



# Scottish Biodiversity Strategy to 2045

Tackling the Nature  
Emergency in Scotland



Scottish Government  
Riaghaltas na h-Alba

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Emergency in Scotland

**Cover photography:**

Moss covered trees and fallen branches at Barnluasgan, Argyll.  
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Eurasian beaver at Knapdale, Argyll.  
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A small serpulid aggregation with feather stars in Loch Teacuis  
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# Ministerial Foreword



A new international consensus is building around the urgent need to act decisively to address the twin crises of biodiversity loss and climate change together. Just like climate change, the loss of species and degradation of our natural environment is an existential threat to humanity. And just like climate change, the action needed is both urgent and transformative. That's why the Scottish Government is clear that this is an emergency that requires an emergency response.

This strategy sets out the framework for that response. It articulates a vision for a future where Scotland's natural environment is restored and supporting thriving communities and wildlife alike, proposes outcomes and key actions that will set us on the path to deliver this vision, and establishes the architecture needed for the cross-government delivery and the deep collaboration we will need with partners, stakeholders and land managers. Tackling the nature emergency is a long-term endeavour, and it will not be achieved within the lifetime of any government or Parliamentary term. We are therefore putting in place a range of vital measures to ensure that this Strategy will continue to be relevant, and direct the delivery of the lasting outcomes for biodiversity that we need to see in Scotland, whatever the political complexion of future governments.

At the heart of this strategy is collaboration. No one can tackle the nature emergency alone, and I want to thank the many stakeholders, including farmers, other land managers, marine industries, their representatives, and individuals who have engaged with the development of this strategy. I look forward to working together and supporting each other to deliver the change we need to see.

The nature emergency is a global emergency and so this partnership needs to extend beyond our borders. That's why I am committed to working with partners across the UK, EU and the world to support progress in protecting and restoring nature wherever it is.

At the time this is published, I am attending the CoP15 meeting of the United Nations Convention on Biological Diversity in Montreal, Canada, representing Scotland at what I hope will be a pivotal moment in the global fightback against extinction and environmental degradation. Scotland is pushing for an ambitious outcome. The Scottish Government has led a process on behalf of the United Nations, securing the support of over 300 sub-national governments, countries, regions and cities and cities around the world for the Edinburgh Declaration. The Declaration calls for a high ambition outcome, and for the role of sub-national governments of countries, regions and cities in delivering for biodiversity to be recognised in the new global biodiversity framework.

This strategy remains a draft to ensure that the final version reflects any agreement made at COP15. A final version will be published alongside the delivery plan, which will build on the key actions presented here to provide a detailed action plan for the whole of government that will guide our work to tackle the nature emergency over the coming years.

A handwritten signature in brown ink that reads "Lorna Slater". The signature is fluid and cursive, with the first name "Lorna" and the last name "Slater" clearly distinguishable.

**Lorna Slater MSP**

Minister for Green Skills, Circular Economy and Biodiversity

# Executive Summary

The Global Climate Emergency and the Nature Emergency are twin reinforcing crises: the actions we take to address each are fundamental to our wellbeing and survival as a species. There is now an [indisputable body of evidence](#) that biodiversity, both globally and in Scotland, is in real trouble. Our efforts to address the crisis to date have generated some lessons and local successes, but we urgently need to accelerate and scale up those efforts to drive landscape and seascape scale recovery.

This strategy sets out a clear ambition: for Scotland to be **Nature Positive** by 2030, and to have restored and regenerated biodiversity across the country by 2045. Our vision is:

By **2045**, Scotland will have restored and regenerated biodiversity across our land, freshwater and seas.

Our natural environment, our habitats, ecosystems and species, will be diverse, thriving, resilient and adapting to climate change.

Regenerated biodiversity will drive a sustainable economy and support thriving communities, and people will play their part in the stewardship of nature for future generations.



Scots pine at Beinn Eighe National Nature Reserve.  
©Lorne Gill/NatureScot.

To deliver the Vision, we have identified a detailed set of [Outcomes](#) which help us to define and understand what success will look like by 2045:

- ▶ Across our land and seascapes
- ▶ On land
- ▶ In rivers, lochs and wetlands
- ▶ In marine and coastal environments

These Outcomes will be achieved through detailed actions set out in Delivery Plans.

This Strategy contains 26 of the most urgent [Priority Actions](#) which will put us on track for being halting the loss of biodiversity and being **nature positive** by 2030. These actions will:

1. Accelerate restoration and regeneration
2. Expand and connect protected areas and improve their condition
3. Support nature-friendly farming, fishing and forestry
4. Recover and protect vulnerable and important species and
5. Generate the investment needed to support nature recovery

We will ensure that our ambitious Vision, Outcomes and Priority Actions are successfully delivered by putting in place a [Strategic Delivery Framework](#) to provide the enabling conditions for success. The framework comprises:

- ▶ This **Strategy**, which sets out our high-level Vision and Outcomes
- ▶ A Natural Environment Bill to put in place **Statutory Targets for nature restoration**
- ▶ **Delivery Plans** to be reviewed every five years which set out detailed actions we will take
- ▶ An **Investment Plan** to set out the cost of these actions and drive investment in their delivery
- ▶ A **monitoring and reporting framework** so we can monitor the effectiveness of our actions

