these are in State ownership. They are managed according to the IUCN criteria (International Union for the Conservation of Nature). Ireland's current National Biodiversity Plan includes an objective to publish legislation to give a legal basis for Ireland's National Parks.

Core European conservation designations in Ireland

The European Directives are significant in relation to conservation of Ireland's natural heritage. Most notable are the Birds Directive [79/409/EEC codified 2009/147/EC] and the Habitats Directive [92/43/EEC] They require the designation of SPAs and SACs which form a network of protected sites across the European Union called NATURA 2000.

SACs: These sites are protected under the legislation from significant damage to their relevant habitats and species, and are considered to be the prime areas of wildlife conservation in Ireland, being of national and European importance. The Habitats Directive lists habitats and species which must be protected, including 45 Priority Habitats, considered of particular significance. Ireland possesses 16 of these Priority Habitats.

SPAs: These sites are designated under the Birds Directive and protected under the legislation from actions that would damage their value to bird species, especially those on Annex 1 of the Directive.

GRAPH 21. DCHG AND HERITAGE DIVISION EXPENDITURE

BOX. 4 CONSERVATION DESIGNATIONS IRELAND

7.4.2 NATURAL HERITAGE SCHEMES AND GRANTS RELATED TO BIODIVERSITY CONSERVATION

NPWS SCIENTIFIC & BIODIVERSITY UNIT

NPWS CONSERVATION FARM PLAN SCHEMES

The NPWS Farm Plan Scheme, launched in 2006, was designed to assist farmers for losses incurred as a result of restrictions on farming or other activities necessitated by the designation of lands to promote biodiversity. The FPS funds the creation of a bespoke farm plans, compliance reviews and the provision of assistance for farm plan implementation. FPSs are essentially small scale bespoke agri-environment schemes as the funding provided covers the additional costs and income foregone of managing land for conservation objectives (ADSA, 2016). The NPWS FPS is largely focussed on certain protected species and habitats, including: breeding and wintering waders, geese and swan in some SPAs, corncrake, chough, natterjack toad and hen harrier. The biggest species scheme uptake was for hen harrier. The Farm Plan schemes also focussed on reducing pressure of overgrazing in specific regions, including Connemara and Mayo.

The FPS was closed in 2010 to new entrants, although it still operates on a very limited basis.

BIODIVERSITY AWARENESS

The NPWS Biodiversity Awareness scheme ended in 2014, although, awareness activities continued

to be funded through other budget streams. While the scheme was operation it provided funding for a variety of conservation activities including the publication of material on biodiversity such as booklets (the 'nature way' series and 'pollinators in Ireland'), awareness events such as Bio-Blitz, financial aid towards the production of a fifth series of the 'living the wildlife' documentary and the running costs of conferences, seminars and workshops. This funding stream was also used to contribute towards the costs of National Biodiversity Week, and this particular funding continues today. A key part of expenditure was the Notice Nature website and campaign which aimed to raise awareness of the importance of biodiversity and encourage engagement. Expenditure on the Biodiversity Awareness programme ended in 2014. However, the Heritage Council has subsequently reopened their biodiversity awareness grant scheme in 2014.

CONSERVATION PLANNING, OBJECTIVE SETTING AND MANAGEMENT PLANS

A key aspect of the Scientific and Biodiversity Unit's work is conservation management and planning. This work area involves the setting of conservation objectives for all SPAs and SACs, as required by the EU Nature Directives, along with the creation of Threat Response Plans for key vulnerable species, such as dolphin, whales, otter, hen harrier, all bat species and the kerry slug.

BURREN FARMING FOR CONSERVATION PROGRAMME ADMINISTRATION

NPWS funding for the Burren Farming for Conservation Programme (BCFP) is provided to cover the administration and office costs for the programme.

SPECIES PROTECTION

NPWS species protection programme supports reintroduction and recovery efforts for key species in Ireland, including projects such as the captive breeding of Nore pearl mussel, the reintroduction of three raptor species, the recovery of grey partridge population, the protection of the roseate tern colony at Rockabill Island, and the trial of captive breeding corncrakes. Veterinary costs such as the x-ray of injured raptors are also included under this heading.

INVASIVE SPECIES CONTROL

NPWS work on the control of Invasive Alien Species on State properties, particularly Rhododendron clearance in National Parks and Nature Reserves.

DESIGNATION SITE NOTICES AND ENFORCEMENT

Expenditure on the designation of sites including official notification of designations, and the legal fees and costs associated with appeals.

NATIONAL PARKS & RESERVE UNITS

NATIONAL PARKS RUNNING COSTS & MAINTENANCE

This NPWS National Parks investment aims to secure the conservation of iconic landscapes and other prime aspects of Ireland's natural heritage. Funding under this heading includes a wide range of activities linked to the maintenance and running costs of National Parks, from the upgrading of visitor centres, to health and safety training, the creation of trails and much more. Only certain activities have been included as relevant for biodiversity and these largely relate to the capital costs to facilitate access to natural heritage, including the maintenance of paths and board walks, fields and fencing, landscaping costs, and key maintenance costs. Other current expenditures under this programme such as utilities, catering, telephone costs, have been excluded, as have building maintenance and capital costs due to their limited relevance for biodiversity conservation.

NATURE RESERVES RUNNING COSTS & MAINTENANCE

The regional management and maintenance costs for the network of State owned nature reserves are managed by the NPWS. Only certain activities have been included as relevant for biodiversity and these largely related to the capital costs related to physical work to facilitate access as is the case for the National Parks. Current expenditures under this programme, such as utilities, catering, telephone costs, have been excluded.

HERITAGE COUNCIL GRANTS PROGRAMME

The Heritage Council provides grant aid for a wide range of small scale heritage projects, linked to built, cultural and natural heritage. There are a number of specific grant programmes such as

community projects, country heritage plans, heritage research grants, management and conservation grants, conservation led grants, landscape policy grants, biodiversity and wildlife grants policy and infrastructure grants, and education grants, to name a few. These grants are provided to NGOs, small community organisations and county councils. Over the 2010-2015 period, there were a number of changes in the grant programmes in operation, and therefore the biodiversity relevance of grants funded by the Heritage Council have been analysed on an individual grant basis.

HERITAGE INFRASTRUCTURE: HERITAGE COUNCIL HERITAGE & BIODIVERSITY OFFICERS

Heritage Council funding for Heritage Officers and Biodiversity Officer Staff in local government.

NATIONAL BIODIVERSITY DATA CENTRE

The National Biodiversity Data Centre (NBDC) operates on contract to the Heritage Council and is funded by the Council and the NPWS, and some other sources. It collects, manages and disseminates data on Ireland's biodiversity in order to document biodiversity and monitor changes over time. The NBDC main cost units include personnel, operational costs of research and publication, and the promotion of biodiversity awareness.

7.4.3 NATURAL HERITAGE SCHEMES: COEFFICIENTS & CATEGORISATIONS

The central remit of the NPWS is the conservation of biodiversity. All of the schemes described under the NPWS Scientific and Biodiversity Unit have been allocated at 100% relevance to the conservation of biodiversity, as conservation is their sole or primary aim.

However, programmes under the National Parks and Reserve Unit have more than one objective. National Parks are not designated solely on the basis of biodiversity, but are also linked to cultural heritage and act as spaces for recreation, leisure and tourism. However the protection and management afforded by these schemes does have a clear link to biodiversity, and so a 25% coefficient has been applied to National Park running costs and maintenance. It must be noted that BERs in other countries have attributed 0% to national parks based on their recreational focus. Whereas nature reserves have been allocated 100% for their primary relevance to the conservation of biodiversity.

Expenditure by the Heritage Council Grants has been assesed on an individual grant basis.

7.4.4 NATURAL HERITAGE - EXPENDITURE ON BIODIVERSITY CONSERVATION

An in-depth analysis of expenditure on natural heritage has been undertaken for the NPWS, the Heritage Council, and the NBDC.

The NPWS was the major source of expenditure on biodiversity conservation in the Heritage division of DCHG. The NPWS is estimated to have contributed €133 million towards actions for biodiversity conservation over the 2010-2015 period. This figure includes NPWS personnel costs [€50 million], which accounted for 38% of the total spend. Staff costs have been included as the overall remit of the NPWS is the conservation of biodiversity. Personnel costs represent the largest single area of expenditure by the NPWS, however they cannot be related to a single action for conservation as NPWS staff are involved in a wide range of activities for conservation from policy creation to site restoration, and therefore have not be analysed in relation to conservation actions or objectives.

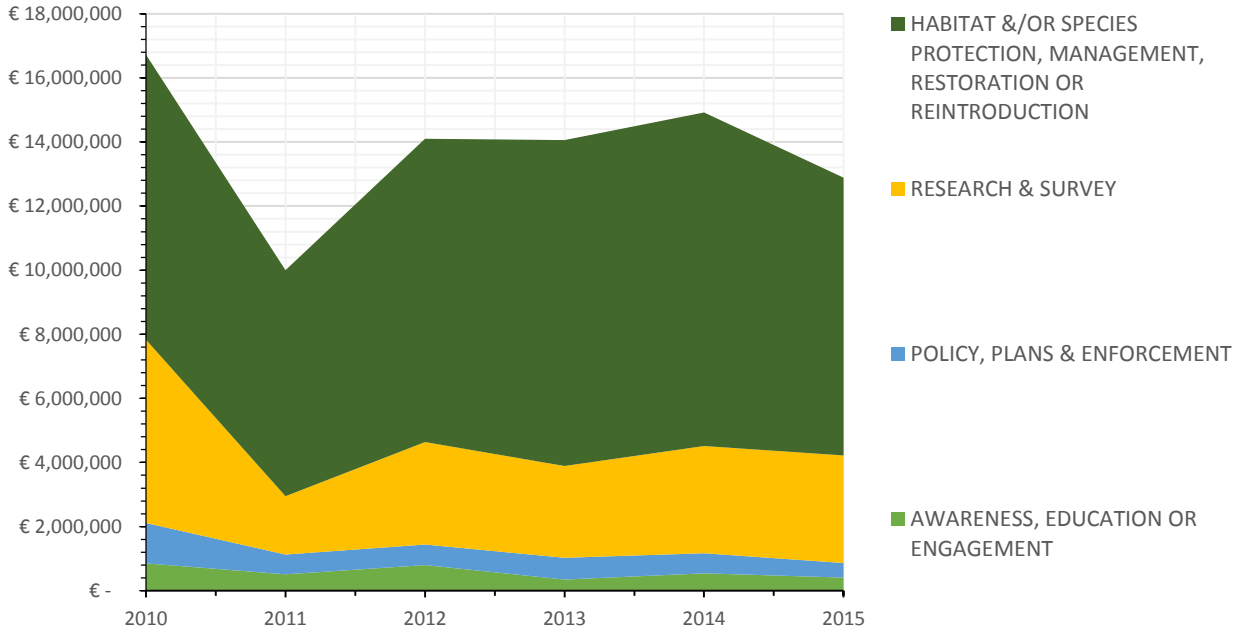
Non-pay programmatic expenditure by the NPWS was estimated to be €82.6 million over the 6-year review period (see Graph 22). Of this, 66% of this non-pay expenditure [€54.6 million] was devoted directly to habitat &/or species protection, management and restoration or recovery, through actions such as species reintroduction, agri-environment schemes or invasives removal. This classification was dominated by expenditure under two programmes the NPWS Farm Plan Scheme (47%) [€25 million] and the Cessation of Turf Cutting Scheme (37%) [€20 million].

The second largest programmatic expenditure by the NPWS was on research and survey efforts, accounting for 25% of their expenditure, some €20.3 million over 6-years (Graph 22.). For the NPWS this expenditure was used to complete

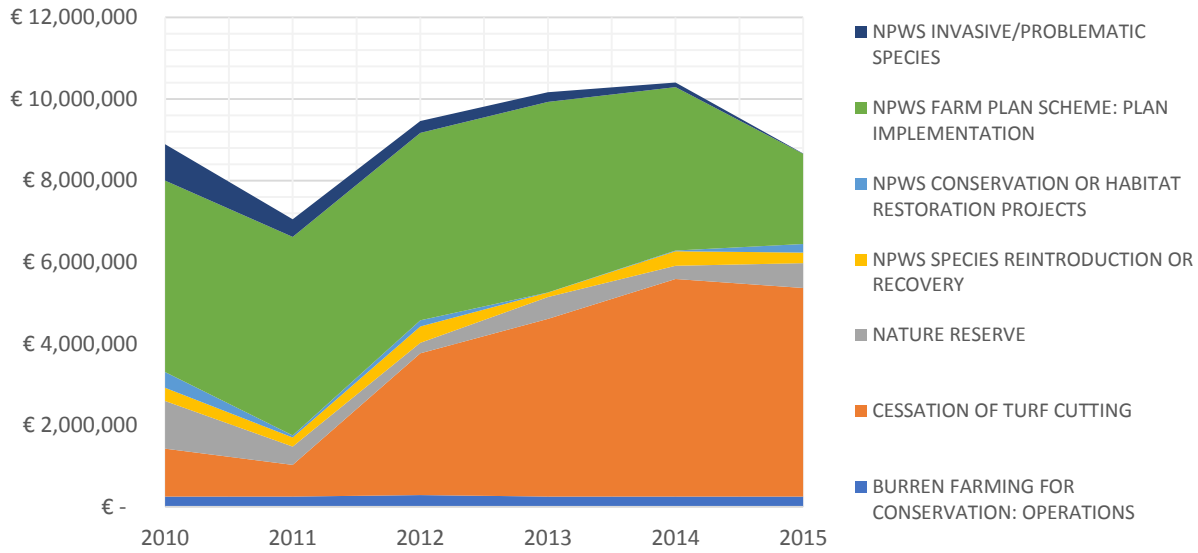
reporting requirements for the EU Nature Directives including surveying and monitoring for protected species and habitats. A much smaller proportion of NPWS expenditure was devoted to increasing awareness of biodiversity, some €3.4 million between 2010-2015, through publications, funding for engagement events, and conferences. Policy and enforcement work were also funded, accounting for €4.27 million, including enforcement notices and legal fees linked to designated sites.

Translating these figures into the NBAP objectives, shows that NPWS programmatic expenditure (non-pay) is largely focused on NBAP '*objective 6 to expand and improve protected areas'* accounting for 68% (€56 million) of expenditure. NBAP *'objective 2 to increase knowledge'* also received significant funding accounting for 25% of expenditure (€20.3 million). Just 4% is linked to '*objective 4. Conservation and restoration of biodiversity in the wider countryside',* and 3% to '*objective 3 to increase awareness'.*

Variations in expenditure were largely linked to growing amounts spent under the Cessation of Turf Cutting Scheme towards 2015, and a reduction in spending towards 2015 on the Farm Plan Scheme, although some of the latter schemes are now being financed under DAFM's Locally-Led AES.



GRAPH 22. NPWS EXPENDITURE BY CONSERVATION ACTION



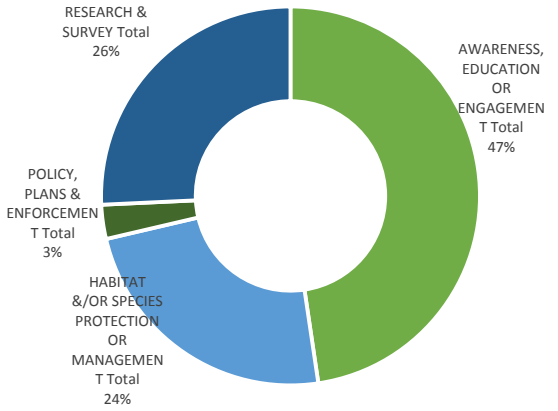
GRAPH 23. NPWS HABITAT & SPECIES PROTECTION & RESTORATION PROGRAMMES

Alongside NPWS expenditure, the Heritage Council is estimated to have contributed €3.1 million towards the conservation of biodiversity, with an average yearly expenditure of €530,000 on natural heritage. Out of a total spend of €3.1 million, 66% of this expenditure between 2010-2015 was made on grants and 34% on the salaries of the heritage officers and biodiversity officers. As shown in Graphs 20 & 25, there was an overall decline in expenditure on biodiversity conservation by the Heritage Council between 2010 and 2015 of -53%. This decline reflects wider trends in Heritage Council budget, which was reduced by some -48% over the same period, and suggests that expenditure on biodiversity conservation has been particularly heavily hit.

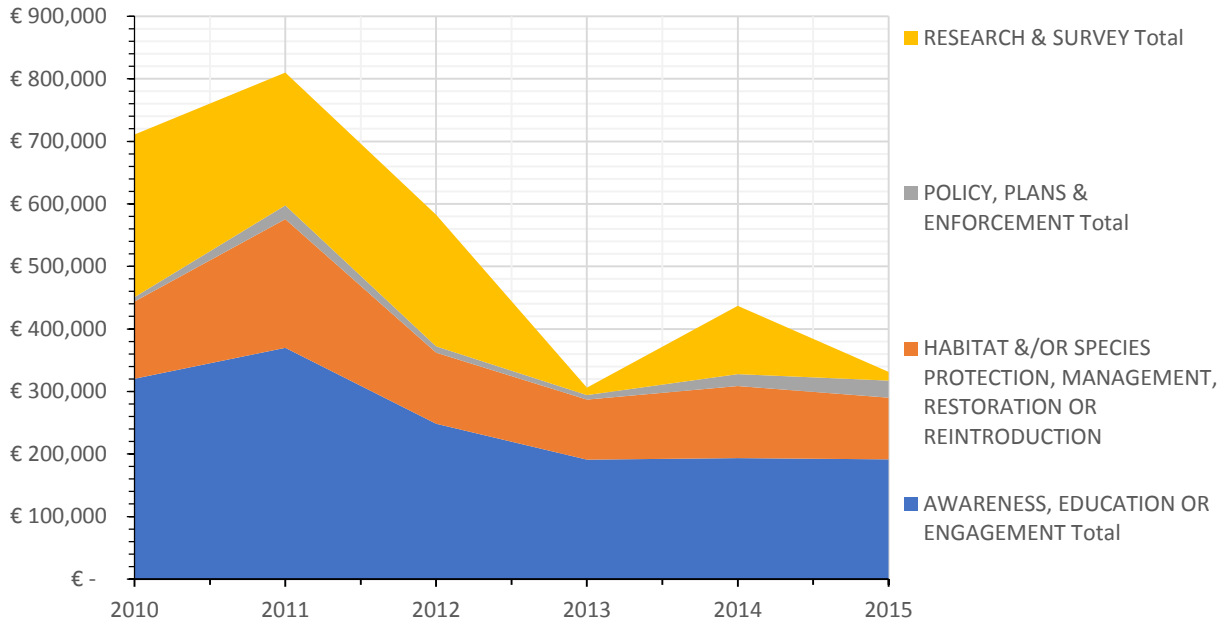
During the 2010-2015 period, the main conservation actions which the Heritage Council funded are shown in Graph 22. The largest conservation actions funded was awareness, education and engagement activities which received around €1.5 million between 2010-2015. It should be noted that staff salaries for biodiversity officers and heritage officers are counted under this action and accounts for 71% of this expenditure. The Heritage Council also contributed between €700-800,000 between 2010-2015 respectively to research and survey programmes and habitats and species protection.

Although grants for research and surveys directly funded by the Heritage Council have shown a particularly steep decline of -95% comparing spending in 2010 and 2015 (Graph 25). In addition to their own expenditure, both the Heritage Council and the NPWS financed the NBDC work on research and survey work on biodiversity to the sum of €3.6 million.

Total estimated expenditure on natural heritage by the Heritage Council, NPWS and NBDC amounted to €130 million with an average aggregate spend of €23 million per year (95% NPWS spend). Out of this figure personnel costs accounted for at least 38%.



GRAPH 24. HERITAGE COUNCIL EXPENDITURE ON BIODIVERSITY CONSERVATION (2010-2015)



GRAPH. 25 HERITAGE COUNCIL EXPENDITURE ON BIODIVERSITY CONSERVATION (2010-2015)

7.4.5 EFFECTIVENESS OF NATURAL HERITAGE SPENDING ON BIODIVERSITY

Expenditure by the NPWS between 2010-2015 was dominated by two programmes: the Cessation of Turf Cutting Scheme and the Farm Plan Scheme.

The Cessation of Turf Cutting Compensation scheme (CTCCS) is designed to protect the integrity of raised bog SACs from domestic turf cutting. The scheme compensates qualifying individuals who were sourcing domestic turf from SAC sites, but are now prohibited from doing so. In 2017, approximately 2,000 applicants have applied for compensation under the CTCCS scheme, and €20.2 million was estimated to have been paid out by the NPWS through the CTCCS between 2010 and 2015.

However, the CTCCS has reportedly suffered from a range of issues. Renou-Wilson et al. (2011) emphasise that sustained cutting by even a small minority of rights holders considerably reduces the effectiveness of the whole scheme by continuing to impair the hydrological integrity of SAC sites. They also highlight the reluctance of some turbary rights owners to accept compensation due to a range of complex social factors, from the loss of ancestral rights to a lack of trust in the scheme (Peatlands Forum 2012). Finally, Renou-Wilson et al. (2011) question the cost-effectiveness of the scheme has and suggest that acquisition would be a better value for money option than compensation.

Unless actively restored, the cessation of cutting alone is unlikely to achieve biodiversity conservation targets as biodiversity losses will continue from both domestically and industrially cut peatlands. The National Peatland Strategy (DAHG, 2015) acknowledged these problems and proposed consultation with the Peatland Forum (representing peatland stakeholders, including turbary rights owners) to identify a way forward for the protection of designated sites. A NHA Review in 2014 had proposed that 46 existing peatland NHAs be de-designated due to the level of peat cutting, the costs of compensation and the poor prospect of rehabilitation, and determined instead that 25 other peatlands with lower private peat cutting pressure and more potential for rehabilitation should be designated instead (DAHG, 2014). These proposed changes to NHA designations still need to be followed up by revised legislation. For SACs, the new National Raised Bog SACs Management Plan (2017-2022) complements the NHA Review by setting out a roadmap for the long-term management, rewetting and restoration of the best examples of protected raised bogs in Ireland.

The other major area of biodiversity expenditure for the NPWS is the **Farm Plan Scheme**, accounting for some 20% of expenditure over the study period. The Farm Plan Scheme (FPS) has been employed by the NPWS to target certain protected or vulnerable species or damaging activities. ADAS (2016) highlights that the FPS is particularly linked to species which were the subject of the European Court of Justice cases brought against Ireland in relation to implementation of the Birds Directive (DAHG 2015).

The targeted and bespoke nature of the FPS has received positive feedback from participants, and commendations for allowing farmers flexibility rather than enforcing a prescribed set of measures and taking a tailored approach to benefit different species. Some successes in terms of biodiversity increases have been attributed to the FPS, and the ADAS (2016) report highlights the increased breeding productivity of chough. Although, evidence of biodiversity improvement linked to the FPS is not extensive, uptake has been high with some 685 plans created since the schemes inception (Bleasdale & O'Donoghue, 2015).

One marker of the success of the FPS is that many of the FPS measures developed have subsequently been taken on by DAFM and subsumed within Pillar II funding. The FPS has continued to trial novel approaches to farming for environmental benefits, such as very specific measures to farm plots for corncrake conservation, and the FPS approach is now featuring in the DAFM forthcoming Locally-Led Agri-Environment Schemes (LLEAS). Another key benefit of the scheme is that farmer participation has been linked to positive change in attitudes towards SPA designations, and the FPS has been linked to not only desirable biodiversity and socio-economic outcomes (ADAS, 2016).

Alongside programmatic expenditure on the CTCCS and the FPS, another key area of expenditure for the NPWS are the running costs and maintenance costs associated with nature reserves and national parks. Protecting priority areas for biodiversity has always been a fundamental strategy for the conservation of biodiversity, and these safeguarded areas and species have also been found to provide substantial benefits to human well-being (Larsen et al. 2012). Ireland's networks of National Parks and nature reserves play a key role in the conservation of biodiversity, and are essential to meeting international agreed goals to slow biodiversity loss and prevent species extinction loss (McCarthy, D.P. et al. 2012; Le Saout et al. 2013). Public access to these sites is also critical to promoting awareness and enhancing value of Ireland's natural heritage and biodiversity.

The last two decades has also seen the popularisation of landscape-scale conservation strategies (Hodder et al. 2014; Gambino & Peano, 2015; Sayer 2009) and the advent of the ecosystem-approach in conservation debates and practice (Tallis, 2009).

> *Landscape scale conservation planning looks beyond protected areas and discrete wildlife sites, to wider natural processes functioning across landscapes-landscapes to perform multiple functions.*

Both landscape-scale conservation and the ecosystem approach advocate the need to conserve dynamic, multi-scale, ecological patterns, processes and natural systems, to achieve functional and sustainable biodiversity conservation, alongside protected areas and species. The adoption of such an interdisciplinary and large-scale perspective makes them complex and a challenge to achieve. However, they have huge potential as strategies to significantly restore ecological health and secure long term environmental sustainability.

However, the ability of both the NPWS and the Heritage Council to fulfil their roles and functions has been reduced due to the programme of expenditure cuts over the last few years which has negatively affected their ability to deliver on conservation objectives. At the time of writing, there was no natural heritage officer in the Heritage Council, nor was there anyone on the Board of the Heritage Council with a particular specialism in biodiversity; and their role as an independent voice for nature conservation has consequently reduced drastically. The Heritage Council's lack of regulatory remit means that it is in a unique position to advocate for natural heritage policy and act as a bridge between

different stakeholders and government departments. However, the lack of natural heritage staff and expertise means that they struggle to fulfil this potential.

7.4.6 Natural Heritage Future Funding Sources and Challenges

The programme of funding cuts since the 2008-2011 economic crisis has impacted on the capacity of both the NPWS and the Heritage Council . As a result, both of these organisations have been subject to tough choices regarding the areas they are able to finance. There is always far more to do than funds permit, although the degree of funding cuts between 2010-2015 brings into question whether the NPWS has the resources to carry out even its core legal obligations under the EU Directives. This trend may be beginning to change, with civil servants from the NPWS reporting (*pers com*) that budgets are now stabilising.