# Priority Actions For 2030

<b>1. Accelerate restoration and regeneration</b>		
Introduce statutory nature restoration Targets	Introduce a programme of ecosystem restoration	Continue to drive down and deliver substantially reduced deer densities across our landscapes
Take further action to ensure sustainable management of grazing by sheep is compatible with the reduction in deer impacts, so that ecosystem health as a whole improves	Implement Scottish Plan for INNS surveillance, prevention and control, and secure wider support measures to enable effective INNS removal.	Ensure grouse-moor management sustains healthy biodiversity
Develop a policy and investment framework for restoring Scotland's Atlantic Rainforest	Improve resilience in coastal and marine systems by reducing key pressures	Increase and safeguard space for coastal habitat change
<b>These Actions support our efforts to meet CBD Goal A and Targets 2, 6 and 9<sup>1</sup></b>		
<b>2. Expand and connect protected areas and improve their condition</b>		
Expand our Protected Areas to at least 30% of the land and seas	Ensure we secure positive effects for biodiversity from our National Planning Framework (NPF4)	Ensure that every local authority area has a nature network improving ecological connectivity across Scotland
Increase the number of sites in Scotland's Marine Protected Area network with specific fisheries management measures, and designate at least 10% of Scotland's seas as Highly Protected Marine Areas	Introduce at least one new National Park	Realise the potential of National Nature Reserves as key assets for increasing ecological connectivity
<b>These Actions support our efforts to meet CBD Goal A and Targets 1, 2, and 3</b>		
<b>3. Nature-friendly farming, fishing and forestry</b>		
Ensure increased uptake of high diversity, nature-rich, high soil-carbon, low intensity farming methods while sustaining high quality food production	Introduce an agricultural future support framework which delivers for nature restoration and biodiversity, as well as high quality food production	Shift half of all funding for farming and crofting from unconditional to conditional support by 2025, with targeted outcomes for biodiversity

<sup>1</sup> See [Annex 1](#)

Ensure that productive forests and woodlands deliver increased biodiversity and habitat connectivity as well as timber production	Implement further fisheries measures in vulnerable marine ecosystems and Priority Marine Features outside of MPAs	Implement an ecosystem approach to management of sea fisheries, based on the best available scientific advice, and minimising adverse impacts on non-target species and habitats
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**These Actions support our efforts to meet CBD Goal A and Targets 1, 2, 3, 4 & 6**

#### **4. Recover and protect vulnerable and important species**

Continue effective species recovery, reintroduction and reinforcement programmes	Manage existing and emerging pressures to improve the conservation status of seabirds	Respond to pressures facing marine mammals to maintain or improve their conservation status
Implement measures to protect and recover Scotland's wild Atlantic salmon and migratory fish populations	Revise the <a href="#">Scottish Biodiversity List</a> of species and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland	Support surveillance and monitoring to support managing risks around pathogens and disease in wild bird populations

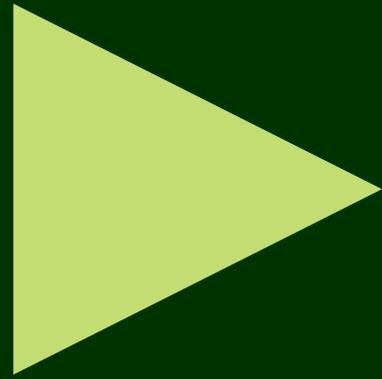
**These Actions support our efforts to meet CBD Goal A and Target 4**

#### **5. Invest in nature**

Maintain and seek to increase investment in nature restoration through our £65 million Nature Restoration Fund	Develop a Biodiversity Investment Plan to direct how we address the Finance Gap for nature	Establish a values-led, high-integrity market for responsible private investment in natural capital, supported by a national project pipeline for nature-based solutions
Provide direction on, and investment in, green skills and local economic opportunities supporting nature-based education, skills and volunteering	Increase investment in Scotland's Marine Environmental Enhancement Fund and the benefits delivered to Scotland's coasts and seas	Continue to develop and enhance the woodland and peatland carbon codes to attract and assist additional investment and develop other codes where appropriate

**These Actions support our efforts to meet CBD Goal D and Target 19**

# Chapter 1



Loch of Spiggie, Shetland ©Lorne Gill/NatureScot

# 1. Introduction

## 1.1 What is Biodiversity and why is it important?

Biodiversity is the web of life. It is the variety of all living things and the ecosystems where they live (on land or in water). It comprises the living organisms in a particular space, whether in a window-box, garden, park, meadow, peatland, river, loch, estuary, ocean, beach or mountain top.

### **Biodiversity, Nature And Natural Capital**

These terms are often used interchangeably but they are not precisely the same. In this document:

**Biodiversity** refers to the variability among living organisms within terrestrial, marine and aquatic ecosystems and the ecological complexes they are part of. This includes diversity within species, between species and across ecosystems.

**Nature** includes biodiversity, geodiversity and the natural elements of our landscapes and seascapes. It encompasses all the underpinning features and forces that have continued since the Earth was formed from summit to seabed including rocks, landforms, soils and processes like weather systems. Nature has shaped our history, culture and identity. The best way to truly understand the importance of biodiversity is to imagine what nature would be like without it.

**Natural Capital** is a concept that recognises Nature as a valuable asset which provides a stock and flows of ecosystem services (for example clean air, carbon storage, flood management, food production and recreational opportunities). Collectively these underpin and benefit our society and economy. Framing the natural environment in this way emphasises the need to invest in, and manage, this asset within safe environmental limits.

■ ■ Nature is our home... Good economics demands we manage it better. We are part of nature, not separate from it. ■ ■

The Economics of Biodiversity: The Dasgupta Review

Biodiversity inspires people. It has enormous value in its own right but is also central to our survival as a species. Our economy, jobs, health and wellbeing depend on it and it is an integral part of our culture and way of life. More than half of the world's GDP (US\$44 trillion) is thought to be dependent on nature in some way. Yet humanity has caused the [loss of 83% of all wild mammals and half of all plants](#).



Otter and cub, amongst the shoreline seaweed on Loch Scresort, Isle of Rum National Nature Reserve  
©Laurie Campbell/NatureScot

Biodiversity supports food production and security through insect pollination in farming and horticulture and our fishing industry, which depends on resilient and productive seas. It provides the blueprint for many modern medicines and contributes to our wellbeing, providing recreation, relaxation and a sense of place. Healthy biodiversity protects soil from eroding, purifies water and helps prevent and mitigate flooding.

**We face twin reinforcing crises: a decline in biodiversity will exacerbate the climate crisis – and a changing climate will accelerate the rate of biodiversity loss.**

The role biodiversity plays in addressing and mitigating the impact of climate change is vital. Globally, when they are functioning well, ocean and land ecosystems remove around 50% of human-made carbon dioxide emissions each year. The more the world warms however, the more stress will be placed on ecosystems, triggering feedback loops that will accelerate warming and extreme weather events. Protecting and regenerating biodiversity is the best chance we have to mitigate and adapt to climate change.

## 1.2 Why do we need a biodiversity strategy?

We are at a critical juncture. Our failure to address the mutually reinforcing **twin crises** of biodiversity loss and climate change is already impacting on our economy, society and wider wellbeing.

The strategy sets out a **nature positive** vision for Scotland – one where biodiversity is regenerating and underpinning a healthy and thriving economy and society and playing a key role in addressing climate change. The Scottish Biodiversity Strategy will sit alongside Scotland’s Climate Change Plan and, through developing and driving investment in nature based solutions, will play a significant role in delivering our commitment to Net Zero. In its own right, it sets out how we will protect and regenerate biodiversity to ensure the sustainable flow of ecosystem services on which we all depend. The strategy also speaks to the huge economic and social opportunities regenerating our biodiversity will bring – in terms of new investment, new job opportunities for communities and our overall health and wellbeing.

The Scottish Biodiversity Strategy is for everyone – large corporate players, small businesses, land managers, non-government organisations and Scotland’s communities and citizens whose decisions in everyday lives as producers and consumers have an impact on biodiversity. Only by coming together to deliver transformational change in the way we use and manage our resources can we avoid irreversible damage to biodiversity.

## 1.3 The international context

Globally there is increasing consensus on the urgency of tackling the biodiversity crisis. The UN Decade of Ecosystem Restoration was launched in 2020 with the aim of preventing, halting and reversing the degradation of ecosystems worldwide. Through the Leaders' Pledge for Nature, world leaders have committed to reversing nature loss by 2030 and delivering a nature positive world. **Nature Positive** means reversing the downward curve of biodiversity loss so that levels of biodiversity are once again increasing, **bending the curve** of biodiversity loss. The Scottish Government signed the Leaders' Pledge for Nature at the UNFCCC's 26th Conference of Parties (COP26), held in Glasgow.

### A Nature Positive Scotland by 2030



Scotland is fully committed to implementing international obligations and participates actively in international multilateral fora, supporting the United Nations Convention on Biological Diversity (CBD) and the development of the Global Biodiversity Framework (Annex A). Scotland is also committed to implementing key regional agreements such as the Bern Convention and the Convention for the Protection of the Marine Environment in the North-East Atlantic (OSPAR), as well as to maintaining or exceeding European Union (EU) environmental standards.

## 1.4 Scotland's strategic context

Delivering a **nature positive** future for Scotland requires a multi-sectoral, whole of society approach. Key policies and strategies increasingly recognise the fundamental importance of biodiversity to achieving broader environmental, economic and social objectives. There is a significant and unique opportunity to leverage a key set of policy levers:

- ▶ **Scotland's National Strategy for Economic Transformation** sets out a vision that by 2032 Scotland will be a **wellbeing economy** – an economic system which serves the collective wellbeing of current and future generations within safe ecological limits, placing people and the planet at its core. Underpinning this is a commitment to work across society to deliver lasting action that secures a **just transition** ensuring that economic change is managed in a way that is fair for all
- ▶ **The Environment Strategy for Scotland** creates the overarching framework for Scotland's strategies and plans on the environment and climate change. It contains six outcomes including

**■ ■ Scotland's nature is protected and restored with flourishing biodiversity and clean and healthy air, water, seas and soils. ■ ■**

- ▶ **The Climate Change Plan** sets out policies and proposals up to 2032 as part of the journey to the net zero target by 2045 with a 75% reduction in emissions by 2030. Nature-based solutions such as woodland creation and peatland restoration will reduce emissions and help us adapt to the impacts of climate change in line with Scotland's Climate Change Adaptation Programme
- ▶ The 'Delivering Scotland's **Circular Economy** – route map to 2025 and beyond' consultation recognises the need to ensure the range of actions we are undertaking are both complementary and coordinated as part of our overall efforts to tackle the twin crises of climate change and biodiversity loss
- ▶ Scotland's **Blue Economy** vision states that 'By 2045 Scotland's shared stewardship of our marine environment supports ecosystem health, improved livelihoods, economic prosperity, social inclusion and wellbeing.' This means marine, and inter-linked freshwater and coastal environments are restored, adapted and resilient to climate change and sustainably managed to achieve good environmental status
- ▶ **Scotland's Vision for Agriculture** outlines our aim to transform how we support farming and food production in Scotland to become a global leader in sustainable and regenerative agriculture. We will work with and support farmers and crofters to meet more of our own food needs sustainably and to farm and croft with nature
- ▶ Scotland's forthcoming **land reform bill** seeks to reform the way Scotland's land is used and managed to ensure greater benefit to communities and the environment

- ▶ Forests and woodlands deliver a rich mixture of benefits, contributing to our economy and providing jobs, helping make Scotland a zero carbon economy. The **2070 Vision for Forestry** sets out how we will have more forests and woodlands, sustainably managed and better integrated with other land uses
- ▶ [NPF4 \(The National Planning Framework\)](#) is a long-term plan for Scotland that sets out where development and infrastructure is needed, in a way that safeguards nature and gives all of Scotland's people access to the wellbeing it provides

The remainder of this Strategy is set out as follows:

- ▶ Chapter 2 [Sets out the evidence of biodiversity loss and the drivers of loss in Scotland](#)
- ▶ Chapter 3 [Sets out the Strategy's Vision, the Outcomes we need to see if the Vision is to be achieved, and the Key Actions we need to take to deliver the Outcomes](#)
- ▶ Chapter 4 [Sets out the Conditions for Success which need to be put in place to support the successful delivery of the Outcomes](#)
- ▶ Chapter 5 [Sets out how we will measure the effectiveness of our actions](#)

## Case Study: Deadwood Management in Scotland's National Forests



Many species of birds, amphibians, reptiles and mammals forage, shelter and rear young in and around deadwood and veteran trees, and these are even more valuable for a range of insects (especially beetles), fungi and lichens. Deadwood is also vitally important for species in aquatic ecosystems. Standing trees that are dying or dead (called snags), decaying logs and small pieces of deadwood on the forest floor are vital for forest biodiversity and are maintained whenever possible.