A number of areas were highlighted by participants during the data collection as potential sources of additional financing for the natural heritage sector. One was the removal of restrictions placed on National Parks to keep the money they gain through tourism and which could otherwise be earmarked for conservation purposes. Others include efforts to further embrace the co-benefits of conservation and partnering with private sector organisations, such as health organisations to focus on the mental and physical benefits of natural environments, or climate change initiatives and carbon credits, or the use of nature based solution for hazard management.

Consultees have mentioned that the simple mobilisation of additional funding is not necessarily the solution to the financial issues faced by the Natural Heritage sector. Many participants traced financial problems back to with the problems with the perception of nature conservation initiatives. To ensure long term and suitable finance a key obstacle to overcome may be this conflict between communities and nature conservation agendas. Engagement with local communities, improving relationships and changing public perceptions could be as vital to success as the mobilisation of additional finance. A key measure to achieve this local engagement could be the further roll out of the Heritage Council biodiversity officers scheme to every Local Authority to try to cultivate further local community support. For example, as part of the programme of conservation measures of the National Raised Bog SACs management plan 2017-2022, a raised bog community engagement, education and awareness programme is now being proposed. Community initiatives such as Tidy Towns have also begun to embrace and incorporate biodiversity objectives and could be a platform for further community involvement in nature conservation efforts.

7.5 Water-Ways & Freshwater Fisheries

7.5.1 Freshwater Resources and Water-Ways Sector Overview

Ireland has been described as a '*hydrological mosaic*' with an extensive freshwater resource and network of waterways (Feeley et al. 2017), including over 12,200 lakes, 74,000km of river network, and wide-ranging areas of wetland traversing the Irish landscape. Freshwater resources are used for a number of purposes, including water abstraction for drinking and for agriculture and industry), fish farming, and tourism and recreation through angling and other water based pursuits. Feeley et al (2017) and Bullock & O'Shea (2016) find that 83% of Ireland's population receive their drinking water through Irish Water, the Irish water utility, with just 17% relying on private suppliers or wells. Nationally, 57% of rivers and 46% of lakes are reported to be of good status, although only marginal improvements have been recorded and there is a continuing decline if the proportion of high quality waterways (EPA 2017).

The management of freshwater resources, water-ways and freshwater fisheries in Ireland is the remit of several different organisations:

Environmental Protection Agency (EPA)	Independent public body charged with monitoring the health of the Irish environment and protecting environmental quality, including the governance and oversight of the Water Framework Directive.
Office of Public Works (OPW)	Lead State body of for the coordination and management of flood risk in Ireland.
Inland Fisheries Ireland	Fisheries board charged with the management protection, conservation, development and improvement of inland fisheries.
Water-Ways Ireland	Cross-border body which manages, maintains and develops inland navigable waterways.
Irish Water	Domestic and non-domestic water supply and waste water services.
The Lough's Agency	Cross-border body which conserves, manages, promoted and develops fisheries and marine resources.

Freshwater resources in Ireland are shaped by a number of key policies, chiefly:

- the EU 'Water Framework Directive',
- the EU 'Floods Directive',
- the Urban Waste Water Treatment Directive,
- the Drinking Water Directive.

Of these, the Water Framework Directive (WFD) is one of the most influential.

The WFD aims to achieve sustainable management of freshwater resources by requiring EU member States to take a holistic catchment based approach to managing their rivers, lakes, groundwater, estuaries and coastal waster. EU member States are required to ensure all waters achieve good ecological status (originally targeted for 2015). The WFD is managed by the DHPCLG and is within the remit of the EPA.

The Floods Directive requires EU member States assess and manage their flood risk, through a programme of assessment and plans including a preliminary flood risk assessment, prepare flood hazards and risk maps, and prepare flood risk management plans. The OPW is the national competent authority for the implementation of the Floods Directive in the Ireland, and responsible waterways and drainage network.

Both the EPA and OPW also have a range of other responsibilities alongside freshwater resources, with the EPA covering other aspects of environmental quality and protection, and the OPW is also responsible for public estate management and heritage sites.

7.5.2 Water-Ways and Freshwater Fisheries Schemes related to Biodiversity Conservation

The OPW, IFI, Waterways Ireland and the Loughs Agency have a number of schemes and programmes affecting waterways and freshwater fisheries management which are relevant to biodiversity conservation.

Office of Public Works

Environmental Rivers Enhancement Programme

The Environment Rivers Enhancement Programme (EREP) is designed to improve the ecology of drained rivers in Ireland through re-naturalisation. The EREP commenced in 2008, funded by the OPW and coordinated by the IFI, to strategically align OPW's obligations under the WFD and the National Biodiversity Plan. The programme consists of a capital enhancement programme and technical design programme. The capital programme involves on-site material and labour for ecological enhancement with the aim to enhance or increase the diversity of physical and flow regimes to benefit biodiversity. The technical design programme undertakes the design, supervision and scientific monitoring of the EREP by the IFI, carrying out pre/post monitoring works and recording improvements to establish if the restoration works were successful.

OPW Invasive Species Control

Invasive species control work linked to arterial drainage maintenance operations, largely for Japanese knotweed and Himalayan balsam. Previous projects have also included control of *Lagarosiphon major*.

SAC Site Restoration

Baseline ecological / hydrological studies for a pilot Fen SAC site. This is an action in the National Peatlands Strategy for which the pilot site is Tory Hill SAC, Co. Limerick. This objective is conservation of the Fen habitat, and so is directly biodiversity related. This project will continue in 2017 moving towards developing conservation measures and considering impacts on landowners

Inland Fisheries Ireland (IFI)

IFI was formed in 2010 following the amalgamation of the former Central Fisheries Board with the Regional Fisheries Boards. The IFI principal function relates to support and advice on the management and protection of inland fisheries and sea angling, and therefore most of the activities of the IFI Ireland can be linked to biodiversity. However, a significant element of this expenditure is linked directly and indirectly towards angling activity, for instance the IFI provides grants for facilities such as fishing stands or activities such as sponsorship of angling competition. The following schemes were considered relevant for the conservation of biodiversity:

Salmon Conservation Fund

Revenue for the Salmon Conservation Fund is generated from the sale of salmon angling and commercial fishing licences. The revenue generated from the Salmon Conservation Fund is reinvested to promote the recovery of salmon stocks and habitats. Funding is prioritised for those rivers in most need of rehabilitation. Projects funded include the creation and raking of spawning beds, the stabilisation of eroded banks, creation of new pools, improve spawning habitat, riparian zone improvement.

Invasive Species & Bio-Security Control

Direct management activities to counter non-native invasive species, including actions to control *Lagarosiphon major*, Asian clam, Japanese and bohemian knotweed, giant hogweed, Himalayan balsam, New Zealand pigmy-weed, and the pike control programme intended to protect native trout population. This programme also includes the development of biosecurity protocol and best practice species control guidelines

IFI Habitat & Species Protection

IFI efforts to restore wild fish species habitats & species, outside of the Salmon Conservation Programme.

IFI National Research Survey Programme

The National Research Survey Programme (NRSP) of which the largest component is listed under the heading of WFD as spending to monitor the health of rivers and lakes from the perspective of the fish species present. Scientific studies are also associated with the NRSP, including, currently, one on Brown Trout. The IFI is involved in various research initiatives including, currently, the EPA-funded *ESManage* project which is examining the impact that water quality has on the freshwater ecosystem, including salmon and trout populations. The EU *Amber* project is investigating the impact of removing river barriers, such as weirs, which could potentially return a river to its

more natural condition. In addition, an IRC funded PhD on conservation of endangered fish species is directly examining a biodiversity issue.

IFI Monitoring of Freshwater Species

Fish population monitoring efforts, including fulfilling monitoring for the Habitats Directive and Red Data Book Programme. The programme includes work to conduct surveys of local or threatened species such as lamprey and charr, the National Bass Programme/ Bass Conservation estuary surveys, the National Eel Management Plan (monitoring eel recruitment) and National Salmonid monitoring, WFD, Habitat Directive, Wild Salmon and Sea Trout Management.

IFI Policy Development

The IFI is seeking government funding to support a National Strategy for Angling Development (NSAD) that includes fish conservation and habitat enhancement, but especially facilities to promote angling. Policy Development (including GIS, Marine Species, NSAD and SRQ data).

IFI Operational & Projects/ IFI Administration

The conservation of fisheries is central remit is the conservation of freshwater biodiversity for recreational and biodiversity benefits. The operational project and administration cost for the IFI can also be considered of relevance to biodiversity cost, as these include efforts to enable habitat conservation, survey, monitoring efforts to take place. Enforcement represents a significant element of IFI expenditure and includes the checking of licenses and anti-poaching activity. Fish patrols account for 155,000 man hours per year which would account for over €6m per year in personnel costs alone. In the past, these patrols would have been looked upon as protecting an angling resource, but with salmon stocks falling they now service to protect biodiversity, especially of the multi-season fish

The Loughs Agency

Conservation & Protection Programme

The Loughs Agency assists with the conservation and protection of fish stocks. This includes fish kill and pollution incident investigation, reporting and investigation of illegal fishing, science projects (e.g. the use of genetics to manage wild salmon populations), the gathering of data to monitor salmon or for community education or population surveys. The Loughs Agency is a cross border agency, and therefore the assessment of its expenditure is restricted to a 50% contribution.

EPA

The majority of EPA expenditure has been discussed within the 'Environmental Protection' section as it considered to be relevant to more general expenditure and environmental quality improvement for social benefits. An exception is the Integrated Catchment Management Programme.

Integrated Catchment Management Programme

An Integrated Catchment Management approach is increasingly seen internationally as essential to successful water management and a key part of the WFD objectives to enable the sustainable use of our water resources. The EPA Catchment Science and Management unit has been established to develop effective integrated catchment management in Ireland. The main purpose of the Unit is to protect and improve water resources, while ensuring that any water body remains productive for the communities that depend on it.

7.5.3 Water-Ways and Freshwater Fisheries: Coefficients and Categorisation

Many of the IFI, EPA, and OPW programmes linked to the management of water-ways and freshwater species, such as the control of invasive or the re-naturalisation of rivers and the salmon conservation works, are considered directly relevant to biodiversity conservation and therefore the full expenditure for these programmes (100%) has been included.

Some notable exceptions include the IFI work on policy development, operational programmes and staff administration costs. A 50% coefficient has been applied for these programmes to account for the dual focus of the IFI's work on angling and the conservation of fish populations. The Loughs Agency has been given a 25% marker to account its cross-border focus and split focus on angling and fish conservation.

Programme	Categorisation	AICHI	NBAP	%
EREP	Protection &/Or Restoration	6	4	100
OPW SAC SITE WORKS	Policy, Plans & Enforcement	11	6	100
INVASIVE SPECIES PROGRAMME (OPW)	Protection &/Or Restoration	9	4	100
LOUGHS AGENCY CONSERVATION & PROTECTION PROGRAMME	Protection &/Or Restoration	6	4	25
SALMON CONSERVATION FUND	Protection &/Or Restoration	5	4	100
INVASIVE SPECIES CONTROL (IFI)	Protection &/Or Restoration	9	4	100
HABITAT & SPECIES PROTECTION IFI	Protection &/Or Restoration	15	4	100
IFI FISHERIES RESEARCH	Research & Survey	19	2	100
IFI MONITORING OF FRESHWATER SPECIES	Research & Survey	19	2	100
IFI POLICY DEVELOPMENT	Policy, Plans & Enforcement	2	1	75
IFI OPERATIONAL & PROJECTS	Protection &/Or Restoration	15	4	50
IFI ADMINSTRATION	Protection &/Or Restoration	15	4	50
INTEGRATED CATCHMENT MANAGEMENT PROGRAMME	Policy, Plans & Enforcement	2	1	25

TABLE 14 WATER-WAYS & FRESHWATER COEFFICIENTS & CATEGORIES

7.5.4 WATER-WAYS AND FRESHWATER FISHERIES - EXPENDITURE ON BIODIVERSITY

Collectively, **the IFI, OPW, Loughs Agency and EPA contributed an estimated €101.5 million to biodiversity conservation between 2010-2015 through the management of waterways and freshwater fisheries**, equivalent to an average of €16.9 million per year.

€ M	2010	2011	2012	2013	2014	2015
EPA	€	€	€	€	€ 0.4	€ 0.8
IFI	€16.1	€ 15.4	€ 17.9	€16.1	€16.3	€ 15.7
LA	€ 0.35	€ 0.27	€ 0.18	€ 0.33	€ 0.31	
OPW	€ 0.47	€ 0.47	€ 0.47	€ 0.47	€ 0.47	€ 0.26
Total	**€ 16.6**	**€ 15.8**	**€ 18.4**	**€ 16.5**	**€ 17.2**	**€ 16.7**

TABLE 15. FRESHWATER AND WATERWAYS EXPENDITURE ON BIODIVERSITY

The vast majority, **96%, of this expenditure was derived from the IFI,** as the main agency focused on the conservation and management of freshwater biodiversity. An additional 3% was provided through OPW schemes and 1% from the EPA catchment management scheme (Table 15.).

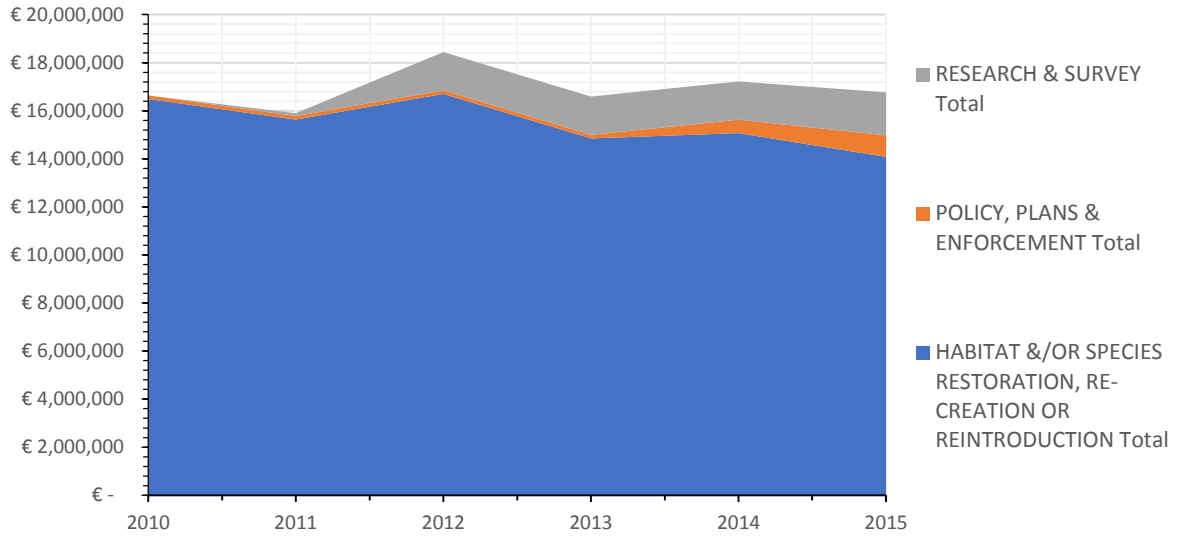
Consequently, the main focus of this section is on assessing IFI expenditure. The majority of IFI expenditure[3], €92.8million, contributes to the conservation of biodiversity directly through habitat & or species protection efforts (Graph 26).

However, 82% of this expenditure is the operational costs of the IFI (€75.8 million) with 10% spent on staff costs (€9.4 million). This includes relevant activities such as fisheries protection but only 8% is linked to activities directly contributing to habitat & or species protection or restoration, such as site/area restoration (4% - €3.1 million), invasive species and management (2% - €1.5 million), and species recovery efforts (€2.5 million).

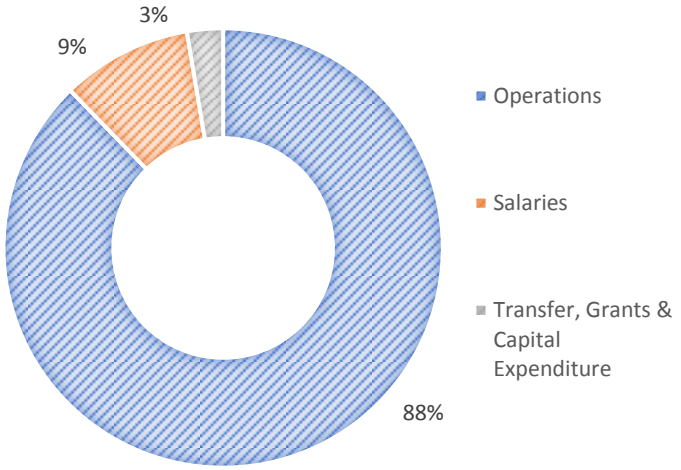
The remaining 6% of total expenditure is linked to policy, planning and enforcement (2% - €2.1 million) through efforts to create biodiversity action plans by the OPW and IFI, EPA Integrated Catchment Management, and applied research and survey and species monitoring efforts (4%) (€6.6 million).

In relation to the NBAP objectives, these government agencies were estimated to provide €92.8 million in support of NBAP '*objective 4. To conserve biodiversity in the wider countryside'* between 2010-2015, €7.5 towards '*objective 2 to increase knowledge base for biodiversity conservation'*, and €1.2 million towards '*objective 1 to mainstreaming biodiversity conservation'*.

[3] Including OPW where joint expenditure.



GRAPH 26. FRESHWATER FISHERIES & WATER-WAYS EXPENDITURE ON CONSERVATION ACTIONS



GRAPH 27. IFI EXPENSE UNITS

7.5.5 EFFECTIVENESS OF WATER-WAYS AND FRESHWATER FISHERIES SPENDING ON BIODIVERSITY

Freshwater and estuarine fish stocks managed by the IFI are threatened from numerous quarters including invasive species, poaching and damage to habitat and ecosystems. IFI is actively involved in efforts to mitigate these threats, but has struggled to contain some invasive species, including the spread of zebra mussels to all but a handful of near pristine lakes in the West. Rather little finance is left over for habitat improvement, for example of salmon spawning beds, although the Salmon Conservation Fund does redistribute license fee income to support rehabilitation by local clubs. Some habitat restoration activities are also supported under EU LIFE. Although important, some of these activities could be described as fire-fighting in the face of major exogenous threats such as continuing pollution of water from diffuse agricultural sources and the impact of climate change on migrating salmon.

In some areas, IFI's activities are a response to the adverse impacts of other sectors or Government Departments or Agencies. In the past, this would have included flood management works by the OPW, although coordination between the agencies has improved through the EREP programme. Conflicts have also arisen with agriculture and with municipal and domestic wastewater management due to the impact of nutrient inflows into rivers

and lakes. Impacts from these sectors are moderating, although the reduction in poor status waters has been accompanied by a continuing decline in the proportion of the high status waters of most value to salmonid species. Stark evidence of problems still regularly surface as fish kill incidents, although the proportion due to distinct causes such as agricultural or industrial discharges appears to have diminished (EPA, 2017).

One of the main areas of continuing conflict is with the DAFM marine division over the issue of lice infection from coastal salmon farms. Although efforts are being made to improve the sustainability of aquaculture, this is an area in which one area of State spending is arguably having a biodiversity impact that another area of State spending is called upon to mitigate. Government proposals to expand aquaculture present a persistent issue in this regard.

On-going research is also contributing to a better understanding of the relationship of recreation, and commercial, fish species with the ecosystem or wider biodiversity. There are opportunities for synergy between this research and the expenditure of other departments or agencies (e.g. OPW, EPA, Agriculture, Forestry and Irish Water) in river and catchment management.

7.5.6 Water-Ways and Freshwater Fisheries Future Funding Sources and Challenges

Few new source of finance for water-ways and inland fisheries were highlighted during the data collection. However, a number of references were made to new funds linked to the invasive species control, incentivised by the EU Regulations 1143/2014. The EPA also reported that they were working to join new networks, such as the *biodiversa* network and the *Belmont Forum*, which could potentially enable access to new source of finance in the future. There is also potential for additional co-benefit for biodiversity through the use of innovative nature-based solutions for water management and purification, such as constructed wetlands. Finally, the new Local Authority Waters and Communities Officers could be new platforms for increased local actions for both water and freshwater biodiversity at the catchment scale.

7.6 Local Government

7.6.1 Local Government Overview

Local government in Ireland is exercised by 31 Local Authorities, termed county, city or city and county councils, operating within specific geographic areas referred to as local government areas. These local authorities are the principal local administrative and decision-making units, they are multi-purpose bodies responsible for planning, traffic and transport infrastructure, environmental protection and sanitary services, public safety, recreation, amenities, community infrastructure, as well as supporting economic development and enterprise at a local level. The operation and development of local authorities is overseen by the Department of Housing, Planning and Local Government (DHPLG), who provide the policy framework within which local authorities work and deliver services to the communities that they represent and serve.

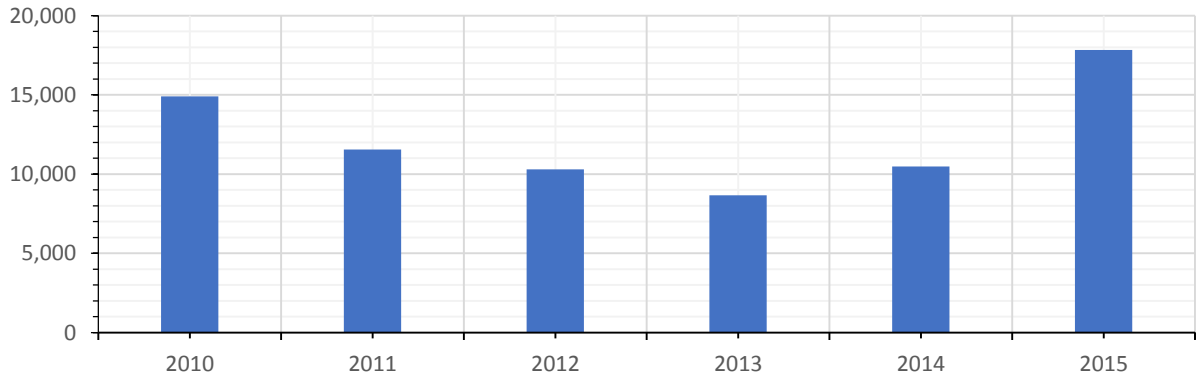
Local government is financed through a variety of sources. Income for local government expenditure derives from:

- **Service charges** e.g. commercial water charges, waste charges, parking charges and planning application fees, (24% of income in 2011).
- **Rates** or levies on the occupier of commercial property, (28% of income in 2011).
- **State grants** paid to local authorities in respect to specific services e.g. higher education, road maintenance grants, (26% of income in 2011).
- The **Local Government Fund** (LGF) financed by the proceeds of motor tax, local property tax and an exchequer contribution, providing local authorities with the finance for general discretionary funding and transfers to transport, Irish water, etc. (14% of income in 2011).

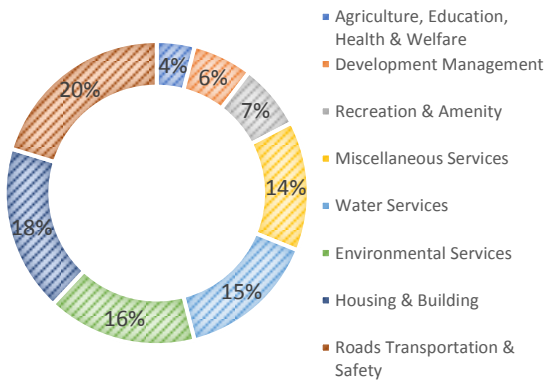
Additional funding sources can include community funds, the environment fund and the rural development funding.

Local government in Ireland has an annual average Gross Voted Expenditure of €4.4 billion, and between 2010-2015 total gross voted expenditure was approximately €26 billion (Graph 28.). Each local authority is able to determine its own spending priorities in the context of the annual budgetary process, having regard to both locally identified needs and available resources. Consequently, expenditure varies between local authorities due not only to geographical remit, population size but also due to spending priorities.

The main components of local government expenditure (Graph 29.) include: road, transport and safety; housing and building; environmental services (landfill, waste etc.); recreation and amenity; land use planning; education; health and welfare. Local authorities also distribute LEADER and Local Agenda Environmental Partnership 21 funding. Between 2011-2015 local government expenditure declined by -18%, corresponding with a -27% decline in income received by local authorities from Central Government Funds.



Graph 28. Local Government Expenditure 2010-2015



GRAPH 29. LOCAL GOVERNMENT EXPENDITURE AREAS

7.6.2 LOCAL AUTHORITY SCHEMES RELATED TO BIODIVERSITY CONSERVATION

Local authorities are multi-purpose bodies which undertake a range of activities relevant to environmental protection and awareness, including environmental services, water services, recreation and amenity works. However, specific programmes related to biodiversity conservation are less frequent. The most obvious and easily identifiable contributions come from large funds: namely EU funds such as Local Agenda 21 and EU funds such as LEADER and Interreg. In some cases, individual local authorities were also found to have specific budgets for biodiversity conservation.

LOCAL AGENDA 21 ENVIRONMENTAL PARTNERSHIP FUND

The Local Agenda 21 Environmental Partnership fund, hereafter LA21, has been operating since 1997 in order help increase awareness of environmental issues, locally, or to help communities to undertake environmental projects by assisting small scale non-profit environmental projects at a local level. LA21 assists sustainable development from the ground-up and facilitates, at local level, the achievement of the objectives of the LA21 action plan on sustainable development which was agreed at the UN Conference on Environment and Development in Rio de Janeiro, in 1992.

A wide variety of projects and schemes have been supported under the Fund in previous years, including biodiversity projects community gardens and allotments, compost schemes, rainwater harvesting, waste reduction initiatives, educational initiatives and environmental exhibitions. The LA21 EPF is administered by local authorities, while the Department of Communications, Climate Action and Environment (DCCAE) maintains a co-ordinating role. LA21 finance involves partnership arrangements between local authorities and various local groups including community groups, schools and environmental NGOs.