Supporting **Scotland's Vision for Forestry**, Forestry Land Scotland (FLS) work hard to enhance biodiversity adding thousands of tonnes of new deadwood across Scotland's national forest each year, which provides habitat for hundreds of generalist and specialist species. They focus on increasing the provision and retention of scarce types of deadwood, such as large-diameter snags and logs, keeping deadwood in woodland during tree harvesting operations, leaving dead or dying veteran trees and logs on-site, and creating piles of deadwood.

FLS have been working with the [Royal Zoological Society of Scotland](#), and the [Rare Invertebrates in the Cairngorms](#) project, to create specific deadwood habitat for rare species, including the endangered pine hoverfly, one of the rarest species in Scotland. Previously thriving in pinewoods across the country, it currently can only be found at one or two sites due to a lack of suitable deadwood habitat for its larvae which develop and feed in the water that collects in rot-holes in Scots pine stumps. In 2022, this conservation management resulted in adult hoverfly being spotted in the wild for the first time in nearly a decade.



Pine hoverfly larvae being placed in deadwood trough - image credit: Kenny Kortland



Captive breeding pine hoverfly - image credit: Kenny Kortland

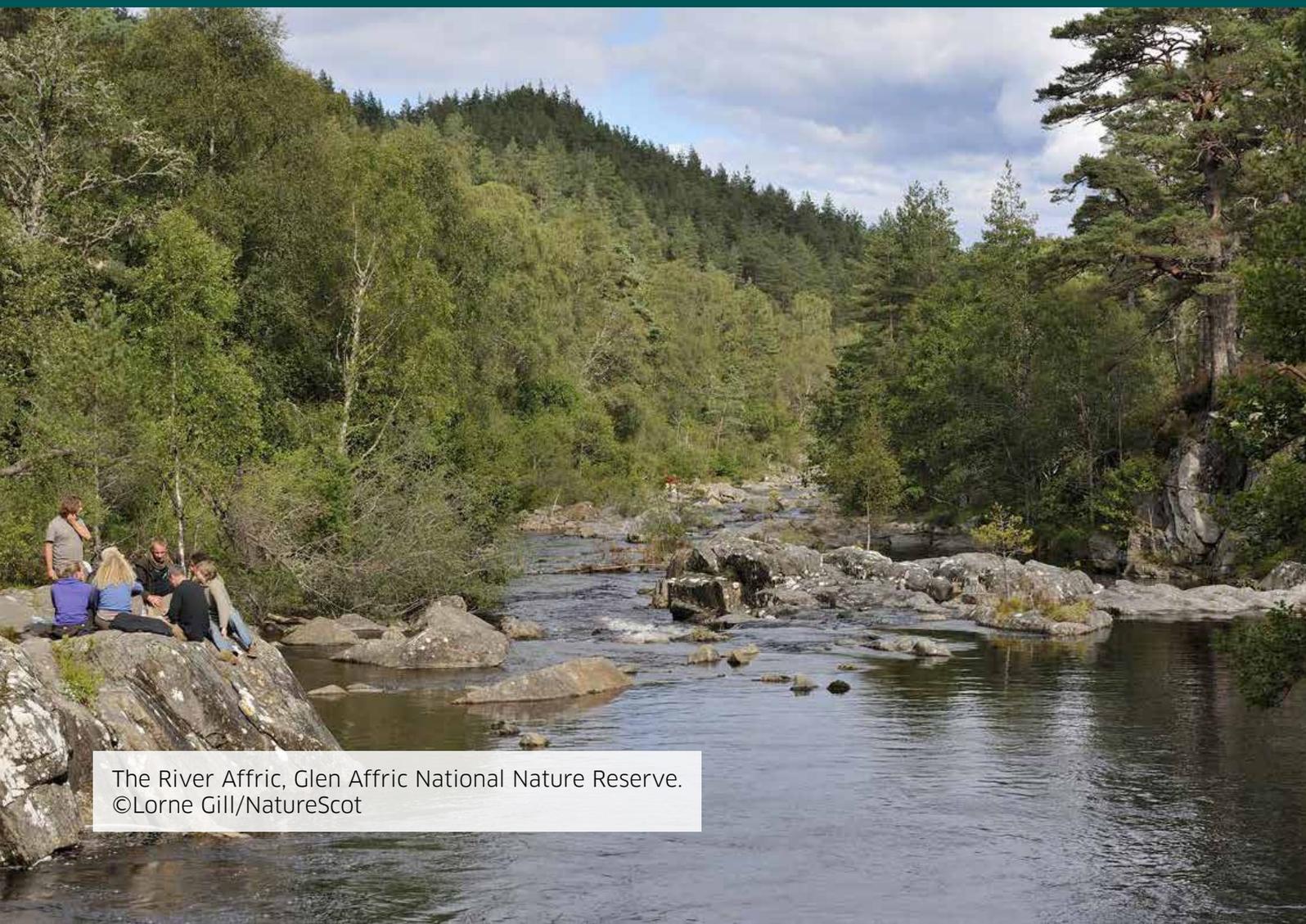
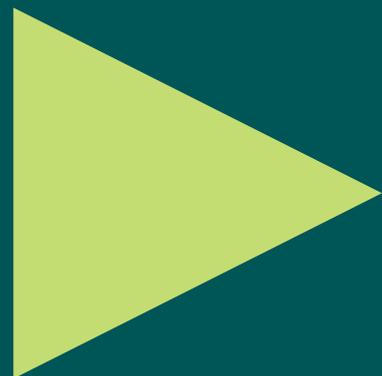


Dead birch log - image credit: Kenny Kortland



Two-banded longhorn beetle - image credit: Kenny Kortland

# Chapter 2



The River Affric, Glen Affric National Nature Reserve.  
©Lorne Gill/NatureScot

## 2. The Evidence

### 2.1 An international biodiversity crisis

Globally biodiversity is declining faster than at any other time in human history. The UN's [Global Biodiversity Outlook](#) (September 2020) and the IPBES [Global Assessment of Biodiversity](#) (May 2019) describe the pressures on nature. Globally there has been:

- ▶ An 83% population decline across freshwater species
- ▶ A 60% population decline across vertebrate species
- ▶ A 41% decline of known insect species
- ▶ Over 85 per cent of wetlands (area) has been lost
- ▶ 50% of the world's coral reef system has been destroyed
- ▶ 32% of the world's forest area has been destroyed

The IPBES report identified five direct drivers of global biodiversity loss:

- ▶ Changing use of the land and sea especially for agriculture, forestry, fish farming and coastal infrastructure
- ▶ Direct exploitation of organisms via harvesting, logging, hunting and fishing
- ▶ Climate change
- ▶ Pollution
- ▶ Invasive non-native species (and growing prevalence of pathogens)

These direct drivers are associated with a range of [indirect drivers](#) of biodiversity loss, including socio-cultural values and behaviours, demographic and consumption factors, poor governance and the impacts of some technological innovations. The global use of natural resources has more than tripled since 1970 and continues to grow. This, in turn, has led to a huge increase in waste of raw and manufactured food and other goods, and an entire industry based on recycling the materials and embodied energy they represent.

Both increased consumption and, in response, production is an outcome of people's increasing distance from, and understanding of how the products they consume are produced and their impact on biodiversity and the natural environment more generally.

**In the past 50 years, the human population has doubled, the global economy has grown nearly fourfold and global trade tenfold, together driving up the demand for energy and materials."**

IPBES (2019) Global assessment report on biodiversity.

## 2.2 Scotland's biodiversity crisis

In Scotland, the evidence around the scale and nature of the biodiversity crisis is also strong and continues to mount. Sources include Scotland's [Biodiversity Strategy Indicators](#); Scotland's [Natural Capital Asset Index](#); the 2019 [State of Nature](#) report; the [Biodiversity Intactness Indicator](#); [Scotland's Marine Assessment 2020](#); the 6-yearly assessment of progress towards Good Environmental Status under the [UK Marine Strategy](#) (updated in 2019); and periodic assessments undertaken by The Convention for the Protection of the Marine Environment of the North-East Atlantic ([the 'OSPAR Convention'](#)). This evidence base points consistently to a natural environment that has been heavily degraded, with continued declines across much of our land and seascapes.

### In our terrestrial landscapes:

- ▶ The [Biodiversity Intactness Indicator](#) indicates that Scotland has retained just over half of its historic land-based biodiversity. That is slightly more than other parts of the UK, but Scotland still ranks in the bottom 25% of nations
- ▶ Measurements of **natural capital** indicate it has declined by over 15% since 1950.<sup>2</sup> The Natural Capital Asset Index finds that only around 64% of Scotland's protected woodlands are in a favourable or recovering condition despite being the habitat with the greatest ecosystem services potential in Scotland
- ▶ There has been a 24% decline in **average abundance** of 352 terrestrial and freshwater species since 1994 (noting that 1994 was not a high point) and a 14% decline in range for 2,970 terrestrial and freshwater species since 1970<sup>3</sup>
- ▶ An expert review of diversity within species found that of 26 key species selected for assessment, four were classed as being at risk of severe genetic problems. Drought-sensitive plants (mosses and liverworts) have shown strong declines since 1990. Despite recent improvements in air quality, pollution-sensitive lichens have continued to decline since 1971

### In our marine environments:

- ▶ There was a 38% decline in the Scottish breeding seabird indicator between 1986 and 2016. Abundance indicators for fish species show some signs of recovery from deep historic lows
- ▶ Out of 15 components in the UK Marine Strategy, 11 of them had not achieved Good Environmental Status by 2020, with recognition that more action is required. Scotland's Marine Assessment 2020 highlighted declines in biogenic habitats and species such as Atlantic salmon

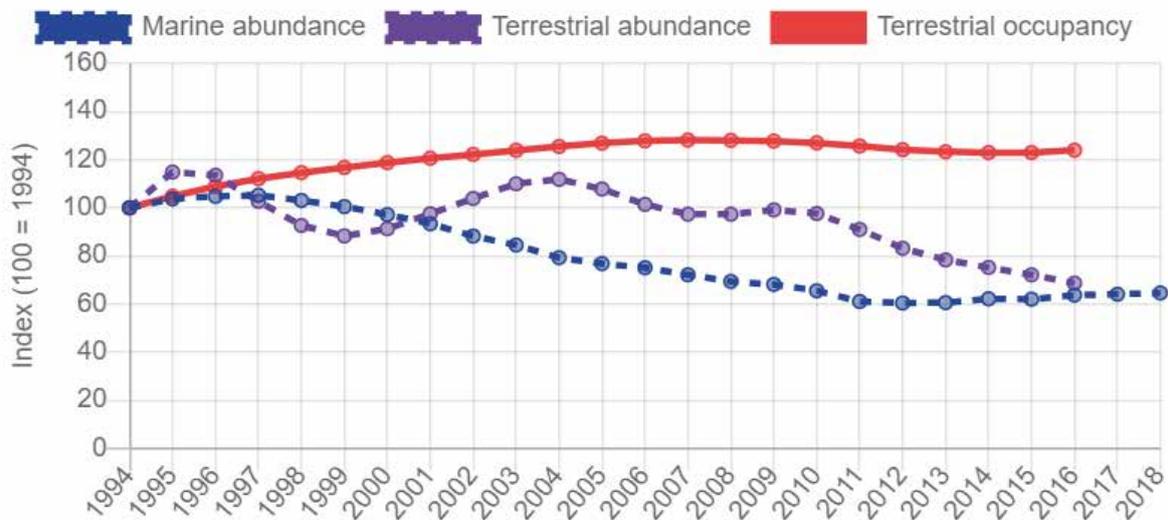
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2 <https://www.nature.scot/doc/scotlands-natural-capital-asset-index-2022-summary>