Grant analysis of LA21 shows that the programme funded a number of projects relevant for biodiversity conservation from 2010-2015 from biodiversity publications to species identification training, genetic conservation and the creation of nature trails, or the financing of local biodiversity actions plans and biodiversity surveys, monitoring and habitat mapping, among many other actions. Average funding level for projects were around €400-600 from both the environment fund and the local authority, whilst on average applicants contributed an additional € 1000.

LEADER

The EU CAP Agricultural Fund for Rural Development (EAFRD) includes requirement that at least 5% of funding must be spent on the LEADER programme. LEADER is a community development initiative which seeks to provide financial assistance to rural communities through Local Action Groups, in order to shape the future development of their area. LEADER funding is administered through the 7-year EAFRD cycle (2007-2013, 2014-2020). €250 million has been allocated as LEADER funding for Ireland for the 2014-2020 cycle, while for 2007-2013 some €273 million was distributed to projects.

LEADER funding is allocated to 28 sub-regional Local Action Groups (LAGs), a partnership of local public and private entities, which are responsible for selecting and approving projects in their area. The types of projects funded through LEADER depends on the nationally set strategic priorities under the National Rural Development Programme. For the 2014-2020 LEADER programme, there are three priorities (1) economic development, enterprise development and job creation, (2) Social Inclusion, and (3) rural environment (linked to the protection and sustainable use of water resources, local

biodiversity and renewable energy). The programme objectives for 2007-2013 included (1) rural diversification, business development, tourism, cultural and leisure facilities, village and countryside renewal (including environmental upgrading), conservation and upgrading of rural heritage (including restoration and development of locally significant natural areas, features of environmental significant etc.), training and information. Different LEADER finance is not equally split between objectives which can be awarded different amounts by LAG.

Funds for the 2014-2020 period were only allocated in 2016. Funding data is only available under the 2007-2013 LEADER programme and was analysed on a grant-by-grant basis to specifically select only projects relevant for biodiversity, including the following activities - the purchase of equipment for biodiversity research, funding for ecological studies, the creation of wildlife areas or gardens, recovery of species such as red kites, habitat conservation projects such as river or bog restoration, genetic conservation works, creation of habitat or biodiversity action plans, training and awareness events and publications, nature trails. On average LEADER projects received amount €24,000 from LEADER funding and €10,000 from applicant investments between 2007-2013.

INTERREG

The Interreg programme provides EU funding for cross border and territorial cooperation, connecting organisations, businesses and communities in Wales, Northern Ireland, Scotland and Ireland. Interreg is one of a family of EU programmes which provide opportunities for regions in the EU to work together to address cross-border economic, environmental and social challenges. The programme focuses on cross-border innovation, adaption to climate change, cultural and natural resources and heritage. Projects funded were assessed on an individual basis and only those linked to conservation included in the review. This included programmes such as the practical implementation of freshwater pearl mussel pilots, or targeted ecological models tools for lake management. Interreg funds are generally attributed to partnerships of a number of organisations including, local authorities, NGOs, universities and other government agencies. Total funding for biodiversity related Interreg projects ranged between €815,000 and €2.2 million between 2007-2013, and €4.7-15 million for 2014-2020 period (thus far).

COUNTY/ CITY COUNCIL BIODIVERSITY PROGRAMMES

Individual local authority biodiversity programmes or expenditure outside LEADER, LA21 or INTERREG was difficult to identify. This was due to their small-scale and a lack of detailed recording of financial data for these programmes or amalgamation with other environmental services budgets. Consequently, it was only possible to establish biodiversity programmes and project work funding for five local authorities: Clare, Dublin, Galway County, Fingal and Waterford. This included budget lines to provide staff and finance specifically for the conservation of biodiversity, including the funding of biodiversity officer positions, biodiversity awareness funding and specific restoration or survey projects. The information included here had to be directly sourced from civil servants in local government. Only those who responded to the review and provided data could be included, and therefore the information under this heading should be viewed as incomplete.

7.6.3 LOCAL AUTHORITY PROGRAMMES: COEFFICIENT AND CATEGORISATION

Detailed grant-by-grant analysis was undertaken for expenditure under the LA21, LEADER and INTERREG programmes, and therefore funding under these programmes has only been included if it is linked to a specific activity considered relevant for conservation. For these grant programmes, this commonly included a wide range of actions with different degrees of relevance. High relevance activities such as the creation of wildlife gardens, the production of local biodiversity action plans, site restoration or species population management or protection. There were also less relevant activities such as the creation of green infrastructure or community gardens and environmental awareness activities of marginal or theoretical relevance for biodiversity conservation at 5%. Activities with split purposes such as the creation of nature trails which have recreation and

biodiversity awareness benefits have been marked at 50-75% depending on their focus.

7.6.4 Local authority - Expenditure on Biodiversity

Total expenditure on local government administrated projects related to biodiversity conservation is estimated to have amounted to €17.4 million between 2010-2015. This figure includes expenditure sourced from the EU, the Environment Fund, local government revenue, and private funding and therefore cannot be compared to total local government budget.

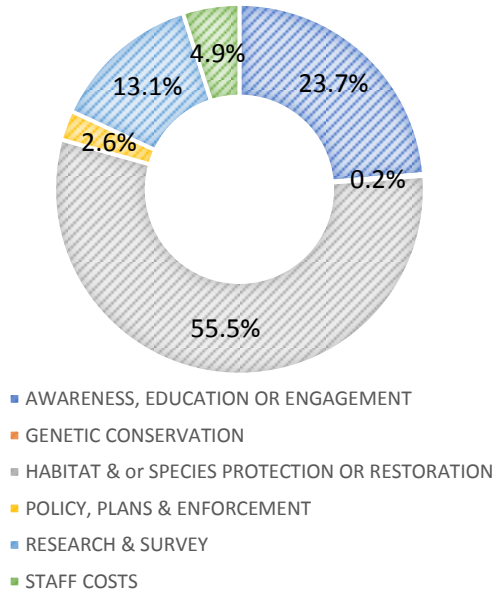
Private applicants (NGOs, local organisations or community groups) are estimated to have provided 57% of the biodiversity expenditure at the local authority level between 2010-2015 through match-funding for projects. The two EU programmes LEADER and Interreg funding for all Local Authorities provided another 23% of funding (co-financed by local authorities), pure local government funding amounted to 15% and the environment fund contributed another 5%. It must be noted that the confidence in this split is limited, as the proportion of private applicant spending was not always available for the LEADER and LA21 funds, and information on individual local authority biodiversity budget was sparse, and therefore these figures are likely to be an under-estimated.

Biodiversity-related expenditure from the local government sector appears to show a considerable decline from 2010-2015. This decline is thought to be largely due to two features of the data rather than indicative of a long-term decline. Firstly, this decline is linked to the inclusion of a one-off compensation settlement of €7.5 million in private finance for the restoration of a SAC in Waterford city and county council (Graph 31) which artificially increased finance levels above normal for 2010-2012. Secondly, as shown in Graph 31, LEADER funding drops out in funding in 2014 this is a product of the LEADER funding 7 year cycle. The absence of LEADER finance, which did not restarted until 2016, resulted in an annually reduction of approximately €0.5 million in biodiversity related expenditure from 2014-2016.

Although this is not the complete picture of local government biodiversity finance, assessing local government expenditure in relation to different conservation actions suggests that the majority of expenditure is, if the SAC compensation in Waterford is omitted, linked to biodiversity awareness, education and engagement actions, such as workshops Bioblitz, nature camps. Biodiversity awareness efforts account for 42% of local authority expenditure between 2010-2015, some €4.1 million.

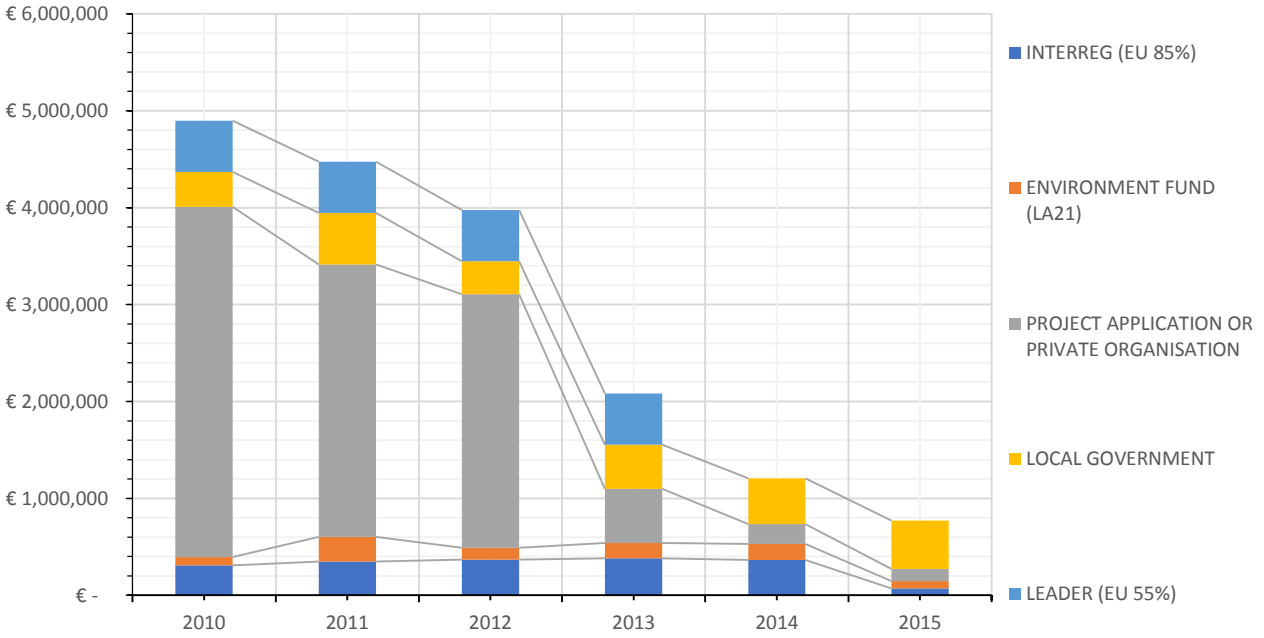
In addition, habitat &/or species protection or restoration efforts received €2.1 million (22% of expenditure spend), through actions to restore habitats, create wildlife gardens, and manage species populations or invasive species. While research and survey work received €2.2 million (23%) for local biodiversity monitoring works, habitat mapping or species impact assessment projects.

This distribution is then reflected in term of local authority contribution to different NBAP objectives, as the local government sector was estimated to contribute largely (42%) towards NBAP *objective 3. increasing awareness and appreciation of ecosystem services*, along with 23% towards *objective 2. substantially strengthening knowledge*, and 22% towards *objective 4. conservation of biodiversity in the wider countryside*.

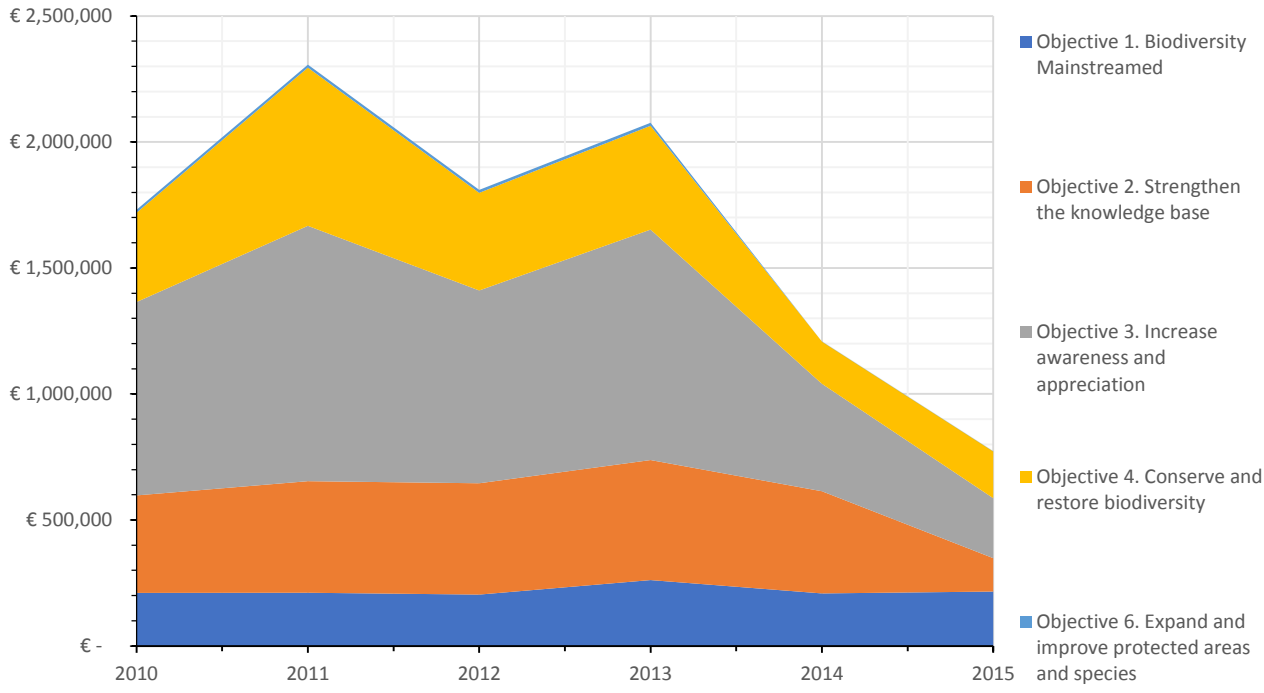


Graph 30. Local Government Expenditure on Conservation Actions

This review of local government expenditure may not show the full picture for individual local government biodiversity budgets. Due to the wide range in spending figures gathered from individual budgets it is not deemed to be appropriate to apply an estimate across the 31 local authorities in Ireland. It must also be noted that Parks expenditure could be an areas of future biodiversity expenditure which was not captured by this review



GRAPH 31. LOCAL GOVERNMENT SECTOR EXPENDITURE SOURCES



GRAPH 32. LOCAL GOVERNMENT SECTOR EXPENDITURE BY NBAP OBJECTIVES

7.6.5 Effectiveness of Local Authority Spending on Biodiversity

The majority of local authority expenditure is linked to a multitude of individual local projects which were funded through the LEADER, LA21 and INTERREG programmes, through a combination of State, EU and private funding sources.

As an EU programme the effectiveness of LEADER has been subject to national and international critique. Evaluations have brought into question whether LEADER has fulfilled its full potential as an instrument for rural development. In fact, it has been strongly argued by some researchers (Dax et al. 2016; Storey 1999) that LEADER's implementation has fallen far behind its potential to beneficially impact on rural regions.

In the Irish context, there has been a considerable delay in the distribution and allocation of 2014-2020 LEADER programme, with a hiatus between 2013 and 2016. This funding gap has resulted in a considerable absence of local funding for biodiversity projects, and a period of financial instability for projects trying to achieve ongoing funding. Although, LEADER funds have now been allocated against funding priorities for the 2014-2020 cycle and the funding allocation for the rural environment objective (1 of 3 objectives), linked to biodiversity conservation, was found to fall substantially below that of other objectives.

Alongside large funds, local government spending between 2010-2015 was also dominated by a one-off large compensation payment at Kilmacleague through Waterford City and County Council, for the encroachment of a landfill on a Tramore dunes SAC site in the late 2000s. Ecological compensation works, such as Tramore, are required through the Habitats Directive and Environmental Liability Directive in cases of overriding national interest. These compensation payments became necessary due to a failure in site protection which allowed unlawful infilling of the SAC. Consequently, is was necessary to excavate of approximately 50,000m^3 of unauthorised waste material and to rehabilitate the site, alongside the creation of Kilmacleague compensatory wetlands. The ecological value of reconstructed sites will never be a carbon copy of the original, but may produce a functionally similar habitat available for species to use. The scale of spending on this one project, relative to other biodiversity-related expenditure, helps to demonstrate both the high cost of ex-post remediation of environmental damage, but also the relative insignificance of spending on measures to enhance the environment.

Although biodiversity officers funded by Local Authority and Heritage Council received very little local authority funding over the review period they are often described as the 'front line' of local conservation action. Local and community based conservation has long been at the forefront of conservation strategies, and biodiversity officers have a crucial role in protecting, managing and enhancing the local environment by promoting awareness, catalysing local action, and integrating biodiversity with spatial planning and development management. However, in 2017 there were just four funded local government biodiversity officer across the 31 local authority units in Ireland (funded either by the local government or heritage council).

The underfunding of local authority biodiversity staff is a key issue in facilitating local community action for conservation. There also appears to be a lack of interplay between local and national biodiversity conservation efforts. The Local Authority Biodiversity and Heritage Officers who responded to the data request or provided feedback on the state of biodiversity finance in their areas also highlighted a number of issues with the effectiveness of current funding source. Firstly, they often emphasised the lack of dedicated funding for conservation. The dominance of joint funding source can often mean that conservation cannot be accessed unless it can be linked to other areas such as recreation, tourism, and community cohesion or health and wellbeing benefits. Furthermore, they also highlighted that funding is often limited only to those activities which are perceived to have high level of public acceptance, e.g. education activities for families, which restricted scope of conservation work. Further issues with effectiveness of funding including emphasis that funding pots are often too small, inequalities between different Local

Authorities due to population sizes and insecurities due to annual level funding.

However, existing biodiversity officers do show that local government has in some cases has been willing to be involved in biodiversity conservation but their capacity is limited and needs increased funding, staffing and linking into national planning and coordination.

7.6.6 Local Authority Future Funding Sources and Challenges

Arguably Local Government is the front line for biodiversity conservation, enabling local action to aid biodiversity conservation. Current funding sources are highly reliant on EU sources such as the LEADER programmes, Interreg and LA 21. In the future there are possibilities that there may be changes to the LEADER programme which may be supported by other (than EAFRD) EU funds and renamed Community-Led Local Development. Furthermore, the LA21 fund is currently financed through the Environment Fund which is has a declining income.

Local authority staff highlighted a number of barriers to financing conservation which need to be overcome in the future: (1) current insecure small-scale annual funding, (2) lack of dedicated finance for conservation, (3) lack of staff particularly ecologists – need to have people in place to access funding, (4) lack of top level Local Authority buy-in and advocates, (5) lack of resources to write large bids, (6) lack of capacity for NPWS support and resources to aid local authorities, (7) caution about linking up with the private sector. These barriers potentially need to be reversed to enhance biodiversity conservation efforts at the local level.

A number of new potential sources of finance were also highlighted at the local authority level. One civil servant highlighted the potential for green infrastructure and recreation to be used to co-finance conservation efforts in urban areas. While others emphasised the need to develop new partnerships with forestry, agriculture, tourism or health to finance conservation efforts, or alternatively to build through existing networks such tidy towns groups.

7.7 Other Agencies, Semi-State Organisations and Programmes

This section provides a brief overview of some of the biodiversity expenditure from programmes, agencies and funds which lie outside the core sectors discussed above but still provide important contributions to conservation. Including:

- The EU life programme
- The EPA biodiversity team
- Failte Ireland

Semi-State Organisations:

- Bord na Mona
- Coilte

7.7.1 EU LIFE Programme

The LIFE programme is the EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU, providing a co-financing approach. In 2011, the LIFE programme had a total annual budget of €373 million to distribute to projects across the EU.

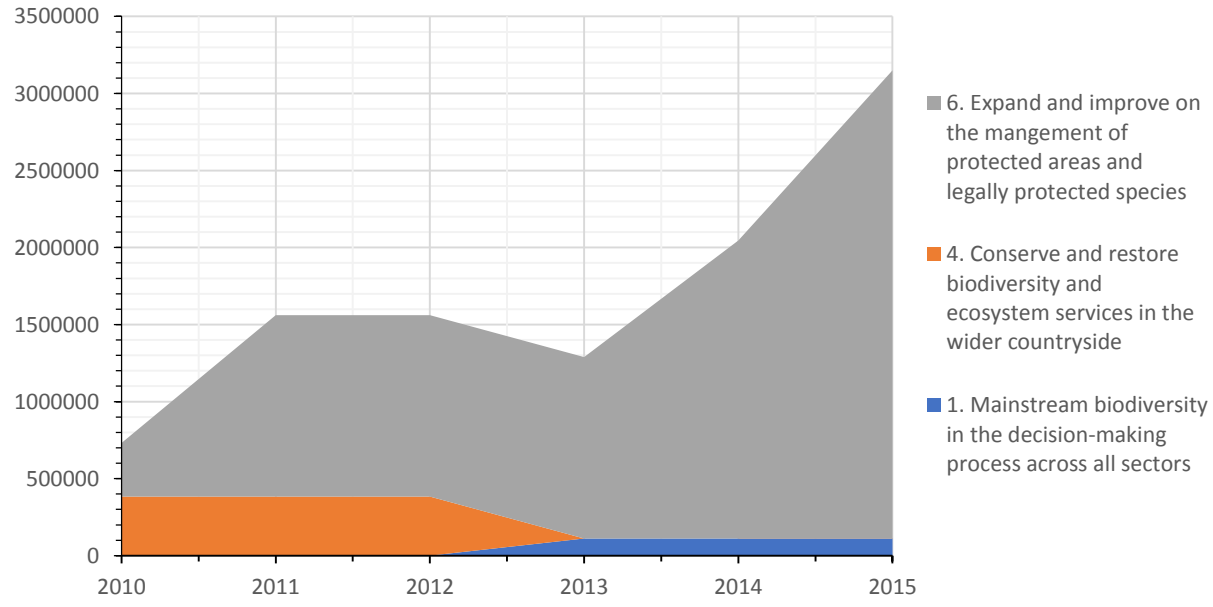
Between 2010 and 2015 there were a number of successful LIFE projects in Ireland which have been co-financed by a range of public, non-profit and private partners (see Graph 33.). Those detailed here have considerable relevance for biodiversity conservation, including:

- Raptor LIFE
- Raised Bog LIFE
- GeoPark LIFE
- CAISIE LIFE
- Mulkear LIFE
- Dulhalow LIFE
- Kerry LIFE
- Aran LIFE

In total the LIFE programme is estimated to have contributed some €10.3 million towards biodiversity conservation in Ireland, with an average annual spend of €1.7 million.

Under the LIFE programme, 97% of expenditure was linked to direct action to protect and restore habitat & species on site, with just 3% linked to actions for sustainable use.

A key focus of the LIFE funding in Ireland is on protected sites and species, and tagging LIFE expenditure against the NBAP objectives shows that 86% of LIFE funding can be linked to NBAP '*objective 6 to expand and restore protected areas'*. In contrast to other spending department or agencies, just 11% is linked to '*objective 4. The conservation and protection in the wider countryside'*.



Graph 33. LIFE programme expenditure by NBAP Objectives

7.7.2 Environmental Protection Agency

General environmental protection expenditure by the EPA is discussed separately in Section 7.8. However, there are a number of specific actions undertaken by the EPA which are worth emphasising for their relevance to biodiversity, these include:

- EPA Biodiversity Team,
- Biological Monitoring and Assessment,
- Landcover Mapping Projects,
- EPA Strive Research Programme (biodiversity and natural capita),
- Licencing of Genetically Modified Organisms.

EPA general work on environmental monitoring has been included in environmental protection expenditure covered in Section 7.8.

EPA Biodiversity Team – € 0.13	A specialist EPA Biodiversity Team is drawn from all the EPA offices and contributes to the Biodiversity Action Plan and the Ireland's Environment Report. The Environment Report is a comprehensive document that examines the current environmental status including in relation to air quality, water, waste, climate, health and well-being, and nature.	
Biological Monitoring and Assessment - € 3.81 million	Biological monitoring and assessment work carried out by the EPA. This work related to water and to a lesser extent to soils. Linked to the Water Framework Directive. A 50% coefficient has been applied as the WFD has socio-environmental objectives in terms of safe water quality as well as ecological objectives.	
Landcover Mapping Project € 0.13 million	Land cover mapping work is considered of high relevance to biodiversity, especially in terms of mapping environmental change and loss of habitat.	
EPA STRIVE € 0.98 million	EPA research programme funds biodiversity and natural capital related research projects.	
Genetically Modified Organism Licencing €1.08 million	Licensing of GMOs aims to protect native biodiversity and associated ecosystem services from the risks associated with boosting commercial productivity in agriculture	
EPA	**TOTAL CONTRIBUTION**	**€ 6.13 million 2010-2015**

These EPA programmes were estimated to have provided €5 million towards research and survey works for biodiversity conservation, and €1.08 million to habitat & species protection effort through the licencing of GMOs.

7.7.3 The National Botanical Gardens

The National Botanical Gardens (NBG), funded by the OPW, aims to explore, understand, conserve, and share the importance of plants by helping conserve species worldwide. Alongside globally significant work to conserve species the NBG also aim to increase public awareness of plant species and undertake research on threatened native species. The NBG is involved in the conservation of a number of Irish plant species such as the Killarney Fern, Irish Fleabane, club sedge and other threatened Irish flora. Due to the international relevance and expenditure on the botanic gardens themselves, only 50% of the NBG expenditure has been included as linked to domestic biodiversity conservation. The expenditure counted includes current running costs. Over the 2010-2015 period, the NBG is estimated to have contributed **€10.47 million** to biodiversity conservation in Ireland linked to the conservation of *in-situ* and *ex-situ* genetic diversity.

7.7.4 Failte Ireland

Failte Ireland, the Irish tourism body, has no direct relevance to biodiversity, although it has initiated environmental monitoring programmes, developed biodiversity guidelines and provided input into planning decisions. Through these programmes Failte Ireland is estimated to have contributed **€0.3 million** towards biodiversity conservation between 2010-2015. This expenditure is largely linked to research & survey efforts, but also to safeguarding of biodiversity.

7.7.5 Semi-State Organisations

There are two semi-State organisations which also contribute to the conservation of biodiversity in Ireland: Bord na Mona (BNM) and Coilte.

Coillte

Coillte is the commercial semi-State forestry company which manages 7% of Ireland's land, or some 440,000 ha. Total biodiversity related expenditure by Coillte, excluding LIFE programmes, was estimated to be €2.73 million between 2010-2015. The vast majority of Coillte's expenditure, 95%, was linked to habitat & species protection and restoration efforts through actions on the

maintenance and enhancement of biodiversity areas in their forest estate and to staff costs associated with this work. Notably staff costs accounted for € 2.6million with an average yearly spend of €0.43 million. Expenditure in this area increased in 2015. Additional expenditure by Coillte was linked to the monitoring of these biodiversity areas which accounted for total expenditure of €0.11 million between 2010-2015.

Bord Na Mona

Bord Na Mona (BNM) is the semi-State company involved in mechanised peat extraction, power generation (peat and renewables), biomass procurement and supply, and domestic fuel products. In 2015 the company announced that the harvesting of peat for power generation is to be *'phased out'* by 2030.

Between 2010-2015, BNM spent €8.9 million on the restoration of the peatlands of their estate related to rehabilitation of formerly worked areas. This expenditure is counted as contributing to habitat & or species restoration and recovery efforts. General efforts under this expenditure included rewetting, natural colonisation, stabilisation and other activities to restore drained areas. Funding for these works is derived from the BNM Environmental Reinstatement Fund which is a legally required restoration fund. The spending detailed here accounts for the amount of this fund utilised each year. Notably, expenditure in this area increased by 38% from 2010-2015 following the creation of their biodiversity action plan.

Through their biodiversity action plan BNM aim to '*add value for biodiversity'* not simply to comply with legal requires attached to the reinstatement fund. BNM have considerable funds available for restoration work with little in the way of budgetary constraints but opportunity constraints in terms of site availability. However, BNM lack a landscape level restoration programme and instead largely work on a site-by-site basis. Furthermore, BNM's primary remit for the restoration work is on stabilising peat and stopping the loss and erosion of peat into water courses, and then biodiversity objectives.

7.8 Environmental Protection & Services

7.8.1 Environmental Protection Expenditure Overview

Expenditure on biodiversity conservation is closely connected to wider efforts to ensure environmental protection, improvement and maintenance of environmental quality through environmental services. A wide range of public expenditures are encapsulated under the terms environmental protection or services, including but not limited to:

- Protection of ambient air and climate,
- Waste water management,
- Waste management,
- Protection and remediation of soil,
- Groundwater and surface water,
- Noise and vibration abatement, and
- Protection against radiation.

Environmental services and protection actions are largely the remit of the Department of Housing, Planning and Local Government, and the EPA. Environmental protection and services are primarily undertaken to safeguard civil society from potentially harmful effects of pollution, waste or radiation and maintain the health of the environment as a valuable asset for people.

Environmental protection activities and environmental services are also likely to benefit biodiversity. For example, the EPA bathing water quality assessment will not only ensure safe water quality for civil society, but will also support habitat quality for aquatic species. Equally, EPA activities in the area of domestic and urban waste water treatment, although distinct from biodiversity conservation and linked to waste water standards, are also likely to provide beneficial outputs for biodiversity through reduced pollution of freshwater and marine aquatic habitats. Indeed, WFD criteria for good status relies largely on biodiversity standards. Local city and county councils also manage the collection of domestic and other waste in conformance with the Waste Framework Directive, helping to prevent environmental pollution and indirectly reducing impacts on biodiversity.

In general, activities that significantly affect human environmental health also present a risk to wider environment quality and biodiversity. Although environmental health and biodiversity are evidently closely entwined, the conservation of biodiversity is not a primary purpose of environmental protection or environmental services which are designed in the first instance to ensure human health and well-being.

Expenditure on environmental protection and services is already tracked by the Irish government through the Central Statistics Office (CSO) environmental statistics and accounts division. Eurostat has developed a series of environmental economic accounts covering areas such as taxes, material flow accounts and the green economy, and the CSO reports on environmental protection to comply with Eurostat legal and voluntary reporting obligations. Since July 2017, expenditure on environmental protection activities has been made available by the CSO through the '*environmental subsidies and similar transfers module'*. This CSO module includes some of the programmes and expenditure included in the review under as expenditure on biodiversity and landscape.

Due to the distinct focus on human health and well-being, general environmental protection or environmental services expenditure has generally not been included as biodiversity expenditure in the total figures for the NBER. With the exception of the EPA work on biological monitoring and assessment set out in 7.7.2 (€3.8 million from 2010-2015). This separation has also been to maintain a distinction between general environmental protection expenditure and expenditure more closely related to biodiversity conservation. Instead environmental protection and services expenditure is reported separately in this section, to illustrate relevant wider environment protection activities which are likely to also contribute indirectly to the protection of biodiversity in Ireland. Overall environmental protection expenditure is already reported by the CSO.

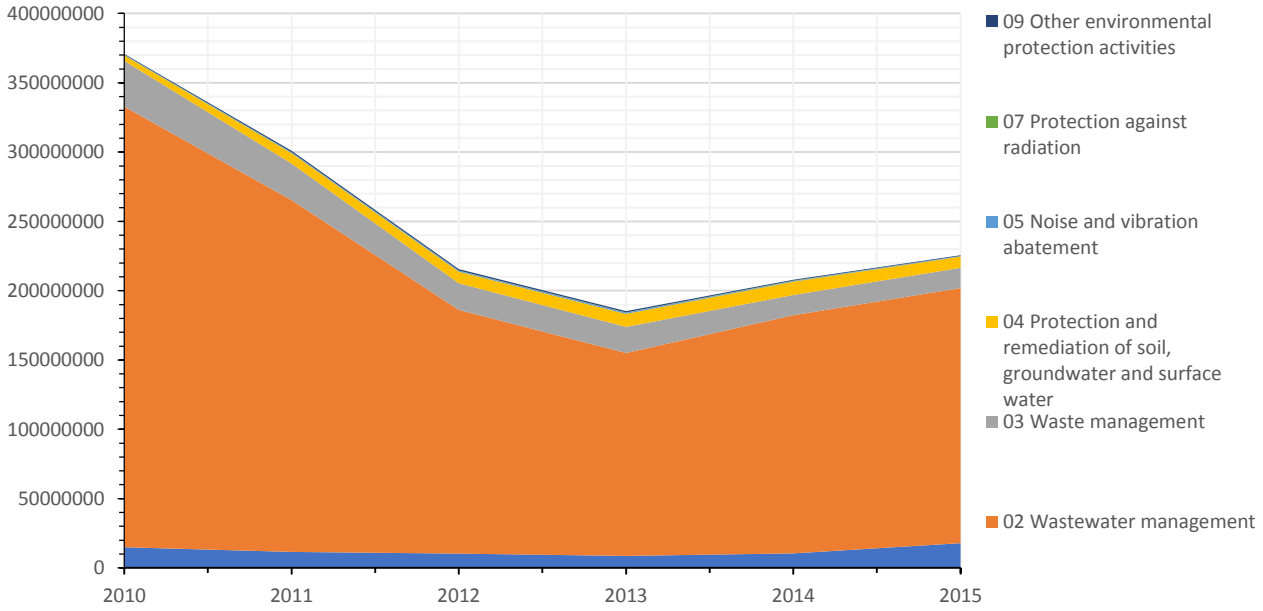
Expenditure on general environmental protection between 2010-2015 is shown in Table 16 and Graph 34, this data is based on the CSO environmental transfers and subsidies modules (CSO, 2017). Note that schemes already included in the review have been discounted to avoid double counting, e.g. expenditure on biodiversity and landscape protection and agri-environment schemes.

As shown in Table 16 and Graph 34, public expenditure on environmental protection and environmental services is substantial, amounting to an estimated **€1.5 billion between 2010-2015**, even with the exclusion of biodiversity and landscape protection activities. On average environmental protection and services expenditure was € 251 million per year.

The majority of environmental protection expenditure, some 83%, is linked to wastewater management. Alongside wastewater, expenditure includes waste 8%, protection of ambient air and climate 4%, and protection and remediation of soil, groundwater and surface water 3%. Expenditure on environmental protection declined by approximately -40% between 2010 and 2015, with a notable reduction of -42% of expenditure on wastewater management and -55% of waste management. The reasons for this reduction is unknown.

Environmental Protection	2010	2011	2012	2013	2014	2015
01 Protection of ambient air and climate	€ 14,904,000	€ 11,545,000	€ 10,292,000	€ 8,667,000	€ 10,479,000	€ 17,841,000
02 Wastewater management	€ 317,889,000	€ 253,781,000	€ 175,856,000	€ 146,390,000	€ 171,827,000	€ 184,038,000
03 Waste management	€ 33,016,000	€ 26,412,000	€ 19,200,000	€ 18,841,000	€ 14,579,000	€ 14,601,000
04 Protection and remediation of soil, groundwater and surface water	€ 3,923,000	€ 7,502,000	€ 8,366,000	€ 9,398,000	€ 9,590,000	€ 8,185,000
05 Noise and vibration abatement	€ 201,000	€ 468,000	€ 667,000	€ 838,000	€ 386,000	€ 423,000
07 Protection against radiation	€ 304,000	€ 242,000	€ 200,000	€ 200,000	€ 400,000	-
09 Other environmental protection activities	€ 534,000	€ 10,16,000	€ 984,000	€ 918,000	€ 631,000	€ 494,000
TOTAL	€370,771,000	€ 300,966,000	€ 215,565,000	€ 185,252,000	€ 207,892,000	€ 225,582,000

TABLE 16. ENVIRONMENTAL PROTECTION EXPENDITURE



GRAPH 34. ENVIRONMENTAL PROTECTION & SERVICES PUBLIC EXPENDITURE BETWEEN 2010-2015

Environmental protection expenditure by the EPA has done much to protect Ireland's environment in the face of urban development pressures, rural change and technological change. Water, specifically waste water, is a key area of activity of much relevance to biodiversity. In this area, the EPA has been responsible for the monitoring of EU Directives which have contributed to a gradual reduction in the proportion of rivers of bad or poor quality.

However, the quality of many of Ireland lake waters is still deteriorating and there continues to be a gradual loss of high status rivers such that there has been no overall improvement in quality. Water is of high relevance to biodiversity. So too, is the potential biodiversity impact from climate change and greenhouse gas for which the EPA has regulatory, research and advisory responsibilities.

While being independent, the extent of the EPA's activities and its capacity to meet its objectives are dependent on funding and the importance that each government places on environmental quality. At a policy level, biodiversity has not always received the attention it deserves and the extent to which positive results have been achieved has often been due to the greater attention necessarily given to aspects such as water quality or waste water treatment in an effort to implement EU Directives. At times, other aspects of environmental wellbeing have not been pursued as political priorities and this has had implications for adherence to international commitments and the dilution of funding, including indirectly for biodiversity. The EPA has a responsibility for guidance and regulation. It is the honest broker. However, the impacts on the environment, and on biodiversity, are largely dependent on the design and implementation of policies by Government Departments.

7.9 Non-Profit Sector

7.9.1 Non-Profit Sector

Not-profit organisations, also referred to as non-governmental organisations (NGOs), can play a key role in efforts to conserve biodiversity. Environmental NGOs can work to conserve biodiversity through the acquisition of protected sites, management of reserves, running of environmental campaigns and events, the upholding of environmental laws, and ensuring accountability for government policies (Armsworth et al. 2012). International ENGOs, such as Birdlife International, WWF, IUCN, Conservation International, and many more, play a key role in international policy formation through their presence in global environmental and conservation summits.

NGOs in Ireland are particularly linked to biodiversity awareness, biodiversity research and monitoring, ensuring public authorities are answerable to their actions, and to a lesser extent, the management of reserves. More generally, the activity of ENGOs is often linked a desire to improve policy, public participation, to the provision of specialist expertise or to support the need for a long-term vision (Harvey 2015).

This section discusses ENGOs, outlining the biodiversity components of the Irish voluntary sector, the methodology applied to capture biodiversity expenditure for the non-profit sector, and the results of the expenditure review. It outlines sources of funding and expenditure relates these to biodiversity conservation, and discusses the main strategies and prospects for future funding.

7.9.2 Ireland's Environmental Non-Profit Background & Context

A key source of information on the Irish ENGO funding is Harvey (2015). This is one of the few reviews which explores funding of the ENGOs in Ireland and forms the core source used in this section.

ENGOs, of which biodiversity-related NGOs are a subsector, range in size. There are some large ENGOs with substantial membership numbers and a generalist national focus on wildlife, such as the Irish Wildlife Trust, Friends of the Earth Ireland, and Birdwatch Ireland, but also more specialist smaller ENGOs such as the Bat Conservation Trust, Butterfly Conservation Ireland, or Woodlands of Ireland. Different ENGOs operate very different strategies, some working in close cooperation with the government and others taking a much more confrontational approach to ensure accountability for biodiversity loss (Harvey, 2015).

The Irish ENGO sector is quite a small component of the Irish voluntary sector as a whole. Harvey (2015) outlines that ENGOs consist of only 6% of the voluntary organisations in Ireland, making-up only 0.7% of the total inputted value of volunteering, and only 1.1% of the operating expenditure of the voluntary sector. The proportion of ENGOs is also small in comparison to other European countries, in terms of levels of volunteering only 3% of activities in Ireland are devoted to environmental causes (including biodiversity) compared to 6% in Slovakia, Sweden and Britain; 9% in Germany; and 13% in Bulgaria (Harvey, 2015). The rather low level of engagement may be due to the relative lower profile of public environmental concern in Ireland compared with other causes and other countries. Others have observed low levels of environmental knowledge and abstract support for the environment as a good cause rather than pro-environmental behavioural change (Kelly et al, 2001).

The Irish voluntary sector, as a whole, saw considerable expansion in the 1990s and 2000s as a result of an increase of government and philanthropic funding availability. However, Harvey (2015) reports that this expansion did not seem to particularly benefit ENGOs, as philanthropic funding has instead focused on social sectors.

The ENGO sector are estimated to have received only 0.9% of the total funding for voluntary organisations in Ireland, and only 0.6% of State funding for voluntary organisations (Harvey, 2015). Research undertaken by the Irish Environmental Network (IEN) suggests that Irish funding for

ENGOs falls below that of other European countries (where information is available). Government funding was found to be €3.1 million, a figure which Harvey (2015) highlights as being remarkably low in comparison to the Northern Ireland budget (€12.3- €21.1 million) and the UK budget (€240-€368 million).

Despite suggestions of hostility and underinvestment, Harvey (2015) that:

> "*Irish environmental NGOs have made significant gains in environmental protection across multiple fields, such as air, water, soil, food, health, trees, bogs, waste and recycling, urban and rural landscapes (e.g. visually intrusive masts), transport, education, environmental democracy and animal welfare*" (Harvey, 2015).

Well-known examples of the positive influence of ENGOs on environmental quality, include the An Taisce 1948 campaign to convert North Bull Island into a nature reserve, and the Cork Harbour Alliance in preventing discharges from chemical plants. The formation of the Irish Environmental Pillar in 2009 is considered a key turning point by Harvey (2015) who links this to a shift in the awareness and engagement by a range of government departments with environmental briefs. Over the last two decades, ENGOs have been able to build up their technical capacity to participate more effectively at a scientific, policy and legal level, but still need to make advances in terms of sourcing funding and raising the public profile of the natural environment.

Harvey (2015) suggests that ENGOs were hit disproportionally hard by government cost-saving measure linked to the 2008 economic crisis. The report suggests that government grant funding for ENGOs fell by 30% between 2011 and 2015 (to €3.1m, whilst membership and donation based funding fell by -35%, resulting in an overall fall of €8.22m to €5.56m. The average core grant received was thought to have stayed relatively constant at €11,312 in 2011 and €11,401 in 2015. However, there is reported to have been a sizeable fall in government funding for grants and contract works, and increased competition for the smaller amounts which are still available (Harvey, 2015). The crisis period was also linked to a fall in non-government funding through a loss of membership fee income, a key source of unrestricted funding, of some 6% between 2011 and 2015 (Harvey, 2015).

Funding declines reported by Harvey (2015) were found to correspond with a decline in full-time staff in the ENGO sector by 52%, and an increase in temporary scheme based staff and interns. This loss of both funding and staff resources is described as an alarming process of defunding and de-professionalisation which has substantially weakened the ENGO sector in Ireland in the last 5 years.

A key conclusion of the IEN NGO funding report is that at present:

> "*IEN members report that they find themselves in a vicious circle of declining funding, staffing and capacity bringing them below a critical mass of effectiveness*" (Harvey, 2013).

Despite a reduction in funding, Harvey (2015) finds that many ENGO would still like to expand and upscale their programmes, activities and major projects.

	2011	2015	CHANGE
Full-Time Paid	86	41	-52.4%
Part-Time Paid	84	117	+39%
Schemes	17	39	+129%
Interns	13	18	+38%

TABLE 17. ENGO STAFF CHANGES FROM 2011-2015

7.9.3 NON-PROFIT METHODOLOGY

The methodology used to assess biodiversity-related expenditure by ENGOs follows the overall methodology for the BER outlined in Section 4. However, there are a few changes to the methodological design to account for characteristics of ENGOs which need to be borne in mind when reviewing the results. Factors to consider include: (1) the identification of relevant biodiversity-related NGOs for inclusion, (2) data sources and availability; (3) the attribution of biodiversity expenditure coefficients (4) limitations and double counting, and (5) data analysis.

7.9.3.1 IDENTIFICATION OF RELEVANT NGOS

What constitutes an ENGO can be contested. Within the Irish context there are a range of

organisations with different remits and income sources which self-identify as ENGOs. To identify biodiversity-related ENGOs, a list was drawn up using the IEN members. The umbrella network works to support ENGOs through access to funding and services. Each ENGO was then assessed for their relevance by confirming their aims and objectives as stated in the IEN directory, and then verifying this against descriptions of their main aims and objective as described on their individual websites. ENGOs were only included if they made a clear reference to the conservation of biodiversity or natural heritage. This list of was then checked with the NPWS and the IEN, and additional ENGOs were added where appropriate. Local ENGOs were largely not included due to the lack of potential time and resources to find and source data at this scale.

7.9.3.2 NGO EXPENDITURE DATA SOURCES

A number of data sources were employed to collect expenditure figures for ENGOs. The Charities Regulator Ireland, established in 2014, was a key source of income and expenditure data for 2015. However, the Charities Regulator does not contain historic data pre-2015, in fact there is no comprehensive source or database for NGO income or expenditure in Ireland (pre-2014). Instead a variety of sources had to be used to obtain financial data, including the Companies Registration Office (CRO) for large NGOs, NGO annual reports available on request or online, or through *personnel communication* with NGO representatives.

7.9.3.3 DATA ANALYSIS

Expenditure data available for ENGOs was often found to lack detailed programmatic data and generally the only distinctions found were between staff costs, operational/office costs, and project costs. In some cases, more detail was available, but in other cases it was not always possible to even these basic distinctions and instead all expenditure had to be taken as a single lump sum.

Where possible NGOs were contacted to try to gain a more detailed perspective on their spending, especially for NGOs with expenditure over €10,000. However, due to the time and resource constraints currently affecting ENGOs in Ireland it was not always practical for NGO staff members to contribute. Data collection requirements were acknowledged to be demanding. Therefore, the resolution of the data for the ENGO is much more limited compared with the programmatic level data provided by the public sector and has consequently had to be much more approximate in its categorisation and the application of coefficients.

7.9.3.4 LIMITATIONS & REMEDIATION OF DOUBLE COUNTING

A key issue with the ENGO expenditure data is double counting due to cross-over of ENGOs and public spending. Government core grants or project grants, were a key source of income for many ENGOs studied and estimated to provide on average 77% of their income between 2010-2015. This includes core grants delivered through the IEN averaging €11,000, project grants distributed largely through the Heritage Council, LA21 funds, the Environment Fund and LEADER. Some departments, such as DAFM and DCHG, also provided core funding for certain ENGOs and contribute towards their income by employing ENGOs to undertake certain technical or expert conservation or monitoring work.

Where possible government ENGO funding was identified to minimise the risk of double counting. However, it was not possible within the time scale of the review to trace every grant or income received by the ENGOs included in the study and to subtract these from public expenditure. Instead of tracing each individual instance of potential double counting the overall government funding of NGO, both core and project has been estimated. This can be subtracted from the overall national biodiversity expenditure for each year. This approach was deemed the simplest effective method due to the time constraints for the research.

7.9.4 NON-PROFITS INCLUDED IN THE NBER:

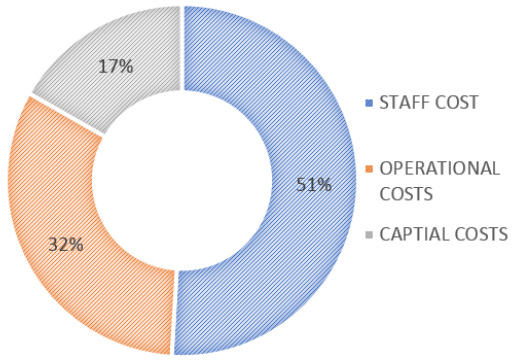
**This is by no means an exhaustive list of all ENGOs organisations related to biodiversity conservation*.

An Taisce (Advocacy & Education)	National trust for Ireland
Bat Conservation Ireland	Aims to conserve of bat species in Ireland and their habitats
Birdwatch Ireland/ the Irish Wild Bird Conservancy	Aims to protect Ireland's habitats and birds
Butterfly Conservation Ireland	Aims to aid the conservation of Irish butterfly species and population
Centre for Environmental Living & Training (CELT)	Promotes sustainable living and nature
Eco-Unesco	Ireland Environmental Education and Youth Organisation that works to conserve the environment and empower young people
Environmental Law Implementation Group	**A**ssists in the protection and enhancement of Ireland's environment by seeking to improve the transposition, implementation and enforcement of Environmental Law
Friends of the Earth Personnel	Campaigns for environmental justices and sustainability
Irish Environmental Network	A network of individual ENGOs who work individually and, as appropriate, jointly to protect and enhance the environment, and to place environmental issues centre stage in Ireland
Irish Grey Partridge Conservation Trust	Promotes the conversation of Ireland's native game birds so that they remain an intrinsic part of Ireland's natural and sporting heritage
Irish Peatland Conservation Council	Remit is to protect a representative sample of the peatland of Ireland for future generation to enjoy
Irish Red Grouses Association Conservation Trust	Dedicated to the management of moorland and lowland heaths for the sustainability of red grouse populations
Irish Seal Sanctuary	A wildlife hospital, rescue and rehabilitation facility for seals
Irish Whale & Dolphin Group	Dedicated to the conservation and better understanding of cetaceans in Irish waters
Irish Wildlife Trust:	Committed to raising awareness of Ireland rich natural heritage and protecting it for future generation
Louth Nature Trust	Conservation group formed to protect the county's nature resources and to aid in promoting awareness of, and interest in, the landscape wildlife, flora, and fauna
Native Woodland Trust	Aims to conserve and expand remaining Irish Native woodlands
Outdoor, Wildlife, Learning, and Survival (OWLS)	Aims are to encourage and facilitate children's enjoyment and learning about nature and our environment
Sonairte – Ecology Centre	Interactive visitor centre promoting ecological awareness and sustainable living
The Vincent Wildlife Trust	Bat and mammal conservation in Ireland through creation and management of reserves
The Curlew Trust	Aims to promote education and conservation measures with respect to raptors and birds of prey
Woodlands of Ireland	Aim to rejuvenation of Ireland's existing semi-natural woodland estate
Voice of Irish Concern for the Environment	Aims to empowers individuals and local communities to take positive action to conserve our natural resources

7.9.4 Non-Profits' - Expenditure on Biodiversity Conservation

ENGOs were estimated to have contributed €20 million towards the biodiversity conservation between 2010-2015, with an average spend of €3.3 million per year. On average 77% of ENGO income was estimated to have come from government sources within the review period.

Assessing total expenditure between 2010-2015 showed that 51% of their expenditure was estimated to be linked to staff costs and salaries, 32% linked to operational costs and administration and project management, and 17% on capital costs. Notably, capital costs have shown a marked decline between 2010 and 2015 of some -48%, operational and staff costs have varied but remained the same on average, and staff costs have declined by around -4% per year.



Graph 35. Expense Types ENGO 2010-2015

For many of the ENGOs included in the review it was not possible to divide up their expenditure on staff or operational costs to the programmatic level, and therefore personnel and operational costs have instead been linked to the major area of conservation action for each of the ENGOs is responsible. For example, the work of Irish Wildlife Trust largely focuses on biodiversity awareness, whilst the work of the Irish Peatland Conservation Council is much more linked to peatland conservation and restoration. However, this approach makes the attribution of expenditure and analysis rather approximate.