3 <https://www.nature.scot/sites/default/files/2019-10/State-of-nature-Report-2019-Scotland-full-report.pdf>

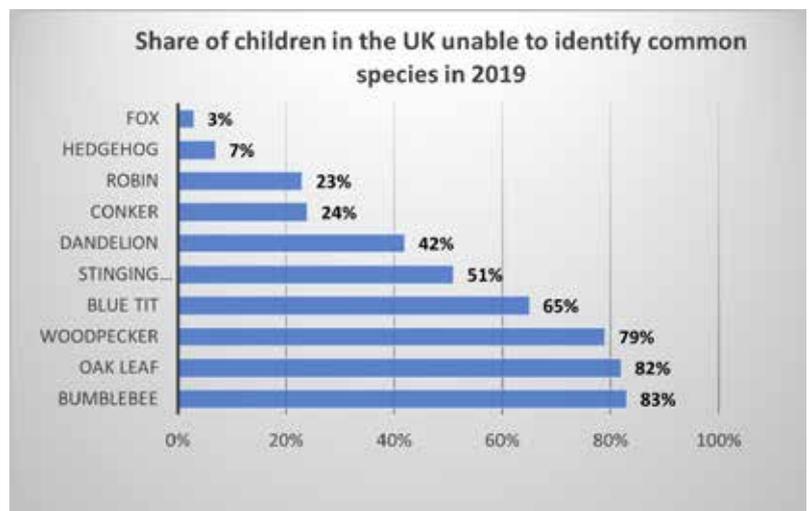
## Across our land and seascapes:

- ▶ Scotland's new [terrestrial and marine species indicator](#) gives a robust image of the overall picture of decline<sup>[5]</sup>



- ▶ Indicators show an increasing spread of 190 established invasive non-native species (INNS) across Great Britain's terrestrial, freshwater and marine environments during the last six decades – with a northwards shift a common pattern
- ▶ SEPA currently classifies only 66% of Scotland's water environment (rivers, lochs, estuaries, groundwater and coastal waters) in good overall condition
- ▶ Almost 18% of Scotland's land surface is protected specifically for nature either as SSSIs<sup>4</sup>, SAC<sup>5</sup>, SPA<sup>6</sup> or Ramsar sites and 37% of our seas now form part of the Scottish MPA network. However, only 65% of natural features on protected sites are classed as being in favourable condition, with a further 13% classed as unfavourable but recovering<sup>7</sup>

Efforts to address the biodiversity crisis will be made more difficult by **peoples' lack of knowledge of nature** and of the benefits it provides. A 2017 RSPB Birdwatch survey, assessing nature knowledge in parents, found that of 2,000 adults, half couldn't identify a house sparrow, a quarter didn't know a blue tit or a starling, and a fifth thought a red kite wasn't a bird – but nine out of 10 said they wanted children to learn about common British wildlife.



Source: Hoop Family App via news reports  
n=1000 children aged 5 to 16

4 Sites of Special Scientific Interest

5 Special Areas of Conservation

6 Special Protection Areas

7 <https://www.nature.scot/doc/proportion-scotlands-protected-sites-favourable-condition-2022>

## 2.3 Drivers of biodiversity loss across our land and seascapes

### On land

Around 70% of Scotland is solely or partially managed for **agriculture** (roughly 10% arable and 20% pasture, with the remainder rough grazing which in the uplands is often secondary to grouse moor and red deer estate management).

There have been profound changes in agricultural practices in Scotland over the last century. Prior to the First World War, horses were the primary source of power on most farms, spilled grain provided food for birds such as sparrows and stock ponds and their margins were valuable habitats for a wide range of plants and animals. Since then, increased mechanisation has led to the loss of drinking ponds for working horses or for cattle on their way to market. In some parts of Scotland, the decline in the number of small farms has led to a decline in diversity in the countryside as fields were enlarged and rationalised.

Changes to ploughing and crop rotations, increased fertiliser use and high livestock numbers have negatively impacted soil and water quality, carbon storage and resulted in increasing greenhouse gas emissions. Large-scale heavy grazing and browsing pressures have reduced the diversity, complexity and resilience of soils and plant life, leading to further reductions in invertebrates, birds and other animals. The past 50 years has witnessed a loss of non-cropped habitat and major loss and fragmentation of all farmland habitats.

The outcome has been substantial long-term decreases in key farmland bird populations: declines of more than 50% for greenfinch, kestrel, and lapwing and 25-50% declines in oystercatcher and rook since 1994. There have also been substantial long-term decreases in pollinators and species-rich grasslands, for example a 39% loss of lowland meadows.

There are however some nascent signs of recovery across Scotland's farmland landscape. Many farmers across Scotland have managed to incorporate improved levels of biodiversity through protecting and restoring features such as ponds, hedges and wildflower margins.



Young hedge at Tarrylaw farm near Balbeggie, Tayside.  
©Lorne Gill/NatureScot

## Case Study: Farmland Waders



Waders, although often seen in winter in large numbers in coasts and estuaries, migrate inland in spring to nest in upland farmland and lowland moorland. They favour semi-natural, rough grazing or less intensively managed moorland or arable land. Livestock farms in Scotland's marginal uplands provide important habitat. As ground nesters, they like open ground with a diverse sward, for hiding nests and chicks and wet areas with broken ground for feeding on worms and insects.

Kinclune Organic Farm in Angus is an upland grassland livestock farm. Rowan and Marguerite Osborne bought Kinclune in 2002 and underwent the organic conversion process. After 16 years, they remain committed to organic management with the benefits of lower input costs and organic premiums on their produce as well as seeing increased biodiversity.

Their daughters, Virginia and Aylwin, members of the Nature Friendly Farming Network, are continuing the livestock business, alongside agri-tourism. They have been working with the RSPB and Working for Waders since 2020 to improve wader habitat on Kinclune. Organic grazed grassland provides superb breeding habitat and Kinclune boasts five species of vulnerable protected wader: Curlew; Lapwing; Common Snipe; Oystercatcher and Redshank. The UK population of these once common species is in decline, with Curlew and Lapwing on the UK Red List of species most at risk, while the Common Snipe, Redshank and Oystercatcher are on the Amber List. Scotland holds an estimated 15% of the global breeding population of Eurasian Curlew.