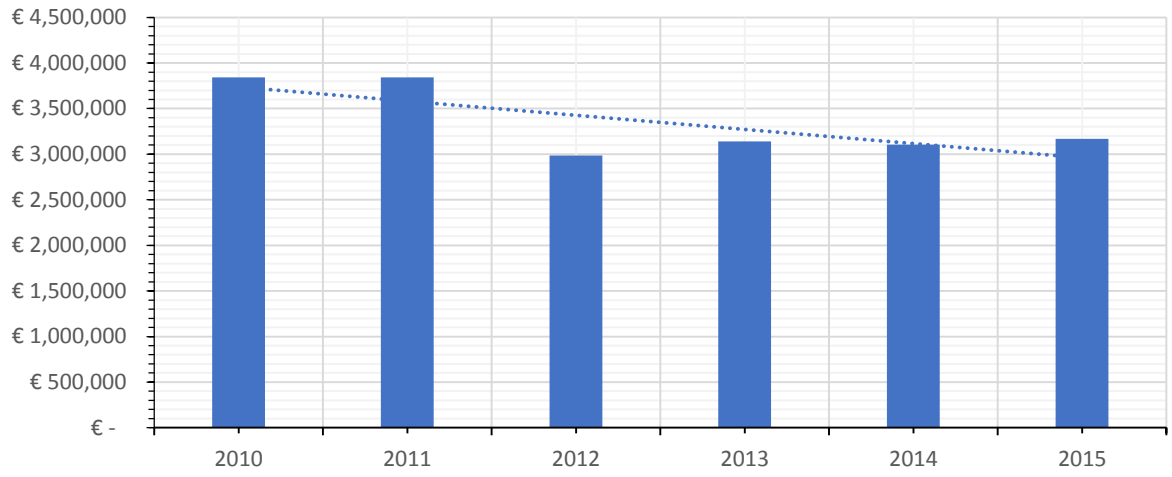
Based on the inclusion of staff and operational costs, the largest proportion of ENGO- expenditure was found to be on habitat & or species protection, restoration or management efforts, which accounted for 40% of total expenditure by ENGOs between 2010-2015 (Graph 35.). This was closely followed by research and survey work accounting for 30%, 21% attributed to biodiversity awareness efforts, and 9% linked to policy, plans and enforcement. A detailed breakdown is shown in the following table.

Administration costs	12%
Species protection or management of populations	22%
Species recovery, rehabilitation or reintroduction	14%
Staff salaries	24%
Campaigns or advocacy	8%
Educational or engagement events	6%
Biodiversity publication & other media	3%
Habitat restoration	2%
Site/area protection or management	15%
Survey monitoring and mapping	3%
Biodiversity policy development	1%
Pollution reduction	2%
Applied research	1%
Enforcement	1%

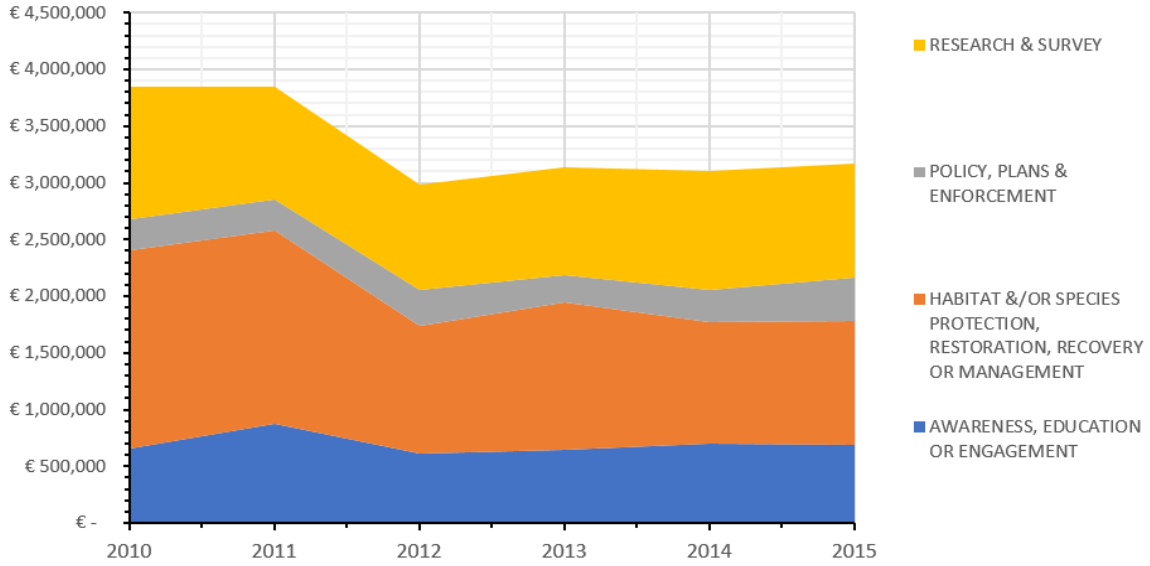
Table 18. ENGO Conservation Actions 2010-2015

Examining ENGO expenditure in terms of NBAP objectives shows that expenditure by ENGOs is unevenly distributed across 6 of the 7 objectives of the NBAP. The majority of expenditure, some 43%, is linked to two objectives, *NBAP objective 4. the conservation of biodiversity in the wider countryside*, and NBAP *objective 3 biodiversity awareness,* some 31%.

An in-depth analysis was undertaken of some of largest Irish biodiversity related ENGOs [Irish Wildlife Trust, Birdwatch, Bat Conservation Ireland, Woodlands of Ireland, Native Woodland Trust, IWDG, An Taisce, and the IPCC) shows that, on average, 49% of their income derived from government grants and projects (compared to 77% average for all ENGOs studied). Notably, there was considerable variation between organisation with government grants accounting for up to 97% of incomes for some organisation but being as low as 8% for others.



GRAPH 36. NGO EXPENDITURE ON BIODIVERSITY CONSERVATION 2010-2015



GRAPH 37. NGO EXPENDITURE BY CONSERVATION ACTIONS 2010-2015

7.9.5 NON-PROFIT FUTURE FUNDING CHALLENGES AND SOURCES

ENGO biodiversity expenditure in Ireland is reliant on government core funding and government financed project grants, which were estimated in this study to account for on average 77% of the ENGO income studied. Additional ENGO income was derived from membership and donations. Larson et al (2014) highlights that a high reliance on single revenue sources leave NGOs open to sensitive economic fluctuations and that recession condition may impair biodiversity conservation through diminished government revenues. A study commissioned by the IEN, Harvey (2015), found that these fluctuations were manifested through the 2011-2015 period with a reduction in funding causing the number of full-time staff in ENGOs to fall by some 52.3%. This fall is argued by Harvey (2015) to have led to a de-professionalisation and weakening of the sector, and emphasises the need for a diversification of the revenue sources for ENGOs.

Financing ENGOs is an area of continued debate. Harvey (2015) highlighted that "*during the recent formation of Public Participation Networks (PPNs), local authority staff made it clear that they would*

deal with, but not fund, voluntary organizations because 'voluntary means voluntary". However, the results of the IEN stud, and the NBER both suggests that lack of finance means that many biodiversity related ENGOs are struggling below the critical mass of capacity to be effective. Equally, the results shown Section 7.9.4 shows that just 7% of ENGOs' revenue went on capital investment.

This current lack of finance has a number of implications. Firstly, ENGOs are trapped in a situation where lack of personnel, time and skills results in lack of time and resources to attract additional funding in order to make the organisations more self-sufficient. Secondly, large amounts of time is spent on tracking down additional sources of finance rather than working on organisations objectives. Essentially '*too-much energy is devoted to continual survival whereas actively being able to pursue conservation objectives'*. Thirdly, lack of finance results in a lack of ability to plan and operate as professional advocates to compete with well-funded industry professionals (Harvey 2015).

Both the results of this study, and Harvey (2015), highlight that biodiversity related ENGOs have a restricted number of revenue sources. Harvey (2015) argues that there are several features that ensures a positive funding environment in other countries area which are absent in Ireland including:

*(1) Funding by an **Environmental Protection Agency or Environment Agency**;*
*(2) Funding by the **lottery**;*
*(3) **Industry funding**;*
*(4) **Large philanthropic funders** (e.g. Atlantic philanthropies does not fund ENGOs) (only relevant funds Mary Robinson Foundation for Climate Justice; National Toll Roads Foundation).*

Somper (2011) adds weight to these views and highlighting the central role of the Heritage Lottery Fund (HLF) and the Landfill Tax Credit on stabilising conservation funding in the UK context, in particular the value of the HLF fund lies in its capacity to provide longer term (5-year) funding. Arguably, it is not just a lack of finance available but the nature of that finance, e.g. the lack of medium or long term funds, or the lack of match funding available.

Using data from a survey, Harvey (2015) highlights ENGOs are highly a conscious their lack of funds and that there are a number of skills which ENGOs believe are needed to resolve issues with finance, including fundraising skills, or support skills such as marketing, public relations, communications, outreach, social media, website, advertising and membership development. Organisation needs such as administration, information technology, governance, financial management, business planning, etc. Several also referred to the need for a dedicated fundraising officer, '*who only tries to get in money, with a budget to make it happe*n'; others to a media and communications officer who could provide support for the fundraising effort.

8. Resource Mobilisation Strategies

The NBER provides a portrait of the distribution and allocation of finance for conservation across the Irish public and non-profit sectors. The review focuses on current expenditure on biodiversity rather than estimating the cost of national scale biodiversity conservation (i.e. how much should be spent on achieving national biodiversity objectives). Consequently, from the data provided solely by the NBER, it is not possible to estimate the scale of the biodiversity funding gap for Ireland. Calculating the funding gap instead necessitates additional data on conservation costs which can be produced through a results based FNA.

However, the NBER does reveal the state of finance for biodiversity conservation in Ireland, current trends and distribution of finance, revenue sources and areas of revenue risk, and effectiveness of funding, which can be used to inform resource mobilisation strategies. As outlined in Sections 6 and 7, the NBER reveals a decline in overall levels of government budget allocations directly for biodiversity conservation, a decline in the Environment Fund, and highlights that a high degree of biodiversity expenditure is sourced from integrated funding or co-financing and delivered by government departments without a dedicated remit for biodiversity conservation, an uneven spread of finance across national and international conservation objectives, and the critical state of many biodiversity-related NGOs with a high degree of reliance on government finance.

In this context, the CBD Resource Mobilisation Strategy is seeking for parties to ensure that domestic finance levels are sufficient to meet national biodiversity action plan objectives. Therefore, this section explores: (i) existing source of revenue for conservation, risks of further declines in these sources, and possible strategies for maintenance and enhancement; and, (ii) new and innovative financial mechanisms, strategies and possible co-benefits to mobilised additional resource to meet national objectives.

8.1 Rebuilding and Enhancing Traditional Finance Mechanisms

Historically the major source of finance for biodiversity conservation in Ireland has been from government sources, including departmental budget allocations, local budget allocations, government environmental funds and grants programmes, subsidies and, to a much smaller degree, public support through charitable donations and fundraising. This dominance of public funding for biodiversity conservation is common world-wide (WWF, 2009) and represents the core source of conservation finance. Public funding is the foundation of finance for conservation. Given current trends of decline in biodiversity and species abundance these core flows of finance need to be at least maintained and, ideally, enhanced.

8.1.1 Direct Government Budget Allocation for Conservation

Dedicated budget allocations for biodiversity conservation are rare in the Irish Public sector, and are restricted to the National Parks and Wildlife Service and the Heritage Council via the Department for Culture, Heritage and the Gaeltacht, e.g. the NPWS spending on nature reserve management and the Heritage Council grants programmes.

However, these government organisations' budget allocations have been particularly adversely affected by public expenditure reviews and cuts since the financial crisis in 2008-2011, as highlighted in Section 7.4. Although there are some indications that public expenditure cuts are now plateauing, continuous year-on-year reduction in budgets have left these agencies in a critical state. Interviews with public servants in both organisations, along with annual reports, reveal that that the capacity of these organisation has been reduced to maintain core infrastructure and critical programmes and priority staff, with many staff in temporary positions or positions left vacant. In some instances, programmes have had to be shut down, e.g. research grants and

biodiversity grants from the heritage council, or funding for the Notice Nature campaign.

By reducing the scope and scale of programmes available for conservation, the annual reduction in budgetary allocations between 2010-2015 has reduced the capacity of these organisations to deliver biodiversity conservation gains. To meet national targets to halt decline in biodiversity trends and deliver positive gains, core funding for conservation through dedicated government budgetary allocations for conservation needs to be increased

There are a growing range of additional arguments, and motivations for the conservation of biodiversity which are increasingly being used to bolster traditional intrinsic value arguments and regulatory drivers, namely instrumental and economic arguments based on the concept of natural capital and ecosystem services. In the Irish context a scoping report in 2008 estimated that Ireland currently benefits from at least €2.6 billion worth of free goods and services from biodiversity (Bullock et al. 2008). For example, researchers at Trinity College Dublin found that pollinators increase the yield of oil seed rape production, providing an added value to the industry of €4 million per year (Stanley et al. 2013).

The mapping of Irelands' natural capital and ecosystem services (e.g. MAES), as required by the EU 2020 Biodiversity Strategy, helps to demonstrate the importance and location of many principal ecosystem services and could be used to bolster arguments for public investment in biodiversity (Parker et al. 2016).

8.1.2 Conservation Funds and Grants

Alongside government budget allocations, conservation finance is also sourced through government funds and grant programmes. In the Irish context this chiefly consists of the Environment Fund. However, the fund is currently showing reduced revenue year-on-year and needs to be supplemented with additional revenue. Moreover, additional funds could be accessed for conservation, including the lottery fund, philanthropic funds and climate funds.

9.1.2.1 Environment Fund

The Environment Fund (EF) was established under the Waste Management (Amended) Act 2001 and currently falls under the remit of the Department of Communication, Climate Action and Environment (DCCAE). The EF is non-voted expenditure which is sourced from levies on plastic bags and landfills which are earmarked for environmental and waste projects. These levies are economic instruments designed to reduce waste and encourage behaviour that improves the quality of the environment. A range of activities for conservation are funded through the EF such as the Heritage Council grants programmes, EPA research on biodiversity and now natural capital, the cessation of turf cutting scheme, the Irish Environmental Network and many more. However, the EF is increasingly being used to cover core department policy funding e.g. EPA research. During the economic crisis, the EF was also used as a replacement funding source to prop-up schemes and programmes affected by expenditure cuts, estimated to account for around 18 million in 2011 (although the review by DPER (2017) suggests that this trend is now beginning to be reversed).

As an economic instrument, the plastic bag levy has been very successful. A 2016 review by the Department of Public Expenditure found that '*the desired behavioural change has been achieved, as there is an overall decrease in volume per capita of plastic bags usage and landfilling of waste*' (DPER, 2016:2). However, the revenue flows for the EF are currently in decline. Revenue from landfill levies is predicted to decline by around 50% from 2018 onwards due to new waste-to-energy facilities, such as the Poolbeg incinerator. Equally, the success of the plastic bag levy in generating consumer behavioural change has led to a decline in the revenue from the levy since 2008 (DPER 2017).

Noting the declining income, the DPER review suggested that "*the EF is currently no longer in a position to sustain current levels of funding for initiatives in the near term*". The reduced income is a potential risk for a number of conservation programmes, and there is a need to considered alternative sources of income for the fund or the potential to increase existing levies. New levies

could be developed linked to other packaging items such as plastic bottles (an approach currently being trailed in Scotland).

9.1.2.2 The National Lottery Fund

In the UK, the Heritage Lottery Funding has become a key source of conservation funding, able to provide long term (5 year) funding for projects and help provide match funding for large scale projects (Somper, 2011). There is potential for the Irish National Lottery to also play a significant role in biodiversity conservation and natural heritage in Ireland.

At present, the Irish National Lottery Fund (INLF) supports (1) sport and recreation, (2) national culture and heritage, (3) the arts, (4) health of the community, (5) youth, welfare and amenities, and (6) natural environment. The DCHG received €3.59 million in 2016 and €3.69 million in 2015, which helps to part fund a number of schemes (i) Irish language support (ii) grants for the heritage council and (iii) Irish education in Ireland and overseas.

Additional funding for biodiversity conservation could be accessed from the INLF by -being linked to community health and recreation. For example, the Health Service Executive is allocated funding for distribution to community groups. Given the growing body of evidence of the salutogenic value of natural green space, bids could be made to use this funding for natural environment as an upstream preventative measure for public health improvements.

9.1.2.3 Philanthropic Funds

Foundations are philanthropic organisations generally established by wealthy individuals, corporations, or other groups to fund charitable activities. Globally, large philanthropic foundations have historically provided a significant source of finance for conservation (Parker et al. 2012; Credit Swisse et al. 2014). For example, in Europe philanthropic funds have provide a critical source of finance for conservation through the Pew Charitable Trust, while in the UK, the Tubney Charitable Trust and the Esmee Fairburn Foundation has supported landscape-scale conservation delivery (Somper 2011).

A key issue for biodiversity conservation in Ireland is the absence of large philanthropic organisations to provide funding for charitable organisations linked to biodiversity conservation. Rather, social issues attract the large-scale philanthropic funding at present (Harvey, 2015). More concerted action should be taken to attract philanthropic foundations to aid biodiversity conservation in Ireland, for example the Atlantic Philanthropies, to help relieve the dependencies of ENGOs on government funding.

8.1.3 Integrated Conservation Financing

EU finance is linked to some 42% of the state-funding for conservation. The dominant EU strategy for financing conservation is '*co-financing*' or '*integrated financing',* based on financing conservation alongside different sectoral activities e.g. marine, rural development or infrastructure. Under this approach, the EU uses a range of existing funding instruments to finance biodiversity conservation by integrating biodiversity and nature objectives into these policies/ funds, including the EAFRD, EFF, EMFF, ERDF and ESF. At present only the EU LIFE programme (with match funding from the beneficiary) provides dedicated finance for biodiversity conservation.

This integrated approach is, more generally termed '*mainstreaming*', advocated by the CBD, and has been successful in generating large sums of finance for conservation. In the Irish context, integrated finance sources provide over 75% of the biodiversity expenditure recorded for 2010-2015. However, the effectiveness of integrated financing of conservation has been questioned in policy reports such as (Kettunen et al. 2017).

Kettunen et al. (2017) argue that, although integrated financing approaches have enabled the incorporation of biodiversity into broader contexts and extended its sectoral reach, "*it also makes the availability of finance dependent on the overall goals and mechanism of the given funding instruments*" (Kettunen et al. 2017). Placing biodiversity finance under the remit of different sectors means that large proportions of the finance for conservation in Ireland are not managed by biodiversity experts, but rather by

agricultural interests, subject to DAFM priorities and objectives. Equally by linking conservation into sectoral policies and instruments, biodiversity has to compete with different sectoral policies.

Moreover, Kettunen et al. (2017) highlights that integrated finance brings with it issues of stability. In Ireland, this has already manifested in the recent economic crisis which saw the hiatus of integrated finance mechanisms such as the Native Wood Scheme. Moreover, the delivery of agri-environment programmes, has been difficult with repeated delays to the delivery of finance to participants, for instance for AEOS in 2013/2014 and for GLAS in 2016, which is damaging to participants confidence in these schemes. Conversely, the uptake and recruitment of participants for integrated finance approach has been difficult in the Irish Marine sector.

Integrated finance is the dominant approach to conservation finance in Europe, and, arguably, has had beneficial effects in terms of stakeholder engagement with conservation. However, environmentally harmful subsidies persist and some spending could be avoided if these were subsidies were withdrawn or re-orientated. South Africa is a leader in this approach and is moving toward investing significant funds into restoring '*ecological infrastructure*', the naturally functioning ecosystems that deliver valuable services to civil society.

8.2 Innovative Financing Mechanisms for Resource Mobilisation

Alongside traditional conservation finance mechanisms, a variety of '*innovative conservation mechanisms'* are increasingly being promoted and developed globally as means to mobilise additional finance for biodiversity conservation. The CBD categorises these as: environmental fiscal reform, payments for ecosystem services, biodiversity offsets, markets for green products, and biodiversity in climate change funding. Innovative conservation finance mechanisms are linked, not just to providing non-traditional sources of finance, but also to accessing private sector finance or to market based mechanisms.

8.2.1 Payments for Ecosystem Services

Payments for Ecosystem Services (PES) schemes create a market for ecosystem services, i.e. the benefits society freely receives from natural systems e.g. clean water, flood protection, soil fertility, carbon storage, and which are valued by individuals, communities, businesses or governments. PES schemes essentially reward ecosystem service providers with a payment for maintaining the flow of these services. The conceptual basis for PES is the '*beneficiary pays principle*', as opposed to the '*polluter pays principle*'.

PES are by no means a novel, in fact there are long standing examples of their application in Ireland through government administered agri-environmental payments, such as REPS, to farmers for maintaining flora rich meadows or limiting stocking rates, although such payments predate the recent attention given to PES. However, the current focus on PES is to move beyond traditional sources of conservation finance and access new combinations of public, private and third sector (non-profit) funding for conservation.

There is potential to provide new PES schemes in areas where there is a clear relationship between land or water management and environmental quality, for instance to deliver outcomes such as managing woodland habitat or peatlands to maximise their benefits for biodiversity. These could be complementary to other ecosystem services benefits as erosion control, carbon sequestration or natural hazard mitigation.

PES have a number of common characteristics. Firstly, they are usually voluntary. Secondly, to be credible, they should deliver clear and measurable ecosystem services benefits which are additional to the flow of services under a business-as-usual scenario. Thirdly, in order to be effective, there should be an evident causal link between management and outcome. Furthermore, payments should be conditional on the delivery of services backed by a means to measure performance over time.

There are growing number of cases of PES globally which could be used to inspire similar schemes in

Ireland. PES linked to the provision of improved water quality have been particularly successful. Private water utilities in Northern England are making PES to upland landholders to protect catchments and so reduce carbon flows into reservoirs, lessening the need for chlorination and the associated threat from *cryptosporidium*. Water quality based PES schemes have also been suggested in Ireland through the proposed Woodlands for Water Scheme. Flood risk management is another area of PES development. PES could, for example, be used to manage water flows through the creation and management of wetlands or flood plains. Carbon control is another potential growth area for PES, as the restoring of degraded peatlands can be funded through carbon storage or offset finance. While in urban contexts, health and well-being benefits could be a key driver of PES for public health.

In all these cases, there are biodiversity gains to be had too in terms of improved habitat for wetland species and in the protection of biodiverse blanket bogs, low intensity grazing land, or the restoration of natural landscapes. Notably, PES can operate through a range of different approaches, including prescriptive payments, reverse auctions, certificates, grants, stewardship schemes, trading schemes

PES are generally most successful where there discrete land or resource management actions have the potential to increase the supply of a particular service(s), there is a clear demand for the services (e.g. flooding issues), where the service is potentially valuable to beneficiaries, and where it is clear whose actions could increase ESS supply (Weaver et al 2015).

In practice, though, there could be limitations on the capacity of resource managers to deliver ecosystem services benefits as, for example, when the realisation of benefits is dependent on the same measures being taken by neighbouring landholders. As with many biodiversity measures, spatial targeting can improve effectiveness by linking PES to locations that would deliver the highest benefit, although this can raise equity concerns where neighbouring landholders are managing the land in a similar way.

There are, however, risks linked to PES, the most widely acknowledged being the potential to create perverse incentives or undermining existing beneficial actions by paying for restoration. There are also challenges to setting up PES schemes, such as generating awareness and interest, measuring ecosystem service benefits, avoiding free riding, high start-up and transaction costs.

8.2.2 Direct Biodiversity Fees

Direct biodiversity fees, sometimes called '*user fees*', are payment for access to for direct use of biodiversity, e.g. through tourism or recreation in areas with high conservation value. This strategy generates around $369 million globally for conservation. Examples in the field of conservation include '*entrance fees*' where tourists pay for access to national parks, protected sites or biodiversity hotspots (areas of high conservation, recreational and cultural value). Payments can either be made to gain access, in the form of entrance fees, licencing fees or permits, or alternatively collected as a form of tourist tax at airports or other transportation stations. This form of finance links into ideas of eco-tourism and the promotion of Ireland as a green travel destination and could be implemented in partnership with Fáilte Ireland and the National Parks Unit of the NPWS.

The network of publicly owned National Parks and Reserves in Ireland is currently financed through government funding via the NPWS Parks and Reserves Unit, and through revenue generation from park infrastructure. Small entrance fees could potentially be trialled. Fees could be administered alongside car parking or through annual membership or access fees (following the National Trust or English Heritage models in the UK). However, this is acknowledged to be difficult politically.

Fáilte Ireland is already marketing tourism opportunities based on the concept of 'wild' or 'wilderness' through the Wild Atlantic Way, Arguably tourists participating in these sorts of activities may already have high interest in nature and a willingness to pay towards conservation.

Any fees connected through these mechanisms could be earmarked for conservation and either go directly into a trust and be redistributed for conservation projects nationally, or alternatively linked to the NPWS National Parks or regional structure to specifically fund conservation activities and enhancement in the region in which they were collected similar existing approaches include hunting and licencing fees such as those collected by the IFI for the Salmon Conservation Fund. Similar models could be applied to other species.

8.2.3 Biodiversity Offsetting

Biodiversity offsetting is a mechanism through which development projects can achieve no net loss, or even net gains, in biodiversity by counteracting residual biodiversity losses which cannot be mitigated on-site (ten Kate and Crowe 2014).

> *"Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project*" (OECD 2010).

Offsetting mechanisms operate by using metrics to calculate the value of biodiversity lost on-site and therefore the gains needed to restore equivalent biodiversity levels elsewhere (Bull et al. 2014). In 2011, offset were estimated to have mobilised significant private finance for conservation, between $2.4-4 billion USD globally (largely in the US market).

Biodiversity offsetting can be used to capture residual impacts on biodiversity in the wider environment in order to try to prevent biodiversity decline through '*death by thousand cuts',* thereby counteracting the incremental erosion and loss of unprotected biodiversity (ten Kate and Crowe, 2014; Gardner et al. 2011). The focus on no net loss is based on the premise that further loss of biodiversity is unacceptable (CBD 2010), and should be conserved at its current level.

The central tenet of offsetting mechanisms is the trading of environmental losses for restoration gains elsewhere, linked to the polluter pays principle (ten Kate and Crowe, 2014). Offsetting mechanisms work through a permit system, to balance the competing objectives of development and conservation to achieve overall win-win solutions (Maron et al. 2016). However, offsetting approaches are controversial, as both our ability to capture the multiple values of biodiversity and the equivalent gains from restored ecosystems is limited (Maron et al. 2016).

Biodiversity offsetting schemes need to be designed carefully to ensure that they operate to produce beneficial outcomes for biodiversity rather than work as a licence to damage biodiversity (Gardner et al. 2013). The primary consideration is that offsetting mechanism will only operate to benefit biodiversity if they are additional to existing environmental protection, i.e. they are designed to account for residual impacts which are not currently mitigated or protected through planning laws and legislation. There are a wide range of critical design decisions in offsetting systems to provide checks and balances that ensure offsetting does not operate as a permit for damaging activities (Maron et al. 2016; Gardner et al. 2013).

Offsets are linked to project developments or land use changes. Mostly, they have been undertaken for large projects e.g. extractive industry or residential developments. However, the same principle could also be used for agricultural land conversions or forestry creation. The use of offsets is seen as a way to achieve better outcomes from development, and ensure sustainable development. They are most suited to developments with a clear footprint on biodiversity e.g. mining, oil and gas, hydropower, wind power, road projects, railways, housing developments, tourism, agriculture, forestry. The most prolific offsetting systems, e.g. the US or Australia, have clear regulatory backing.

8.2.4 Green Bonds and Impact Investment

With government funding of biodiversity falling well-short of the targets sets by the CBD, private finance is being looked upon as one means to fill the gap (Parker et al. 2012; Credit Swisse et al. 2014; OECD 2010). Green Bonds operate in a similar fashion to normal financial bonds (CBD 2018). Funds are made available by a state or financial institutions at fixed rates which are

typically low giving the substantial wide-ranging investment of government or the high credit rating of these institutions. The only distinction is that, with Green Bonds, these funds are only available to environmentally-friendly projects. The first Green Bonds were issued by the World Bank and European Investment Bank in 2007. Since then, the worldwide market has grown to €200 billion (although still only representing 1% of the total bond finance available). In 2015, €42 billion of Green Bonds were made available (see NatureVest for example) (Hamrick 2016).

To date, most Green Bonds have been issued in relation to climate mitigation and adaptation projects. The result of international negotiations in this area means that a large amount of finance has been made available for investments, mostly in developing countries, but in developed countries too. The Climate Bond Standard has been established to standardise the terms on which such bonds are made available. More general Green Bond Principles have also been agreed by major international financial institutions.

However, Green Bonds are not restricted to climate projects, but can be used to address natural capital too. Finance would not be available for any conservation project, but must, in some way, earn returns through the more tangible range of ecosystem services. This is not as obscure as it may first appear. A water utility or flood management agency, such as Irish Water or the OPW, could, for example, invest in catchment restoration to secure higher water quality flood mitigation. The company or agency would benefit from access to a large quantity of cheap finance, but would be required to abide by certain rules, including potentially the provision of natural vegetation of most value to biodiversity. The potential role of a government conservation agency, such as NPWS, would be to act as a researcher, evaluator or broker for the arrangement, ensuring that the outputs were of most value to biodiversity.

Neither do Green Bonds have to be issued by governments or international financial institutions. Many private banks have become involved too as well as companies with an environmental ethos. In February 2016, for example, Apple Inc. issued a $1.5 billion Green Bond (Moodie 2016). In Ireland, the Government sponsored Sustainable Investment Centre (ISI Centre) agreed a partnership In 2016 with the London-based Climate Bond Initiative to assist more governments and corporations in making finance available for climate change solutions. Green Bonds have been issued by the governments of Germany, France and Poland amongst other EU Member States. The Irish Government itself has not yet issued a Green Bond despite calls from Brian Hayes MEP for the Department of Finance to join the National Treasury Management Agency in doing so, but is said to be looking into the possibility (Hancock 2017). However, Ireland's first Green Bond has already been issued by a private corporation, namely Gaelectric Holdings for €10 million.

In summary, while there may be limited opportunities to use Green Bonds to directly support the actions of state conservation bodies, there is very considerable opportunity to use this financial mechanism, and the increasing amount of funds available, to secure biodiversity targets in large investments in the areas of land use, water management, flood and coastal management, infrastructure development, energy and climate change adaption.

8.2.5 Environmental Taxation or Environmental Fiscal Reform

The use of specific environmental taxation strategies, such as the levies applied to plastic bags or the IFI Salmon Fishing Fee, could also be further developed to produce additional finance for conservation purposes. There are a number of successful examples in this area.

Since the 1990s the pesticide tax in Italy has been used to provide additional revenues for organic farming, while, in Sweden, taxes have been applied to fertiliser which effectively lowered the optimal fertilizer dose. In Vienna, they have development a tree protection action fee which is collected by Vienna municipality to improve the city's green infrastructure. There are also examples such as Finnish peat energy tax and the Croatian Forest Public Benefit Fee (IEEP, 2017).

8.2.6 Mobilisation of Resources

There are a wide range of strategies which could be applied to further develop and maintain existing sources of finance for conservation in Ireland, alongside the development of new sources of additional finance for conservation. To develop this area further, a full Financial Needs Assessment should be undertaken for Ireland, and a strategic Resource Mobilisation Strategy developed based on a more in-depth study of some of the strategies outlined in this section. Any efforts to mobilise resources for conservation should be done in partnership with key public and NGO stakeholders and developed through a process of on-going engagement and peer review to ensure uptake and buy-in to new resource mobilisation strategies.

Assessment of the Feasibility of Conservation Finance (WWF 2009)

Financial

- How much money will actually be needed each year to support programs and activities?
- How much revenue is likely to be generated each year by current donors and financing mechanisms? How much additional revenue is needed?

What new conservation financing mechanisms can most feasibly be created?

- Will the revenues generated be worth the cost of setting up the new financing mechanism?
- Could the revenues vary substantially from year to year depending on conditions?
- How will a highly variable revenue flow affect the conservation programs?
- What other sources of funds might be available, either on a long-term or a one-time basis?

Legal

- Can the proposed financing mechanisms be established under the country's current legal system?.
- Will new legislation or an executive action be required in order to establish the proposed financing mechanism? How difficult and time-consuming will it be to pass such legislation?

Administrative

- In the given country, how difficult will it be to administer, enforce, collect, or implement a particular type of financing mechanism? Will it be too complicated or costly to administer?
- Are there enough trained people to administer and/or enforce the financing mechanism?
- Will implementing the particular financing mechanism depend too much on the discretion of individual officials who may be susceptible to undue political influence or corruption?
- How difficult will it be to collect, verify, and maintain the data upon which a particular financing mechanism is based? How will transparency and accountability be assured?

Social

- What will be the social impacts?
- What stakeholders will pay into the new mechanism, and what is their willingness and capacity to pay?
- Will the new financing mechanism be perceived as equitable and legitimate?

Political

- Is there government support for establishing the new financing mechanism?
- Can the government be relied upon to spend the new revenues only for the purposes intended, or is there a strong likelihood that the money may end up being used for other purposes?
- What is the risk of a future shift in government support for a conservation agenda?

Environmental

- What will be the environmental impact of implementing the new financing mechanism?

Box 5. Guidance for the Assessment of the Feasibility of Conservation Finance (WWF 2009:3)

9. FUTURE TRACKING OF NATIONAL BIODIVERSITY EXPENDITURE

9.1 ONGOING RECORDING OF BIODIVERSITY EXPENDITURE

There are a range of justifications for the continued tracking of public and non-profit biodiversity expenditure:

- **Tracking expenditure to fulfil financial reporting commitments**: Continued tracking of biodiversity expenditure will allow Ireland to fulfil ongoing reporting commitment to the CBD**.**
- **Tracking expenditure as a biodiversity indicator:** The IUCN highlights that indicators help governments to understand the urgency of taking measures to reduce biodiversity loss. The tracking of biodiversity expenditure acts as a marker of progress towards national objectives and targets. Expenditure figures can highlight the relative level of expenditure made by different agencies of the State, by the voluntary sector and by the private sector.
- **Tracking expenditure as a measure of programme effectiveness or performance:** Reviews of biodiversity expenditure support the evaluation of policy implementation. For programmes such as DAFM Agri-Environment schemes or the EMFF Biodiversity scheme, the continuous tracking of expenditure can be used to compare budgetary allocation against actual expenditure. Furthermore, it can inform an assessment of effectiveness, efficiency and financial stability by assessing different kinds of expenditure units, operational, personnel, capital and current expenditure. Expenditure on conservation can also be compared and contrasted with that spent on environmentally harmful subsidies or policies.
- **Tracking expenditure to address future challenges:** Tracking biodiversity expenditure can enable the NPWS to identify trends, both declines and increases, in the funding available for conservation and to plan accordingly. Continued expenditure tracking would also show which biodiversity domains and priorities have stable finance and which areas require greater attention.
- **Tracking expenditure can informing a Financial Needs Assessment (FNA):** When combined with a FNA, biodiversity expenditure figures also enable the estimation of the remaining funding gap. This data can then be used to set clear and justifiable resource mobilisation targets for the public and private sectors.
- **Tracking expenditure to set targets or priorities:** Tracking biodiversity expenditure can be used to estimate the levels of additional finance required to achieve biodiversity conservation commitments.
- **Tracking expenditure to increase awareness of biodiversity and ecosystem services:** The recording of biodiversity expenditure can help to highlight to different sectors, agencies and departments, their reliance on natural capital and importance of investing in its sustainability. Effective continual recording of biodiversity finance would encourage the mainstreaming of biodiversity in Irish budgeting and public expenditure.
- **Tracking expenditure to enable financial planning**: Long term biodiversity expenditure reporting indicates areas of low or falling investment, such as the current decline in the finance available through the Environment Fund. A long-term dataset should help the NPWS to develop strategic approaches to finance and investment and helps ensure sustainable levels of finances.

The methodology and experience gained from the NBER can form the basis for on-going tracking, tagging and reporting of biodiversity expenditure. The NBER drew on the methodology developed by UN BIOFIN (2016), but also took an exploratory approach that included a customised definition of what constitutes biodiversity expenditure in Ireland, a classification system, and a defined set of coefficients through which to attribute expenditure. It is recommended that the

methodological approach outlined in the report is developed into a protocol for tagging biodiversity expenditure by public and private departments, institutions and organisations. The biodiversity expenditure protocol would provide clear guidance on how departments and agencies could track and tag expenditure on biodiversity in their annual reporting and accounting processes.

A key aspect of continued recording of biodiversity expenditure will be coordination with existing environmental accounting efforts undertaken by the Environmental Unit of the Central Statistics Office. The unit would be a valuable partner in the process.

9.2 Tracking Expenditure in Different Departments and Sectors

The section runs through the potential options for ongoing tracking of biodiversity expenditure in the public, non-profit sectors in Ireland, careful consideration has been made of the most feasible and practical options given government and NPWS resource constraints.

9.2.1 Funds and Grants Programmes

Expenditure from a number of international/national scale funds and grants programmes have been included in the review, such as EU LIFE programme, Local Agenda 21 Environmental Partnership Fund, LEADER Rural Development Funding and the Heritage Council Grants programme. Some degree of tagging of expenditure, in relation to internal objectives or internal targets, already takes place within these programmes and therefore a *biodiversity* tagging process could potentially be encompassed within existing systems through provision of a biodiversity expenditure protocol. However, in some funds such as LEADER this may only occur every 5-6 years at the end of each funding cycle.

9.2.2 Government Departments and Statutory Agencies

A number of different approaches could be taken to incorporate biodiversity tagging procedures into government departmental or agencies' expenditure.

- A survey based approach using public servants who aided the current review. Although this approach could place time pressures on the respective individuals whose responsibilities could also change;
- An annual report based approach where the NPWS requests that biodiversity tagging is undertaken as part of the annual report and accounting process.
- A CSO-based approach using the data collected under Eurostat modules, such as 'environmental transfers and subsidies'. An additional set of tags could accompany the existing System of Environmental-Economic Accounting to concurrently collect data on biodiversity expenditure. This could record a large amount of the departmental spend, but may not be as good at capturing the expenditure of smaller agencies such as the IFI or the Loughs Agency or detailed expenditure.

The NPWS would also need to adopt this biodiversity tagging protocol for their own accounts, so as to provide an example of how this could be done.

9.2.3 Non Profit Sector

Environmental NGO expenditure on biodiversity conservation was found to be one of the most difficult areas to capture. The existing pressures on the time and resources of NGOs limited their capacity to devote time to complete expenditure data requests.

It is possible that a large part of NGO expenditure could be identified by partnering with the Irish Environmental Network (IEN) who already collect ENGO annual returns as part of their distribution of government funding. Although this approach would only deliver partial data, it would reduce the administrative burden on ENGOs. Alternatively an annual survey based approach could be undertaken.

9.2.4 Data Storage

Ongoing data collection could be centrally complied into the BIOFIN BER data tool which contains an existing infrastructure by which to consistently tag expenditure and to compare allocation data with actual expenditure. This NGO

expenditure contained in this database should be kept confidential by either the NPWS or the CSO.

9.3 Methodological Limitations

Reflecting on the review, it must be noted again that this was an experimental approach and improvements could be made to the methodology.

One of the key challenges for the NBER was accessing historical data due to staff and reporting changes between 2010 and 2017. In some cases programme or schemes had changed names or been reported differently which made the tracking of expenditure over time difficult. It should be much easier to record this expenditure data as a routine annual process, if an annual review and tagging process was adopted.

Certain areas of biodiversity expenditure data were found to be particularly hard to access, namely NGO data and public sector staff costs. In particular, staff costs based on the proportion of staff time spent on biodiversity were found to be difficult, and consequently only core staff working on biodiversity conservation such as NPWS staff, local authority biodiversity officers, NGO staff costs and IFI staff were included in the review. A more extensive survey of staff time spend on biodiversity conservation is need to full capture this expenditure area.

Although the review followed an established definition of biodiversity expenditure, as set out in Section 4, there were still grey areas where there is scope for debate around whether expenditure programmes should be classed as biodiversity expenditure. There were three particularly controversial areas: (1) CAP Pillar I spending linked to cross-compliance condition, GAEC and SMR, which contain some potential benefits for biodiversity, (2) spending on mitigation or compensation efforts to account for direct damage to biodiversity e.g. Transport for Ireland spending on landscaping areas after road construction or compensation spending for damage to designated sites, and (3) spending on general environmental protection activities such as waste water treatment or waste management. Further consideration may need to be given to the inclusion of these areas as biodiversity expenditure in the future.

10. Future Research and Data Application

Bridging the finance gap for biodiversity conservation represents a major and urgent global challenge and a critical arena for further research and development. Historically, our understanding of the level, distribution, and application of finance available for conservation has been poor. The results of the NBER provides the first depiction of the national scale resources and financial flows for biodiversity conservation in Ireland, and explores how this finance contributes towards national targets and international objectives to halt the loss of biodiversity. To be truly useful, these baseline data should be supported by the ongoing recording of biodiversity expenditure to inform future funding strategy.

The NBER provides an insight into existing expenditure on conservation across the public and private sectors in Ireland. The data will enable critical evaluation of the allocation and distribution patterns of finance against biodiversity priorities. The baseline picture of biodiversity expenditure provided by the review also affords a platform for further research and policy development.

A key potential application for the baseline information provided by the NBER is to inform the development of strategic financial planning to mobilise additional resources for conservation. When combined with a Financial Needs Assessment (FNA), the data provided by the review has the potential to provide a clear understanding of the funding gap for in Ireland.

Equally, emerging research in biodiversity finance has begun to focus, not just on the assessment of financial needs and costs, but on the cost effectiveness of conservation, the best return-on-investment to evaluate decision making, and the strategic use of scarce resources for conservation. The baseline information provided by the expenditure review could be further assessed to explore how to maximise progress towards conservation goals within a given fixed budget, and thereby to achieve the most strategic allocation of scarce conservation funding.

The following areas of research are considered some of the most crucial for further research:

10.1 Financial Needs Assessment

A key opportunity to build on the results of the NBER would be by undertaking a complementary assessment of the cost of conservation in Ireland. To should be followed by a comprehensive FNA to determine what level of funding is necessary to fully achieve national objectives and international commitments to conserve biodiversity.

National scale FNAs for biodiversity conservation objectives are currently experimental and a number of possible methodologies could still be taken, including incremental budgeting, historical financial modelling, activity-based costing or results-based costing. Performance or results based-costing is argued to be the preferred approach, but research will be needed to identify the most appropriate method for Ireland. Further research could also explore how the FNA can be integrated within the framework and results of the NBER, the national budgeting process and the National Biodiversity Action Plan. As FNAs are an emerging area of practice, close coordination with the UN BIOFIN team is recommended.

10.2 Forecasting Future Finance

The NBER highlights levels of biodiversity expenditure between 2010-2015. There are additional opportunities for further analysis by projecting future finance availability using financial projections and allocations data. Use should be made of the BIOFIN financial project tools and FNA data tool to forecast future funding based on the baseline data provided by the BER.

10.3 Strategic Financial Planning

Alongside a FNA, the NBER can be used to assess the effectiveness of current funding streams and to provide a basis and insight from which to propose strategies for additional resource mobilisation. The BIOFIN approach advocates the creation of a resource mobilisation strategy for biodiversity. Any strategic financial plan would need to include consideration of the pros and cons of developing synergies with social and economic objectives related to ecosystem services, including such aspects as water quality, flood mitigation and

climate change adaptation. By examining these synergies, strategic financial plans could then explore the potential of a full range of possible financing mechanisms such as payments for ecosystem services, biodiversity offsets, carbon financing, fiscal transfers, etc., together with improved targeting of existing measures for biodiversity to meet a range of social or policy needs.

The assessment should build on the key recommendations of the NBER and aim to develop a strategy to address the finance gap combining suitable mechanisms for adoption in Ireland. A key priority for this strategy would be to achieve cross-departmental buy-in and support.

10.4 National Implementation of the Proposed Resource Mobilisation Strategy

Consideration needs to be given to evidence on how to best implement recommendations pertaining to identified financing mechanisms, including aspects such as institutional requirements, existing laws and regulations, systems of taxes and fees, identification of legal thresholds, removal of biodiversity-harmful incentives, further feasibility studies and implementation plans, certification processes, public-private-partnerships, voluntary agreements, etc.

10.5 Policy and Institutional Review: Harmful Subsidies and Policies

While the NBER provides a portrait of the main financial flows for biodiversity conservation across Ireland, current policy and institutional frameworks affect biodiversity and ecosystem services, both positively and negatively. To more fully understand the barriers to mobilising resources for conservation and to generate financial reform, a more extensive Policy and Institutional Review (informed by the BIOFIN Workbook) would include analysis of incompatibility of measures to protect biodiversity in the face of more general harmful policies and subsidies.

11. Conclusion

The Irish National Biodiversity Expenditure Review (NBER) for the period 2010-2015 has been compiled according to the methodology developed by the Biodiversity Finance Initiative (BIOFIN), the body established by the UNEP to examine financial progress towards the objectives and targets of the Convention on Biological Diversity as agreed in Aichi, Japan in 2010. The NBER consists of this report which examines the distribution of biodiversity-related expenditure across government departments and agencies, NGOs and the private sector, and an analysis of factors that have influenced the nature of biodiversity expenditure and trends in this spending over time. The report is accompanied by a spreadsheet based database of expenditure over the 2010-2015 period which also reveals the categories of expenditure by type and the levels of spending relative to objectives of the CBD and Ireland's own National Biodiversity Action Plan (NBAP).

This database provides a baseline for examining future levels and trends in biodiversity expenditure. It is also a resource that can be maintained to input into the CSO's environmental accounts, including the '*environmental subsidies and similar transfers module'* required for Eurostat and Ireland's reporting obligations to the EU. Various countries are currently examining their expenditure on biodiversity and adding new environmental economic accounting to meet the requirements of the EU Biodiversity Strategy 2020. The NBER represents one of the first expenditure reviews by a developed country that has been conducted according to the guidelines produced by BIOFIN.

The data reveals that Ireland spent around €1.5 billion of biodiversity-related activities between 2010-2015. The study shows how spending has changed over the five years of the review. It demonstrates where spending has been maintained, where it has decreased, and how it has varied over this period. This information is fundamental to a Financial Needs Assessment (FNA) of the monies needed to protect biodiversity and to meet the objectives of the CBD to which Ireland is a signatory.

However, biodiversity-related expenditure only accounts for 0.31% of total government expenditure over the five year period. The NBAP shows how core spending on biodiversity has fallen over time with the budgets of NPWS and the Heritage Council having been particularly badly hit. While the immediate justification for this fall was the economic crisis of 2008-2011, this spending has yet to recover. The NPWS, as the principal government agency responsible for safeguarding our biodiversity, is struggling to protect this resource, especially as much of its funding is spent on maintaining the salaries of a small number of dedicated staff, on essential management of nature reserves and national parks, or on activities that are not central to improving the status of biodiversity, for example compensation for the suspension of turf cutting.

This situation is unfortunate, not just because biodiversity is of esoteric value, or even because is important to our sense of well-being, but because it is the source of a range of ecosystem services that provide for, or support, agricultural productivity, forestry, fisheries, tourism, water quality, storm protection, erosion control and carbon storage, and which are fundamental to our social progress and economic development. Biodiversity and natural capital will be impacted, possibly significantly, by climate change, but is also a resource for mitigating and adapting to this challenge. However, the NPWS report on the status of this vital natural, social and economic resource, reveals that 91% of our habitats are already in "unfavourable condition", and that the status of 41% of these is "bad", while 50% are described as "inadequate". A paltry €140,000 was spent between 2010-2015 on Aichi Target 14, 'ecosystems and essential services safeguarded'.

Ideally, we should be moving away from a situation of fire-fighting and protection to one of enhancing our natural capital. However, there is very little funding for such actions. While €1.3 billion was spent between 2010-2015 on Aichi targets dealing with sustainable activities and sustainable land or marine resource management, a relatively modest amount €123 million was spent

on Target 15, 'ecosystems restored and resilience enhanced'. In other countries, environmental non-governmental organisations (ENGOs) play an important role in setting aside areas, or reserves, for biodiversity. In Ireland, only €20 million was spent by ENGOs between 2010-2015, and on average 77% of this spending was dependent on transfers from state agencies. There are few residual resources available to the sector to plan strategically. In addition, while there is a renewed interest in community-based supports in some government departments, this has not been backed by significant resources, for example from the Environmental Fund or the National Lottery or to local authorities or the Heritage Council. Rather, much of the dedicated spending on biodiversity enhancement has come from EU sources, such as the LIFE Programme.

Instead, a very large proportion of funding by Government Departments or by the EPA is directed to protecting biodiversity from sectoral economic trends that threaten to degrade this resource, for example from agricultural intensification or over-exploitation, for example of fish stocks, peatlands or water resources. Ireland shares these same threats to biodiversity as other CBD signatory states, along with habitat fragmentation, pollution, eutrophication of water bodies, and invasive non-native species. In many cases, these activities are actually supported by economic subsidies and incentives, for example, to increase agricultural productivity or maintain levels of fishing effort. The irony is that these primary sectors, in particular, are ultimately dependent on ecosystem services such as pollination, soil fertility, erosion control, marine habitats or inter-species interactions within the ecosystem. 'Conservation and restoration of biodiversity in the marine environment', is actually the smallest NBAP category of expenditure at 0.3%, or €4.5 million between 2010-2015.

Agriculture accounts for 75% of biodiversity-related expenditure with much of this funding sourced from the EU, for example from the European Agricultural Fund for Rural Development (EAFRD). This funding largely relates to the NBAP objective of 'conserving and restoring biodiversity in the wider countryside', in the form of agri-environmental payments. The dilemma of this 'integrated or co-funding' is that there are competing rationales at play, for instance protecting the incomes of farmers with small or marginal landholdings. This can mean that less attention is directed to biodiversity outputs and that these could be inferior to those which could be achieved with dedicated expenditure. On the other hand, it is understandable that policy makers in Agriculture, and other Government Departments, would want to protect the welfare of recipients and addressing two or more objectives simultaneously is not necessarily a bad thing as acknowledged by the CBD itself. Indeed, if biodiversity expenditure becomes more directed to protecting or enhancing natural capital for social and economic reasons, we can expect more such 'payments for ecosystem services' in areas such as catchment management or coastal protection. The imperatives are to ensure that this spending becomes more targeted and effective for biodiversity, and also that there is more continuity in payments and schemes than was the case for agri-environmental payments during the review period. However, the design of these schemes is improving and proposed spending under the Locally-led Agri-environmental Scheme look to be a positive move.

The other imperative is to ensure that core biodiversity spending is maintained. Not all biodiversity provides for direct, or even indirect, economic benefit, but all biodiversity contributes to our quality of life in one way or another and we have a moral and international responsibility to protect it. This means that real increases are needed in the budgets of State agencies with a responsibility for protecting biodiversity and for public engagement with nature. It also means examining new sources of finance such as user fees or membership, philanthropic funds, Green Bonds and biodiversity offsets in exchange for new built development, as well as restoring the level of funding from sources such as the Environment Fund.

REFERENCES

Acheson, J. M., and R. Gardner., 2010. Evolution of conservation rules and norms in the Maine lobster fishery. *Ocean and Coastal Management*, 53:524-534.

ADAS, 2016. *Evaluation of the GLAS Phase 1 - literature review (final)*, UK. Available at: https://www.agriculture.gov.ie/media/migration/ruralenvironment/ruraldevelopment/ruraldevelopmentprogramme2014-2020/GLASEvaluationLiteratureReview210616.pd.

An Taisce, 2016. *Not So Green: Debunking the Myths Around Irish Agriculture*, Avaialble at http://www.antaisce.org, [Accessed November 14, 2017].

An Taisce, 2017, A*n Taisce Submission Re: Forests, Products and People Ireland's Forest Policy – a renewed visio*n, Available at: http://www.antaisce.org/articles/an-taisce-submission-re-forests-products-and-people-ireland%E2%80%99s-forest-policy-%E2%80%93-a-renewed, [Accessed: November 14, 2017].

Armsworth, P.R. et al., 2012. The Size, Concentration, and Growth of Biodiversity-Conservation Nonprofits. *BioScience*, 62(3), pp.271–281. Available at: https://academic.oup.com/bioscience/article-lookup/doi/10.1525/bio.2012.62.3.8 [Accessed November 14, 2017].

Balmford, A. & Whitten, T., 2003. Who should pay for tropical conservation, and how could the costs be met? *Oryx*, 37(2), pp.238–250. Available at: http://www.journals.cambridge.org/abstract_S0030605303000413 [Accessed April 6, 2017].