Curlew –  
image credit: Kinclune Farm

The sisters' approach to wader conservation is five-pronged:

- (1) **habitat improvement and creation**, including removing trees which provide predator perches, creating wader 'scrapes' (shallow pools for feeding) and re-wetting areas of formerly improved, but unproductive, land
- (2) **sward management**, through rush cutting and livestock grazing management, including exclusion or low density grazing where appropriate
- (3) **nest identification**, monitoring and protection through grazing management and altering the farming calendar (including silage cutting)
- (4) **monitoring and reporting** breeding success with the RSPB and Working for Waders and adapting farming practices accordingly, as well as contributing to Nature Scot supported research and data collection, and
- (5) **controlling predators**, including foxes and corvids, which predate eggs and chicks.

## Case Study: Farmland Waders



Although the sisters' approach to wader conservation is comprehensive, they are keen to encourage other farmers, demonstrating that small changes to farm management practices can make a big difference to our severely threatened species.



Lapwing chick – image credit: Kinclune Farm



Curlew nest in silage – image credit: Kinclune Farm

The drainage of ponds and marshes has increased the rate and extent of **wetland** loss. Reduced water storage capacity and soil compaction has intensified flood risk. Soil erosion through cultivation and trampling by animals close to watercourses has added individually small, but cumulatively large, pollution loads to freshwater bodies. Nitrogen pollution and nutrient enrichment of water courses and bodies is linked to a reduction in the diversity of aquatic plant and animal life.

Scotland's **uplands** (above the limits of enclosed farmland) comprise a range of habitats including moorland, rough grassland, blanket bog, woods and species-rich grasslands. The majority of this land is managed for field-sports and livestock grazing and some multi-functional uses (e.g. renewable energy, nature conservation and amenity interests). Management practices giving rise to high stocking densities of sheep, heavy impacts of grazing, browsing and trampling by deer and inappropriate muirburn especially on deep peat has led to the degradation and loss of upland and peatland habitats. Deer management groups across the highlands have made significant efforts and progress to reduce upland deer populations. However, more work is required to allow our habitats to regenerate. Overall at least 25% of wider uplands are considered to be in poor condition. A range of species and habitats are declining, especially waders, hen harriers, mountain willow and juniper. The greatest decline in birds has been in uplands, with 18% decline since 1994; 17 species contribute to this indicator with nine in long-term decline.

Scotland is the most wooded of the UK countries (19% woodland cover) but this is well below the current European average of 37%. Approximately a third of Scotland's woodland is considered native. This includes globally important areas of Scottish rainforest, including oak and hazel woodland, and Caledonian pine forest – recognised as being of very high value to biodiversity, but currently fragmented, lacking understory and restricted in range. **Woodland biodiversity** faces a challenge from red and roe deer numbers and ranges, and invasive non-native species, specifically rhododendron, which restrict natural regeneration, habitat restoration and undermine replanting efforts. However there are positive signs we are turning the tide: Scotland is currently creating around 80% of the UK's new woodland – 40% of which is native and the woodland birds indicator shows a positive trend (increasing 58% between 1994-2018),

Urbanisation continues to steadily impact on lowland particularly through the expansion of low-density housing and associated developments. Some species like amphibians are good at exploiting urban infrastructure such as sustainable drainage systems but others struggle in modern cities with urban birds declining steadily since the early 2000s.

## In our rivers, lochs and wetlands

Scotland's rivers, lochs and wetlands supply drinking water, support fisheries and aquatic biodiversity, generate hydropower, mitigate flood risk, store carbon and are an essential resource for business and recreation.

The Scottish Environment Protection Agency's (SEPA) monitoring shows that overall 64% of our rivers and lochs are in good or better than good condition in 2020. This is based upon an assessment of water quality, flows and levels, physical condition and barriers to fish migration. This is an improvement of three percentage points since 2015. Scotland's third [River Basin Management Plan \(2021-2027\)](#) and the [Wild Salmon Strategy](#) are key. The former plan aims to achieve 81% of the water environment being in a good or better condition by 2027 and 90% in the long-term once natural conditions have recovered.

Issues which need tackling include increasing water scarcity and abstraction, rising water temperatures, rural diffuse pollution, wastewater, man-made barriers to fish migration and physical modifications to rivers, Invasive non-native species (INNS) such as Japanese knotweed, giant hogweed and North American signal crayfish have considerable impacts on freshwater ecosystems and these are intensifying. Healthy riparian woodlands are critical for the health of water systems and bodies but they are in declining in coverage and condition. Poorly vegetated upper catchments and canalised river systems exacerbate downstream flash flooding events.

## In marine environments, seas and on our coasts

Scotland's seas are highly dynamic, supporting a diverse range of habitats and species. They are of significant cultural and socio-economic importance, especially to local coastal and island communities, and support an array of marine industries. If managed sustainably, Scotland's seas can continue to provide a range of ecosystem services, including food (through fishing and aquaculture) and renewable energy.

[Scotland's Marine Assessment 2020 \(SMA 2020\)](#) highlights the increasing impacts of climate change and ocean acidification. It notes that disturbance of the seabed by bottom-contact towed fishing gear remains a significant, and the most widespread pressure, with the 'no loss in extent' target for subtidal biogenic habitats<sup>8</sup> indicator not being met. The last 30 years have also seen significant changes in the plankton community with potential implications for marine food webs, including commercial fish species. The abundance of some offshore whales, dolphins and porpoise has remained stable, whilst the abundance and distribution of coastal bottlenose dolphins on the east coast has increased. The grey seal population has increased but while the harbour seal population is recovering on the west coast, it continues to decline in the North Coast and Orkney Islands marine regions.

Seabird numbers have been largely stable since 2011, but at a greatly reduced level compared to the 1986 baseline. Across species there are markedly different trends with the most significant decreases in surface-feeding birds. Overall, Scotland's wintering waterbirds continue to increase in abundance, although species exhibit different trends with some changing their range in response to environmental change.