Batáry, P. et al., 2015. The role of agri-environment schemes in conservation and environmental management. *Conservation Biology*, 29(4), pp.1006–1016. Available at: http://doi.wiley.com/10.1111/cobi.12536 [Accessed November 9, 2017].

BIM, 2016. *The Buisness of Seafood 2016: A Snapshot of Ireland's Seafood Sector*,

Biodiversity Ireland, 2017. Ireland's National Biodiversity Indicators. Available at: http://indicators.biodiversityireland.ie/ [Accessed October 7, 2016].

BIOFIN, 2016. *The BIOFIN Workbook: A Tool to Mobilize Financial Resources for Biodiversity and Development*, Available at: http://www.biodiversityfinance.net/sites/default/files/uploads/documents/biofin_workbook_final.pdf [Accessed November 1, 2016].

Bleasdale, A. & O'Donoghue, B., 2015. The role of DAHG in the identification and targeting of biodiversity priorities in the Green Low-carbon Agri-environment Scheme (GLAS). In D. Ó hUallacháin & J. A. Finn, eds. *Farmland Conservation with 2020 Vision*. Teagasc Biodiversity Conference. Wexford: Teagasc, pp. 14–15.

Bode, M. et al., 2008. Cost-effective global conservation spending is robust to taxonomic group. *Proceedings of the National Academy of Sciences of the United States of America*, 105(17), pp.6498–501. Available at: http://www.ncbi.nlm.nih.gov/pubmed/18413614 [Accessed November 10, 2016].

Brockington, D. & Scholfield, K., 2010. Expenditure by conservation nongovernmental organizations in sub-Saharan Africa. *Conservation Letters*, 3(2), pp.106–113. Available at: http://doi.wiley.com/10.1111/j.1755-263X.2010.00094.x [Accessed November 3, 2016].

Bruner, A.G., Gullison, R. & Balmford, A., 2004. Financial Costs and Shortfalls of Managing and Expanding Protected-Area Systems in Developing Countries. *BioScience*, 54(12), pp.1119–1126.

Bull, J.W., Milner-Gulland, E.J., Suttle, K.B., & Singh, N.H., 2014. Comparing biodiversity offset calculation methods with a case study in a Uzbekistan, *Biological Conservation*, 178, pp.2-10.

Bullock, C., Collier, M. & Convery, F., 2012. Peatlands, their economic value and priorities for their future management – The example of Ireland. *Land Use Policy*, 29(4), pp.921–928. Available at: http://www.sciencedirect.com/science/article/pii/S0264837712000129?via%3Dihub [Accessed November 14, 2017].

Bullock, C., Hawe, J. & Little, D., 2014. Realising the ecosystem-service value of native woodland in Ireland. *New Zealand Journal of Forestry Science*, 44(Suppl 1), p.S4. Available at: http://www.nzjforestryscience.com/content/44/S1/S4 [Accessed November 14, 2017].

Bullock, C., Kretsche, C. & Candon, E., 2008. *The Economic and Social Aspects of Biodiversity Benefits and Costs of Biodiversity in Ireland*, 199. Available at: https://www.cbd.int/doc/case-studies/inc/cs-inc-ireland-en.pdf [Accessed October 11, 2016].

Bullock, C. & O'Shea, R., 2016. *Ecosystem Services Valuation for Environmental Risk and Damage Assessment*, Available at: https://www.epa.ie/pubs/reports/research/econ/EPA RR 206 final web.pdf.

Butchart, S.H.M. et al., 2010. Global Biodiversity:

Indicators of Recent Declines. *Science*, 328(5982).

Cahill, N., 2010. *The Impact of European Environmental Policy in Ireland*,

Castro, G. & Locker, I., 2000. *Mapping Conservation Investments: An Assessment of Biodiversity Funding in Latin America and the Caribbean*, Washington D.C.

CBD, 2012. *Methodological and Implementation guidance for the "indicators for monitoring the implementation of the convention"s strategy for resource mobilisation'*, Hyderabad. Available at: https://www.cbd.int/doc/meetings/cop/cop-11/official/cop-11-14-add1-en.pdf [Accessed November 22, 2016].

CBD, 2016. United Nations Decade on Biodiversity. Available at: https://www.cbd.int/undb-new/actors/champions [Accessed October 28, 2016].

CBD, 2018. *Green Bonds,* CBD, Available at: https://www.cbd.int/financial/greenbonds.shtml[{Accessed January 1 2018].

Colhoun, K & Cummins, S., 2013. Birds of Conservation Concern. I*rish Birds*, 9, 523-544.

Dax, T. et al., 2016. The Leader programme 2007–2013: Enabling or disabling social innovation and neo-endogenous development? Insights from Austria and Ireland. *European Urban and Regional Studies*, 23(1), pp.56–68. Available at: http://journals.sagepub.com/doi/10.1177/0969776413490425 [Accessed November 14, 2017].

DAFM (Department of Agriculture, Food, and the Marine), 2016. Ireland's Forests – Annual Statistics, DAFM, Available at: https://www.agriculture.gov.ie/forestservice/forestservicegeneralinformation/foreststatisticsandmapping/annualforestsectorstatistics/; [Accessed: August 29, 2017].

DAFM (Department of Agriculture, Food, and the Marine), 2012. National Forest Inventory – Republic of Ireland - Results, DAFM,], Available at: https://www.agriculture.gov.ie/nfi/nfisecondcycle2012/nationalforestinventorypublications2012/ [Accessed: August 29, 2017].

DAFM (Department of Agriculture Food and the Marine), 2015. S*tatement of Strategy 2015-17*, DAFM

DCHG, 2017. *National Biodiversity Action Plan 2017-2021*, Available at: https://www.npws.ie/sites/default/files/publications/pdf/National Biodiversity Action Plan English.pdf.

Douglas, C., Valverde, F.F. & Ryan, J., 2008. *Peatland habitat conservation in Ireland. In: Proceedings of the 13th International Peat Congress* - After Wise Use – The Future of Peatlands. Volume 1 Oral Presentations, pp 681-684.

Djoghlaf, A. & Dodds, F., *Biodiversity and ecosystem insecurity : a planet in peril*, Available at: https://books.google.co.uk/books?id=9h03DwAAQBAJ&pg=PT336&lpg=PT336&dq=cbd+biodiversity+funding+gap&source=bl&ots=QTAuBCDeUk&sig=1V1MxiXr-gnfG5Qrt7AKUYug4mU&hl=en&sa=X&ved=0ahUKEwiKooDfkrzXAhWPjKQKHQ0LA_84ChDoAQgnMAA#v=onepage&q=cbd biodiversity funding gap&f=false [Accessed November 13, 2017].

DPER, 2017. *Spending Review 2017 Environment Fund*, Dublin. Available at: file:///C:/Users/Rachel Morrison/Downloads/Environment-Fund (2).pdf.

Dunford, B., 2016. *The Burren Life Programme: An Overview*, Available at: http://files.nesc.ie/nesc_research_series/Research_Series_Paper_9_BDunford_Burren.pdf [Accessed November 14, 2017].

Environmental Protection Agency (EPA), 2012. *Ireland's Environment An Assessment*, Dublin. Available at: http://www.epa.ie/pubs/reports/indicators/00061_EPA_SoE_2012.pdf [Accessed October 7, 2016].

EPA, 2016. *Ireland's Environment An Assessment*, Wexford, Ireland. Available at: http://www.epa.ie/pubs/reports/indicators/SoE_Report_2016.pdf.

EPA, 2008. *State of the Environment Report 2008*, Environmental Protection Agency (EPA).

EPA, 2006, *Biodiversity in Irish Plantation Forests Final Report*, ERTDI Report Series No. 51, National Development Plan 2007-2013, EPA.

EPA, 2017. *Water Quality in Ireland 2010-2015*, Dublin. Available at: http://www.epa.ie/pubs/reports/water/waterqua/waterqualityinireland2010-2015.html.

European Environment Agency (EPA), 2007. *Halting the loss of biodiversity by 2010: proposal for a first set of indicators to monitor progress in Europe*,

Evans, D.M. et al., 2012. Funding nature conservation: who pays? *Animal Conservation*, 15(3), pp.215–216. Available at: http://doi.wiley.com/10.1111/j.1469-1795.2012.00550.x [Accessed June 22, 2017].

Fahey, L., 2010. *REPS & AEOS*. Presentation at Teagasc Agri-Environment Conference, 7 th September, 2010. Carlow. Teagasc.

Feehan, J., Gillmor, D.A. & Culleton, N., 2005. Effects of an agri-environment scheme on farmland

biodiversity in Ireland. *Agriculture, Ecosystems & Environment*, 107(2–3), pp.275–286. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0167880904003287 [Accessed November 14, 2017].

Feeley, H. et al., 2017. *ESManage Project: Irish Freshwater Resources and Assessment of Ecosystem Services Provision*, Available at: http://www.epa.ie/pubs/reports/research/water/EPA RR 207 final web-2.pdf.

Feger, C. & Pirard, R., 2011. Assessing funding needs for biodiversity: Critical issues. *Policy Briefs, IDDRI*, 4. Available at: http://www.iddri.org/Publications/Assessing-funding-needs-for-biodiversity-Critical-issues [Accessed November 13, 2017].

Finn, J.. & O'Hullachain, D., 2012. *A review of evidence on the environmental impact of Ireland's Rural Environment*, Wexford. Available at: http://t-stor.teagasc.ie/bitstream/11019/400/1/REPS review_post-review.pdf [Accessed November 14, 2017].

Finn, J.A. 2010. *Monitoring the environmental impacts of the Rural Environment Protection Scheme: a scoping stud*y. Carlow. Teagasc.

Fitzpatrick, U., Regan, E. & Lysaght, L., 2010. *State of Knowledge Biodiversity in 2010 Ireland's Biodiversity in 2010: State of Knowledge*,

Gambino, R., & Peano, A., 2015. *Nature Policies and Landscape Policies: Towards and Allianc*e, Springer, New York.

Gardner, T.A., von Hase, A., Brownlie, S., Ekstrom, J.M., Pilgrim, J., Savy, C., Stephens, T., Treweek, J., Ussher, G., Ward, G., and Ten Kate, K., 2013. Biodiversity Offsets and the Challenge of Achieving No Net Loss, *Conservation Biology*, 27(6): pp. 1254-1264.

Global Environment Facility, 2012. *Financing the Achievement of the Aichi Targets | Global Environment Facility*, Available at: https://www.thegef.org/publications/financing-achievement-aichi-targets [Accessed November 13, 2017].

Hamrick, K., 2016. *State of Private Sector Investment in Conservation 2016: A Landscape Assessment of an Emerging Market*, Ecosystem Marketplace, Available at: http://www.forest-trends.org/documents/files/doc_5477.pdf [Accessed on January 1st 2018].

Hancock, C., 2016. Hayes said Ireland should issues green bonds, Irish Times: January 26th 2017.

Harvey, B., 2015. *Funding Environmental Non-Governmental Organisation*, Irish Environmental Network Report.

Heritage Council, 2010. *Case Studies on High Nature Value Farming In Ireland: North Connemara and the Aran Islands*, Available at: http://www.heritagecouncil.ie/content/files/high_nature_value_farming_north_connemara_aran_summary_2010_890kb.pdf [Accessed November 14, 2017].

Hickey, V. & Pimm, S.L., 2011. How the World Bank funds protected areas. *Conservation Letters*, 4(4), pp.269–277. Available at: http://doi.wiley.com/10.1111/j.1755-263X.2011.00172.x [Accessed November 3, 2016].

Holmes, G., Scholfield, K. & Brockington, D., 2012. A Comparison of Global Conservation Prioritization Models with Spatial Spending Patterns of Conservation Nongovernmental Organizations. *Conservation Biology*, 26(4), pp.602–609. Available at: http://doi.wiley.com/10.1111/j.1523-1739.2012.01879.x [Accessed November 3, 2016].

Hooder, K.H., Newton, A.C., Cantarello, E., & Perrella, L., (2014) Does Landscape-scale conservation management enhance the provision of ecosystem services, *International Journal of Biodiveristy Science, Ecosystem Services and Management,* 10 (1): 71-83.

Huwyler, F. et al., 2014. Making Conservation Finance Investable No Title. *Standford Social Innovation Review*, Jan.

IEEP, 2017. New suite of studies on environmental fiscal reform, IEEP, Available at: https://ieep.eu/publications/new-suite-of-40-case-studies-on-environmental-fiscal-reform [Accessed on 1st Jan 2018].

IFA, 2017. Greening: Scheme Info. Available at: https://www.ifa.ie/greening/#.Wgr8e2i0PIU.

Indecon, 2010. *Mid-Term Evaluation of the Rural Development Programme Irelan*d.

Irwin, S., Pedley, S.M., Coote, L., Dietzsch, A.C., Wilson, M.W., Oxborough, A., Sweeney, O., Moore, K.M., Martin, R., Kelly, D.L., Mitchell, F.J.G., Kelly, T.C. and O'Halloran, J. 2013.The value of plantation forests for plant, invertebrate and bird diversity and the potential for cross taxon surrogacy. *Biodiversity and Conservation* 23: 697–714.

IUCN, 2010. *Indicator on Funding to Biodiversity: Measuring Expenditure for Biodiversity*, Available at: https://www.iucn.org/sites/dev/files/import/downloads/biodiversity_funding_indicator_caucasus.pdf [Accessed November 1, 2016].

IUCNRedList, 2017. Conservation Actions Classification Scheme (Version 2.0). *iucn red list of threatened species*. Available at: http://www.iucnredlist.org/technical-documents/classification-schemes/conservation-

actions-classification-scheme-ver2 [Accessed November 13, 2017].

James, A., Gaston, K.J. & Balmford, A., 2001. Can We Afford to Conserve Biodiversity? *BioScience*, 51(1), p.43. Available at: http://bioscience.oxfordjournals.org/cgi/doi/10.1641/0006-3568(2001)051[0043:CWATCB]2.0.CO;2 [Accessed November 3, 2016].

James, A.N., Gaston, K.J. & Balmford, A., 1999. Balancing the Earth's accounts. *Nature*, 401(6751), pp.323–4. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16862091 [Accessed November 8, 2016].

Keenleyside, C., Allen, B., Hart, K., Menadue, H., Stefanova, V., Prazan, J., Herzon. I., Clement, T., Povellato, A., Maciejczak, M. and Boatman, N., 2011. D*elivering environmental benefits through entry level agri-environment schemes in the EU. Report Prepared for DG* Environment, Project ENV.B.1/ETU/2010/0035. Institute for European Environmental Policy: London.

Kelly, M., Tovey, H., Faughnan, P., 2001. E*nvironmental, values, attitudes and behaviour in Ireland,* Strive Report 2001-MS-SE1-M1, EPA. Johnson Castle, Ireland

Kettunen, M., Illes, A., Rayment, M., Primmer, E., Verstraeten, Y., Rekola, A., Ring, I., Tucker, G., Baldock, D., Droste, N., Santos, R., Rantala, S., Ebrahim, N. and ten Brink, P., 2017. Summary report - Integration approach to EU biodiversity financing: evaluation of results and analysis of options for the future. Final report for the European Commission (DG ENV) (Project ENV.B.3/ETU/2015/0014), Institute for European Policy (IEEP), Brussels / London

Kleijn, D. & Sutherland, W.J., 2003. How effective are European agri-environment schemes in conserving and promoting biodiversity? *Journal of Applied Ecology*, 40(6), pp.947–969. Available at: http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2664.2003.00868.x/abstract [Accessed November 9, 2017].

Larsen, F.W., Turner, W.R. & Brooks, T.M., 2012. Conserving Critical Sites for Biodiversity Provides Disproportionate Benefits to People M. Krkosek, ed. *PLoS ONE*, 7(5), p.e36971. Available at: http://dx.plos.org/10.1371/journal.pone.0036971 [Accessed November 14, 2017].

Larson, E.R., Boyer, A.G. & Armsworth, P.R., 2014. A lack of response of the financial behaviors of biodiversity conservation nonprofits to changing economic conditions. *Ecology and Evolution*, 4(23), pp.4429–4443. Available at: http://doi.wiley.com/10.1002/ece3.1281 [Accessed June 22, 2017].

Lerner, J., Mackey, J. & Casey, F., 2007. What's in Noah's Wallet? Land Conservation Spending in the United States. *BioScience*, 57(5), p.419. Available at: http://bioscience.oxfordjournals.org/cgi/doi/10.1641/B570507 [Accessed November 7, 2016].

Lucey, J. & Doris, Y., 2001. *Biodiversity in Ireland: A Review of Habitats and Species*, Available at: www.epa.ie [Accessed October 10, 2016].

Marine Institute, 2017. Importance of Ireland's marine resource. *Marine Institute*. Available at: https://www.marine.ie/Home/site-area/irelands-marine-resource/importance-irelands-marine-resource [Accessed November 14, 2017].

Markandya A, Hamilton K, and E Sanchez-Triana., 2006. *Getting the Most for the Money – How Public Environmental Expenditure Reviews Can Help,* World Bank Environment Strategy Notes No 16. World Bank, Washington DC.

Maron, M. et al., 2016. Taming a Wicked Problem: Resolving Controversies in Biodiversity Offsetting. *BioScience*, 66(6), pp.489–498. Available at: https://academic.oup.com/bioscience/article-lookup/doi/10.1093/biosci/biw038 [Accessed November 14, 2017].

Matin, S. et al., 2016. Predicted distribution of High Nature Value farmland in the Republic of Ireland. *Journal of Maps*, 12(sup1), pp.373–376. Available at: https://www.tandfonline.com/doi/full/10.1080/17445647.2016.1223761 [Accessed November 14, 2017].

Mattison, E.H.A. & Norris, K., 2005. Bridging the gaps between agricultural policy, land-use and biodiversity. *Trends in Ecology & Evolution*, 20(11), pp.610–616.

McCarthy, D.P. et al., 2012. Financial Costs of Meeting Global Biodiversity Conservation Targets: Current Spending and Unmet Needs. *Science*, 338(6109), pp.946–949.

McGurn, P. & Moran, J., 2013. A *National , Outcome-based Agri- environment Programme Under Ireland ' s Rural Development Programme 2014-2020.*

Medarova-Bergstrom, K. et al., 2014. *Common Framework for Biodiversity-Proofing of the EU Budget: General guidance*, London.

Medarova-Bergstrom, K. et al., 2015. *Tracking Biodiversity Expenditure in the EU Budget, Part 1 - Guidance on definition and criteria for biodiversity expenditure in the EU budget*, Brussels. Available at: http://ec.europa.eu/environment/nature/biodiversity/pdf/financing_part_1.pdf [Accessed November 1, 2016].

Miller, D; Agrawal, A.; & Roberts, T., 2012. Biodiversity, Governance and the Allocation of International Aid for Conservation, *Conservation Letters*, 6, 12-20.

Moodie, A., 2016. Can Apple's $1.5 bn green bond inspire more green investment, The Guardian, 20th March 2016.

National Biodiversity Data Centre, 2015. *National Biodiversity Data Centre Making nature count: evidence of winners and losers in the fight to save Irish biodiversity*, Available at: http://indicators.biodiversityireland.ie/files/Press Release_Indicators.pdf [Accessed October 7, 2016].

National Biodiversity Working Group, 2014. *Interim Review of the Implementation of Actions for Biodiversity 2011-2016*, Available at: https://www.npws.ie/sites/default/files/publications/pdf/Biodiversity_Plan_Interim_Review_2011-2016.pdf [Accessed October 13, 2016].

National Parks & Wildlife Service, 2016. Protected Sites in Ireland. Available at: https://www.npws.ie/protected-sites [Accessed October 10, 2016].

National Parks and Wildlife Service, 2013. *The Status of EU Protected Habitats and Species in Ireland 2013*, Dublin. Available at: https://www.npws.ie/sites/default/files/publications/pdf/Art17-Vol1-web.pdf [Accessed October 11, 2016].

Notice Nature, 2017. Threats to Biodiversity. Available at: http://www.noticenature.ie/threats_to_biodiversity.html [Accessed October 11, 2017].

Norton, D., Hynes, S., and Boyd, J., (2016) Valuing Ireland's Marine Ecosystem Services, National University of Ireland, Galway.

NPWS, 2014. *Irelands 5th National Report to the Convention on Biological Diversity*, Available at: https://www.cbd.int/doc/world/ie/ie-nr-05-en.pdf [Accessed October 10, 2016].

O'Flynn, C., Kelly, J. & Lysaght, L., 2014. *Ireland's invasive and non-native species - trends in introductions*, Ireland.

O'Mahony, D.T., 2014. Socio-spatial ecology of pine marten (Martes martes) in conifer forests, Ireland. *Acta Theriologica*, 59(2), pp.251–256. Available at: http://link.springer.com/10.1007/s13364-013-0167-4 [Accessed November 9, 2017].

Ó hUallacháin, D. et al., 2016. A comparison of grassland vegetation from three agri-environment conservation measures. *Irish Journal of Agricultural and Food Research*, 55(2), pp.176–191. Available at: https://www.degruyter.com/view/j/ijafr.2016.55.issue-2/ijafr-2016-0018/ijafr-2016-0018.xml [Accessed November 14, 2017].

OECD, 2010. *Scaling up Finance mechanims for Biodiversity*, Available at: https://www.oecd.org/env/resources/OECD Finance for Biodiversity [f] [lr] WEB SM.pdf.

Parker, C. et al., 2012. *The Little Biodiversity Finance Book: a guide to proactive investment in natural capital (PINC)* 3rd ed., Oxford: Global Canopy Programme. Available at: http://globalcanopy.org/sites/default/files/documents/resources/LittleBiodiversityFinanceBook_3rd edition.pdf.

Parker, N., Naumann, E-K., Medcalf, K., Haines-Young, R., Potschin, M., Kretsch, C., Parker, J. & Burkhard, B. 2016. National ecosystem and ecosystem service mapping pilot for a suite of prioritised services. *Irish Wildlife Manual*s, No. 95. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Ireland, Irish Wildlife Manual 95.

Peatlands Forum, 2012. *The Quirke Report*, Dublin. Available at: https://www.npws.ie/sites/default/files/publications/pdf/QUIRKE REPORT.pdf.

Perrin, P.M., et al., 2008 *National Survey of Native Woodlands 2003-2008 - Volume 1*; Main Report, BEC Consultants for National Parks and Wildlife Service.

Purser, P., F. Wilson, and R. Carden, 2009. *Deer and Forestry in Ireland: A Review of Current Status and Management Requirements.* Woodlands of Ireland. Dublin.

Renou-Wilson, F. et al., 2011. *BOGLAND: Sustainable Management of Peatlands in Ireland*, Dublin.

Salafsky, N. et al., 2008. A Standard Lexicon for Biodiversity Conservation: Unified Classifications of Threats and Actions. *Conservation Biology*, 22(4), pp.897–911. Available at: http://doi.wiley.com/10.1111/j.1523-1739.2008.00937.x [Accessed June 15, 2017].

Salcido, R.P.G., Quiroz, I.A. & Ramírez, R.R., 2009. Understanding investment in biodiversity conservation in Mexico. *Biodiversity and Conservation*, 18(5), pp.1421–1434. Available at: http://link.springer.com/10.1007/s10531-008-9538-6 [Accessed November 9, 2016].

Le Saout, S. et al., 2013. Protected Areas and Effective Biodiversity Conservation. *Science*, 342(6160). Available at: http://science.sciencemag.org/content/342/6160/803/tab-pdf [Accessed April 21, 2017].

Sayer JA (2009) Reconciling conservation and development: Are landscapes the answer? *Biotropica*, 41(6):649–652.

Secretariat of the Convention on Biological Diversity, 2014. *Global Biodiversity Outlook 4: A mid term assessment of progress towards the implementation of the strategic plan for biodiversity 2011-2020*, Montreal.

Secretariat of the Convention on Biological Diversity, 2016. *Report of the international technical expert workshop on identifying, accessing, compiling and aggregating domestic and international biodiversity-related investments and impacts*, Montreal, Canada.

SEMRU, 2017. *Ireland's Ocean Economy*, Galway. Available at: http://www.nuigalway.ie/semru/documents/semru__irelands_ocean_economy_2017_online.pdf.

Shaffer, M. et al., 2002. Population Viability Analysis. In R. Beissinger, Steven & R. McCullough, Dale, eds. *Population Viability Analysis*. Chicago: The University of Chicago Press.

Shlalkhanova, A., 2015. Reports from the Field (Part 4): Analysing biodiversity expenditures in Kazakhstan | BIOFIN. *BIOFIN*. Available at: http://www.biodiversityfinance.net/news/reports-field-part-4-analysing-biodiversity-expenditures-kazakhstan [Accessed November 6, 2015].

Somper, J., 2011. Funding trends – the implications for future nature conservation. *ECOS Spring*, pp.32, 1, 34–42. Available at: https://www.banc.org.uk/ecos-32-1-spring-2011-funding-trends-the-implications-for-future-nature-conservation-jonathan-somper/ [Accessed June 22, 2017].

Stanley, D.A., Gunning, D. & Stout, J.C., 2013. Pollinators and pollination of oilseed rape crops (Brassica napus L.) in Ireland: ecological and economic incentives for pollinator conservation. *Journal of Insect Conservation*, 17(6), pp.1181–1189. Available at: http://link.springer.com/10.1007/s10841-013-9599-z [Accessed November 14, 2017].

Storey, D., 1999. Issues of Integration, Participation and Empowerment in Rural Development: The Case of LEADER in the Republic of Ireland. *Journal of Rural Studies*, 15(3), pp.307–315. Available at: http://www.sciencedirect.com/science/article/pii/S0743016798000734 [Accessed November 14, 2017].

Swiss Federal Office for the Environment (FOEN). 2012. *Report on Swiss Public and Private Financial Contributions in Support of the Objectives of Convention on Biological Diversity*, FOEN, International Affairs Division.

Teagsac, 2016. Teagasc National Farm Survey 2016 Results, Agricultural Economics and Farm Survey Department, Rural Economy Development Programme, Teagsac, Available at: https://www.teagasc.ie/media/website/publications/2017/NFS-2016-Final-Report.pdf, [Accessed: September 11, 2017].

Teagsac, 2017, Agriculture in Ireland, Available at: https://www.teagasc.ie/rural-economy/rural-economy/agri-food-business/agriculture-in-ireland/, [Accessed: November 14, 2017].

ten Kate, K., & Crowe, M., 2014. Biodiversity Offset: Policy Options for governments. Input Paper. IUCN technical study group, Gland.

Tittensor, D.P. et al., 2014. A mid-term analysis of progress toward international biodiversity targets. *Science*. Available at: http://science.sciencemag.org/content/early/2014/10/01/science.1257484/tab-pdf [Accessed April 5, 2017].

Underwood, E.C. et al., 2008. Protecting biodiversity when money matters: maximizing return on investment. *PloS one*, 3(1), p.e1515. Available at: http://www.ncbi.nlm.nih.gov/pubmed/18231601 [Accessed November 9, 2016].

UNDP, 2015. *BIOFIN: The Biodiversity Finance Initiative - Mobilising Resources for biodiversity and Sustainable Development*,

Waldron, A. et al., 2013. Targeting global conservation funding to limit immediate biodiversity declines. *Proceedings of the National Academy of Sciences*, 110(29), pp.12144–12148. Available at: http://www.pnas.org/cgi/doi/10.1073/pnas.1221370110 [Accessed November 8, 2016].

Weaver, P; Tinch, R; Schoumacher, C., 2015. *Ecosystem Science for Policy and Practice.* OPERAs MS50/4.11 Implementation, Available at: www.operas-project.eu [Accessed October 14, 2017].

WWF, 2009. *Guide to Conservation Finance: Sustainble Financing for the Planet*, Washington D.C. Available at: http://awsassets.panda.org/downloads/wwf_guide_to_conservation_finance.pdf.

Zavaleta, E. et al., 2008. Enhancing the Engagement of U.S. Private Foundations with Conservation Science. *Conservation Biology*, 22(6), pp.1477–1484. Available at: http://doi.wiley.com/10.1111/j.1523-1739.2008.01046.x [Accessed November 13, 2017].

APPENDICES

APPENDIX 1. CBD RESOURCE MOBILISATION & FINANCIAL REPORTING DECISION TEXT, COP 11 DECISION XI/4

As outlined in decision X/3, *decides* on an overall substantial increase in total biodiversity-related funding for the implementation of the Strategic Plan for Biodiversity 2011-2020 from a variety of sources, using the baseline information referred to in paragraph 6, and, taking into account the limited information available regarding baselines for the indicators adopted in decision X/3, based on Parties" reporting in line with paragraph 5, *resolves* to achieve the following preliminary targets, which are to be considered mutually supportive but independent:

*(a)*Double total biodiversity-related international financial resource flows to developing countries, in particular least developed countries and small island developing States, as well as countries with economies in transition, by 2015 and at least maintaining this level until 2020, in accordance with Article 20 of the Convention, to contribute to the achievement of the Convention"s three objectives, including through a country-driven prioritization of biodiversity within development plans in recipient countries, using the preliminary baseline referred to in paragraph 6;

*(b)*Endeavour for 100 per cent, but at least 75 per cent, of Parties to have included biodiversity in their national priorities or development plans by 2015 and have therefore made appropriate domestic financial provisions;

*(c)*Endeavour for 100 per cent, but at least 75 per cent, of Parties provided with adequate financial resources to have reported domestic biodiversity expenditures, as well as funding needs, gaps and priorities, by 2015, in order to improve the robustness of the baseline and to refine the preliminary targets, as appropriate;

*(d)*Endeavour for 100 per cent, but at least 75 per cent, of Parties provided with adequate financial resources to have prepared national financial plans for biodiversity by 2015, and that 30 per cent of those Parties have assessed and/or evaluated the intrinsic, ecological, genetic, socioeconomic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components;

8.Mindful of the potential of Aichi Biodiversity Target 3 to mobilize resources for biodiversity, *decides* to consider modalities and milestones for the full operationalization of this Target at its twelfth meeting, with a view to their adoption;

9.Acknowledging that, in many developing countries, domestic resources already cover the largest share of biodiversity-related resource mobilization, *decides* to establish, at its twelfth meeting, a transparent process that would encourage and facilitate reporting efforts by developing countries towards achieving the objectives of the Convention and the Aichi Biodiversity Targets.

[…]

17.Encourages Parties to undertake institutional mapping/analysis, covering the whole range of biodiversity resourcing options, as part of developing country-specific resource mobilization strategies within the framework of revising national biodiversity strategies and action plans;

18.Invites Parties to consider the advice and technical information contained in decision XI/30 on incentive measures;

19.Recognizing that the Convention"s strategy for resource mobilization calls for the exploration of new and innovative financial mechanisms at all levels with a view to increasing funding to support the Convention and its Strategic Plan for Biodiversity 2011-2020, and that some of those mechanisms are already being applied, and *recalling* decision X/3, *reiterates* that any new and innovative financial mechanisms are supplementary to and do not replace the financial mechanism established under Article 21 of the Convention;

[...]

*5.*In support of the targets set in paragraph 7, *encourages* Parties and relevant organizations to improve existing financial information by enhancing accuracy, consistency and delivery of information on biodiversity financing and improving reporting on funding needs and shortfalls; and *encourages* Parties to integrate national resource mobilization strategies, including existing needs assessments, into the decision-making process on their funding targets in order to address the funding gap as soon as possible, and to develop, as appropriate, country-specific resource mobilization strategies, including assessment of resource needs, as part of their updated national biodiversity strategies and action plans, as a matter of priority;

CBD COP Decisions: Resource Mobilisation & Financial Reporting

COP 5

- Promote coordination and collaboration with funding institutions through the development of a funding database and the organization of a workshop on financing for biodiversity, to monitor financial resources; to improve relationship with funding institutions as well as to promote the involvement of the private sector (decision V/11).

- Required Parties to establish a process to monitor financial support to biodiversity, and invited funding institutions to develop a reporting relationship with the Convention.

COP 9

- Recommended that each Party should consider appointing a "resource mobilization focal point" to facilitate national implementation of the strategy for resource mobilization.

COP 12 Decision XII/3 Resource mobilization

- Reaffirms commitment to an overall substantial increase in total biodiversity-related funding for the implementation of the Strategic Plan for Biodiversity 2011–2020 from a variety of sources

- Adopts the following targets:

  I. **Double total biodiversity-related international financial resource flows to developing countries** using average annual biodiversity funding by 2015, and at least maintain this level until 2020…
  II. **Mobilize domestic financial resources** from all sources to reduce the gap between identified needs and available resources at domestic level […]
  III. Endeavour for Parties to have included biodiversity in their national priorities or development plans by 2015, and made **appropriate domestic financial provisions**
  IV. Endeavour for Parties to […] have **reported domestic biodiversity expenditures, as well as funding needs, gaps and priorities**, by 2015, in order to improve the robustness of the baseline
  V. Endeavour for Parties […] to have **prepared national financial plans** for biodiversity by 2015 […]

COP Decision XII/20

- Urges Parties and other Governments to **report on their contribution to the collective efforts to reach the global targets for resource mobilization**, against the established baseline, in their sixth national reports as well as subsequent national reports

- **Urges Parties to increase their efforts to achieve the targets**, including the doubling of total biodiversity-related international financial resource flows to developing countries.

- **Urges Parties** that have not yet done so **to provide the necessary baseline information and report progress against the targets for resource mobilization by 1 July 2017**, using the financial reporting framework.

APPENDIX 2. NATIONAL BIODIVERSITY ACTION PLAN OBJECTIVES (2017-2021)

1. Mainstream biodiversity in the decision making process across all sectors

1.1. Shared responsibility for the conservation of biodiversity and the sustainable use of its components is fully recognised, and acted upon, by all sectors

1.2. Strengthened legislation in support of tackling biodiversity loss in Ireland

2. Substantially strengthen the knowledge base for conservation management and sustainable use of biodiversity

2.1. Knowledge of biodiversity and ecosystem services has substantially advanced our ability to ensure conservation, effective management and sustainable use by 2021

3. Increase awareness and appreciation of biodiversity and ecosystems services

3.1 Enhanced appreciation of the value of biodiversity and ecosystem services among policy makers, stakeholders, local communities and the general public

4. Conserve and restore biodiversity and ecosystem services in the wider countryside

4.1. Agricultural, rural development, forestry and peatland policies and strategies to achieve net benefits for biodiversity and ecosystem services

4.2. Principal pollutant pressures on terrestrial and freshwater biodiversity substantially reduced by 2020

4.3. Optimised benefits for biodiversity in Flood Risk Management Planning and drainage schemes

4.4. Harmful invasive alien species are controlled and there is reduced risk of introduction and/or spread of new species

4.5. Effective management and restoration in place for biodiversity and ecosystem services in the wider countryside by 2021

4.6. Improved enforcement of wildlife law

5. Conserve and restore biodiversity and ecosystem services in the marine environment

5.1. Substantial progress made towards “good ecological status” of marine waters over the lifetime of this Plan

5.2. Fish stock levels maintained or restored to levels that can produce maximum sustainable yield, where possible, no later than 2020

6. Expand and improve on the management of protected areas and legally protected species

6.1. Natura 2000 network established, safeguarded, designated by 2018 and under effective conservation management by 2020

6.2. Sufficiency, coherence, connectivity and resilience of the protected areas network substantially enhanced by 2020

6.3. No protected habitats or species in worsening conservation status by 2020; majority of habitats and species in, or moving towards, favourable conservation status by 2027

7. Strengthen international governance for biodiversity and ecosystem services

7.1. Substantially strengthened support for biodiversity and ecosystem services in external assistance

7.2. Enhanced contribution to international governance for biodiversity and ecosystem services

7.3. Enhanced cooperation with Northern Ireland on common issues

7.4. Substantial reduction in the impact of Irish trade on global biodiversity and ecosystem services

APPENDIX 3. CONVENTION ON BIOLOGICAL DIVERSITY - AICHI TARGETS

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

Target 1
By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Target 2
By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Target 3
By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

Target 4
By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

Target 5
By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Target 6
By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Target 7
By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Target 8
By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Target 9
By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Target 10
By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

Target 11
By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

Target 12
By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Target 13
By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services

Target 14
By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Target 15
By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Target 16
By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building

Target 17
By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Target 18
By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

Target 19
By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

Target 20
By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

APPENDIX 4. BIOFIN CATEGORIES (BIOFIN 2016)

Biodiversity and development planning
Biodiversity coordination and management
Biodiversity laws, policies, plans
Multilateral Environment Agreement (MEA)
Other relevant laws, policies, plans
Spatial planning
Strategic Environmental Assessment (SEA) frameworks
Biodiversity awareness and knowledge
Biodiversity awareness (e.g. public awareness campaigns, park visitor education etc.)
Biodiversity communication
Biodiversity scientific research
Data generation and spatial mapping
Formal biodiversity education
Non-formal biodiversity education, including technical training
Valuation of biodiversity and ecosystems
Biosafety
Genetically modified organisms (GMOs), including Living modified organisms (LMOs)
Invasive alien species
Green economy
Sustainable tourism

Sustainable urban areas
Pollution management
Other pollution reduction measures
Waste management
Wastewater management
Protected areas and other conservation measures
Expansion of protected areas
Ex-situ conservation of species (botanical gardens and gene banks)
Loss of valuable habitats, including targeted conservation of species outside PAs
Other effective area-based conservation measures (OECMs), including buffer zones
Protected areas, including indigenous and communities conserved areas
Restoration
Reintroduction of species
Site re-development and engineering
Site-management
Sustainable use
Sustainable agriculture
Sustainable fisheries
Sustainable forestry
Sustainable wildlife

APPENDIX 5. NATIONAL EXPENDITURE BY BIOFIN CATEGORIES

BIOFIN CATEGORIES		2010-2015 Expenditure
Biodiversity and development planning		
Biodiversity coordination and management	€	96,461,761
Biodiversity laws, policies, plans	€	5,702,194
Multilateral Environment Agreement (MEA)	€	663,245
Other relevant laws, policies, plans	€	1,313,717
Spatial planning	€	12,268
Strategic Environmental Assessment (SEA) frameworks	€	225,000
Biodiversity and development planning Total	**€**	**104,378,184**
Biodiversity awareness and knowledge		
Biodiversity awareness (e.g. public awareness campaigns, park visitor education etc.)	€	13,151,727
Biodiversity communication	€	50,667,391
Biodiversity scientific research	€	16,003,776
Data generation and spatial mapping	€	39,660,414
Formal biodiversity education	€	343,039
Non-formal biodiversity education, including technical training	€	1,928,499
Valuation of biodiversity and ecosystems	€	201,753
Biodiversity awareness and knowledge Total	**€**	**121,956,598**

Biosafety		
Genetically modified organisms (GMOs), including Living modified organisms (LMOs)	€	1,087,680
Invasive alien species	€	5,581,246
Biosafety Total	€	6,668,926
Green economy	€	-
Sustainable tourism	€	333,781
Sustainable urban areas	€	578,178
Green economy Total	€	911,959
Pollution management		
Other pollution reduction measures	€	7,650
Waste management	€	-
Wastewater management	€	-
Pollution management Total	€	7,650
Protected areas and other conservation measures		
Expansion of protected areas	€	64,078
Ex-situ conservation of species (botanical gardens and gene banks)	€	11,479,263
Loss of valuable habitats, including targeted conservation of species outside PAs	€	369,124,798
Other effective area-based conservation measures (OECMs), including buffer zones	€	725,871
Protected areas, including indigenous and communities conserved areas	€	157,620,669
Protected areas and other conservation measures Total	€	539,014,679
Restoration		
Reintroduction of species	€	875,416
Site re-development and engineering	€	29,305,713
Site-management	€	752,676
Restoration Total	€	30,933,805
Sustainable use		
Sustainable agriculture	€	654,514,843
Sustainable fisheries	€	4,810,137
Sustainable forestry	€	39,622,430
Sustainable wildlife	€	1,300,722
Sustainable use Total	€	700,248,132

APPENDIX 6. NATIONAL EXPENDITURE BY ORGANISATION TYPE

Organization type	2010	2011	2012	2013	2014	2015
Local Gvt	4,894,026	4,469,804	3,972,930	2,079,124	1,204,353	768,504
State Gvt	294,523,457	252,061,202	356,604,376	131,228,165	203,302,840	201,149,106
National/Local NGO	3,851,177	3,848,735	2,941,339	3,141,292	3,100,715	3,072,043
Quasi-public private company	1,905,000	1,927,500	1,519,500	1,762,704	1,628,632	2,901,886
Private Company national	-	399,165	399,165	510,425	510,425	1,159,566
Grand Total	**305,173,660**	**262,706,406**	**365,437,310**	**138,721,710**	**209,746,966**	**209,051,104**

APPENDIX 7. ESTIMATED EXPENDITURE ON MAIN SECTORS

Sector	2010	2011	2012	2013	2014	2015
Agriculture	227,808,338	201,395,830	299,849,926	78,341,755	148,071,072	150,065,572
Fishing	22,672,587	19,604,783	22,406,434	20,303,104	20,666,717	19,655,591
Forests	14,160,697	8,525,855	7,736,230	6,733,055	6,312,402	5,084,776
Aquaculture	15,557	16,973	5,748	2,005	1,803	-
Water	347,110	394,500	415,627	414,000	422,400	281,496
Not for profit	3,632,710	3,631,768	2,726,999	2,948,403	2,875,378	2,819,556
Mining and Extractives	1,485,000	1,485,000	1,077,000	1,317,000	1,164,000	2,384,000
Natural Heritage	27,169,895	19,021,980	23,642,492	23,325,407	24,671,097	22,051,444
Education, Science, and Research	307,253	348,032	367,132	382,513	364,807	69,402

APPENDIX 8. FULL LIST OF PROGRAMMES INCLUDED IN THE REVIEW

PROGRAMMES INCLUDED IN THE REVIEW
NATIVE WOODLAND CONSERVATION
NATIVE WOODLAND ESTABLISHMENT
NEIGHBOURWOOD AFFORESTATION
CHALARA (RECONSTITUTION)
WOODLAND IMPROVEMENT
AFFORESTATION GRANTS & PREMIUMS
COFORD PROGRAMME: ECOVALUE
COFORD PROGRAMME: MONITORING & ASSESSING IRISH FOREST BIOMAS
COFORD PROGRAMME: GEOFOREST
COFORD PROGRAMME: SHINE
FOREST REPRODUCTIVE GENETIC MATERIAL (SEED AND STAND)
FOREST ENVIRONMENTAL PROTECTION SCHEME
CONSERVATION OF GENETIC RESOURCES IN PLANTS & ANIMALS

ORGANIC FARMING SCHEME
REPS (NATURA 2000 MEASURE 213/MEASURE 12 NATURA 2000)
REPS (MEASURE 214)
AEOS (MEASURE 213 NATURA/MEASURE 12 AEOS NATURA 2014-2020)
AEOS (MEASURE 214/MEASURE 10 2014-2020)
AEOS INVESTMENTS (MEASURE 216/MEASURE 4)
LESS FAVOURED AREAS
GLAS
FARM WASTE MANAGEMENT
BURREN FARMING FOR CONSERVATION
SEAFOOD ENVIRONMENTAL MANAGEMENT & CERTIFICATION GRANT AID SCHEME
DEVELOPMENT, ACCREDITATION, MANAGEMENT AND CERTIFICATION OF SEAFOOD STANDARDS
SEAFOOD EMS PROGRAMME
RECYCLING OF REDUNDANT FISHING GEAR
CELTIC SEA HERRING
RESPONSIBILY SOURCED STANDARDS
VELVET CRAB CATCH REDUCTION
BI-VALVE FISHERIES IN NATURA 2000 SITE
ENVIRONMENTAL MANAGEMENT OF TUNA FISHERIES
V-NOTCHING LOBSTER SCHEME
ASSESSING GEAR SELECTIVITY & CATCHABILITY IN THE SHRIMP FISHERY
OBSERVER PROGRAMME FOR CETACEAN BYCATCH
ENVIRONMENTAL MANAGEMENT OF SEAL DEPREDATION AND BY-CATCH IN INSHORE FISHERIES
COD AVOIDANCE AND DISCARD REDUCTION
DISCARD REDUCTION IN IRISH FISHERIES & GEAR TRIALS
SUBLITTORAL FISHING GEAR IMPACT STUDY FOR NATURA 2000 COMPLIANCE
NATURA 2000 COMPLIANCE
MARINE STRATEGY FRAMEWORK DIRECTIVE
COMMON FISHERIES POLICY
WATER FRAMEWORK DIRECTIVE (MARINE COMPONENT)
MARINE RESEARCH PROGRAMME (SHIP TIME PROGRAMME)
ORGANIC AQUACUTLURE SCHEME
SEA FISHERIES PROTECTION AUTHORITY
LOUGHS AGENCY CONSERVATION & PROTECTION PROGRAMME
NATIONAL SEABED SURVEY
SALMON CONSERVATION FUND
INVASIVE SPECIES CONTROL (IFI)
IFI HABITAT & SPECIES PROTECTION SCHEME
IFI FISHERIES RESEARCH

IFI MONITORING OF FRESHWATER SPECIES
IFI POLICY DEVELOPMENT
IFI OPERATIONAL & PROJECTS
IFI ADMINSTRATION
SALMON HARDSHIP FUND
GENEVA CONVENTION
GLOBAL ENVIRONMENT FACILITY
SEA LETTUCE INTERVENTION
SHERKIN ISLAND MARINE STATION
EPA BIODIVERSITY TEAM & ACTIVITIES
EPA BIOLOGICAL MONITORING AND ASSESSMENT
INTEGRATED CATCHMENT MANAGEMENT PROGRAMME
ENVIRONMENTAL ENFORCEMENT & LICENCING ACTIVITIES
GENETICALLY MODIFIED ORGANISMS
LANDCOVER MAPPING
EPA STRIVE (BIODIVERSITY & NATURAL CAPITAL)
OPW ENVIRONMENTAL RIVERS ENHANCEMENT PROGRAMME (CAPITAL ENHANCEMENT)
OPW ENVIRONMENTAL RIVERS ENHANCEMENT PROGRAMME (TECHNICAL DESIGN, SUPERVISION AND SCIENTIFIC MONITORING)
OPW NATURA SITE RESTORATION (TECH DESIGN)
OPW INVASIVE SPECIES PROGRAMME
NATIONAL BOTANICAL GARDENS (GROSS)
WILD ATLANTIC WAY ENVIRONMNETAL MONITORING PROGRAMME
EIA/SEA FOR ALL FAILTE IRELAND PLANS, PROGRAMMES AND STRATEGIES
FAILTE IRELAND BIODIVERSITY GUIDELINES
FAILTE IRELAND BIODIVERSITY PLANNING
NATIONAL BIODIVERSITY DATA CENTER
NPWS BIODIVERSITY AWARENESS PUBLICATIONS
NPWS BIODIVERSITY EDUCATION OR ENGAGEMENT EVENTS
NPWS BIODIVERSITY CONFERENCE ATTENDANCE OR TRAINING
CESSATION OF TURF CUTTING SCHEME
NPWS FARM PLAN SCHEME: PLAN CREATION OR COMPLIANCE REPORT
NPWS FARM PLAN SCHEME: PLAN IMPLEMENTATION
NPWS INVASIVE/PROBLEMATIC SPECIES
NPWS CONSERVATION OR HABITAT RESTORATION PROJECTS
NPWS PARTRIDGE SCHEME
BURREN FARMING FOR CONSERVATION (NPWS COMPONENT)
NPWS ANIMAL WELFARE AND VETINERY FEES
NPWS SPECIES REINTRODUCTION OR RECOVERY
NPWS HABITAT OR SPECIES SURVEYS

NPWS DATA MANAGEMENT
NPWS APPLIED RESEARCH, IMPACT ASSESSMENT OR STUDY
NPWS RESEARCH EQUIPMENT
NPWS ENFORCEMENT OF ENVIRONMENTAL LAW/DESIGNATED SITES
NPWS CONSERVATION PLANNING
NPWS APPEALS
NATIONAL PARKS RUNNING COSTS & MAINTENANCE: FACILITIES, FENCING & ACCESS
NATIONAL PARKS RUNNING COSTS & MAINTENANCE: GENERAL
NATIONAL PARKS: LANDSCAPING & GREENERY COSTS
NPWS NATIONAL PARKS AWARENESS
NATURE RESERVE RUNNING COSTS & MAINTENANCE - FACILITIES, FENCING & ACCESS
NATURE RESERVE RUNNING COSTS & MAINTENANCE - GENERAL COSTS
NATIONAL PARKS/NATURE RESERVES CONSERVATION PROJECTS
NATURE RESERVE AWARENESS PROJECTS
NATURE RESERVE LAND MANAGEMENT COSTS
NATURE RESERVE SPECIES MANAGEMENT & VET COSTS
NPWS PERSONNEL
RESULTS BASED AGRI-ENVIRONMENT PAYMENS SCHEME
HERITAGE COUNCIL GRANTS
LOCAL AGENDA 21 PROJECT FUNDING
LEADER 2007-2013 PROJECT FUNDING
MAMMALS IN A SUSTAINABLE ENVIRONMENT (MISE) (INTERREG)
TARGETED ECOLOGICAL MODELLING TOOLS FOR LAKE MANAGEMENT (INTERREG)
HYDROGRAPHIC SURVEY PROJECT (INTERREG)
PRACTICAL IMPLEMENTATION OF FRESHWATER PEARL MUSSEL MEASURES (INTERREG)
ACTION FOR BIODIVERSITY (INTERREG)
WATERFORD COUNTY COUNCIL BIODIVERSITY PROJECTS
DUBLIN CITY COUNCIL BIODIVERSITY PROJECTS
FINGAL COUNTY COUNCIL BIODIVERISTY OFFICER
GALWAY COUNTY COUNCIL BIODIVERSITY PROJECTS
ARAN LIFE
DULHALLOW LIFE (BLACKWATER)
CAISIE LIFE
MULKEAR LIFE
KERRY LIFE
RAISED BOG LIFE 2 & 3
RAPTOR LIFE
ROSEATE TERN
GEOPARK LIFE BURREN

COILLTE BIODIVERSITY STAFF
COILTE BIODIVERSITY MANAGEMENT
COILTE ECOLOGICAL MONITORING
COILLTE PRIORITY WOODLAND HABITATS (LIFE)
COILLTE NATIVE FORESTS
BNM ENVIRONMENTAL REINSTATEMENT WORKS
PEATLAND COUNCIL
NGOs INCLUDED IN THE REVIEW
NATIVE WOODLAND TRUST
WOODLANDS OF IRELAND
BIRDWATCH IRELAND
BAT CONSERVATION IRELAND
IRISH WILDLIFE TRUST
IRISH PEATLAND CONSERVATION COUNCIL L
IRISH WHALE & DOLPHIN GROUP
BUTTERFLY CONSERVATION IRELAND
IRISH SEAL SANCTUARY
THE VINCENT WILDLIFE TRUST
AN TAISCE
ECO-UNESCO
FRIENDS OF THE EARTH
IRISH RED GROUSE ASSOCIATION CONSERVATION TRUST
THE IRISH GREY PARTRIDGE CONSERVATION TRUST
CENTER FOR ENVIRONMENTAL LIVING & TRAINING ADMINSTRATION
VOICE OF IRISH CONCERN FOR THE ENVIRONMENT
SONARITE THE NATIONAL ECOLOGY CENTRE
OWLS
THE CURLEW TRUST
IRISH ENVIRONMENTAL NETWORK
ENVIRONMENTAL LAW IMPLEMENTATION GROUP
IRISH ENVIRONMENTAL NETWORK
STREAMSCAPES
EUROPEAN ENVIRONMENTAL BUREAU