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<sup>8</sup> Underwater habitats created by plants and animals themselves (e.g. mussel beds) and which in turn provide habitat for other plants and animals.

Scotland's coastal habitats are experiencing pressure from climate change. Rising sea levels and larger and more frequent storm-surges are causing erosion and reducing the connectivity of some beach, dune and machair habitats. These factors have led to changes in species composition. Saltmarshes and some dune systems play an important role in increasing the resilience of coastlines to these pressures by reducing and absorbing wave energy and providing a buffer for sensitive inland habitats. However, these may be adversely affected by higher seasonal rainfall, increasing variation in groundwater and freshwater run-off.

Scotland's estuaries are vital for water birds such as waders, ducks and geese. They provide safe feeding and roosting areas, enabling many thousands of water birds to use them as places to winter and refuel on their way to other destinations. Climate change is resulting in shifts in populations of some of our water birds, but coastal areas in Scotland remain internationally important.

## 2.4 Positive Signs: Building on what works

The evidence above paints a picture of a deep biodiversity crisis – in terms of both breadth (across all land and seascapes) and depth (the status of biodiversity compared to historical baselines). Within this overall picture of decline, we are seeing some positive signs of stabilisation and recovery within some habitats and for some species, albeit from a low base. They are fragmented and fragile especially in the light of climate change pressures. And they are not enough in terms of the rate and scale of recovery needed to bend the curve of biodiversity loss and deliver a **nature positive** Scotland.

These indications of a recovery need to be nurtured and intensified. Building on and accelerating what has worked will be critical. Across Scotland there is a rich body of evidence, expertise and practical experiences to build on:

- ▶ The establishment of the **Millennium Forest** was one of the early significant attempts to halt the loss of biodiversity at large scale. Some of the project success is evidenced in a recent report [Scotland's biodiversity: a route map to 2020](#)
- ▶ The **South of Scotland Golden Eagle Project** has overseen the release of 25 eagles since 2018. As a result there are now more golden eagles in south Scotland than at any time recorded in the last two hundred years. Effective community engagement has been the cornerstone of success, with more than 10,000 volunteers and project participants of all ages
- ▶ Home to over 60,000 pairs of puffins, around 8,000 razorbills and 9,000 guillemots the Shiant Islands were declared rat free in 2018 marking successful completion of the **Shiant Isles Recovery Project** coordinated by the RSPB, with support from the European Union's LIFE programme (LIFE+), NatureScot and the landowner
- ▶ The globally important freshwater pearl mussel population supported through the physical restoration of rivers in priority catchments as part of the **Pearls in Peril EU LIFE+ project**

- ▶ By the end of 2021, volunteers in the **Scottish Invasive Species Initiative** (SISI) had contributed over 90,000 hours to eradicate Japanese knotweed with herbicide injections across hundreds of sites, thus reducing this invasive species at many locations across multiple catchments
- ▶ **Landscape-scale restoration** projects in our National Parks



Scots pine woods and the braided River Feshie, Glenfeshie.  
©Lorne Gill/NatureScot

- ▶ The **Green Infrastructure Strategic Intervention** has allocated over £15m to projects creating multifunctional green infrastructure in some of Scotland's most deprived urban areas. These projects are delivering multiple benefits for people and nature including improving habitat for biodiversity, helping people to connect with nature and involving local communities in citizen science and habitat management
- ▶ The **NHS Greenspace Demonstration** project worked across 13 sites with 5 health boards to increase the biodiversity value of 87 hectares of the NHS estate, planting 11,000 trees, establishing 4 therapeutic gardens and creating 1.4 hectares of wildflower meadow
- ▶ Since 2013/14 Scottish Forestry has supported the establishment of 31,544 ha of **new native woodland**; an average of 3,504 ha per year. In 2021/22 4,362 hectares of new native woodland was created, representing 42% of all new woodland created that year
- ▶ The Alliance for Scotland's Rainforest has developed an ambitious '**Saving Scotland's Rainforests Action Plan**' to be implemented beyond 2020

- ▶ The partnership programme **Peatland ACTION** is putting more than 35,000 hectares (ha) of peatland on the road to recovery. Flows to the Future Project (2014 to 2019) is restoring large areas of blanket bog in the heart of the Flow Country that had been damaged by forestry planting



Bog pools at The Flows National Nature Reserve, Forsinard, Caithness.  
©Lorne Gill/NatureScot

The challenge ahead is to build on the nascent signs of nature recovery and the successes above – and accelerate progress to drive landscape and seascape scale change.

## Case Study: Landscape Scale Catchment Restoration in Glen Muick



A river catchment is an area where water is collected naturally by the landscape. Planning nature restoration at this scale allows projects to be located in the best place, taking account of the shape of a glen, structure of a river network and other natural features, such as floodplains and landscapes.

The River Dee Trust and the Dee District Salmon Fishery Board, supported by the Cairngorms National Park Authority, have been working with land managers to re-naturalise one of the major upland tributaries of the River Dee, the Muick. This is a great example of landscape scale river restoration bringing long term, multiple benefits. River restoration, alongside nearby peatland restoration and woodland expansion, will benefit many species and deliver multiple ecosystem services.

- ▶ Removing flood banks and creating shallow scrapes has reconnected the river with natural channels and floodplains, which will reduce the impact of floods, droughts and low flows, and improve water quality.
- ▶ Large trees and roots anchored to the riverbed naturally create new pools and gravel beds, shelter from predators and a source of invertebrates; spawning and feeding grounds for species including salmon and freshwater pearl mussel.
- ▶ Deer legs, leftovers from surrounding sporting activities, tied to the riverbed, pump nutrients into an impoverished system.
- ▶ Riparian woodland planting in previously bare uplands supplies the fallen trees of the future and shades burns which are now too warm - lethal to young salmon.
- ▶ These works are also catalysing a new, green economy - creating jobs in the design, build and monitoring of restoration schemes as well as supporting the traditions and economy of an internationally renowned salmon fishing river and creating a more sustainable, resilient river of the future.

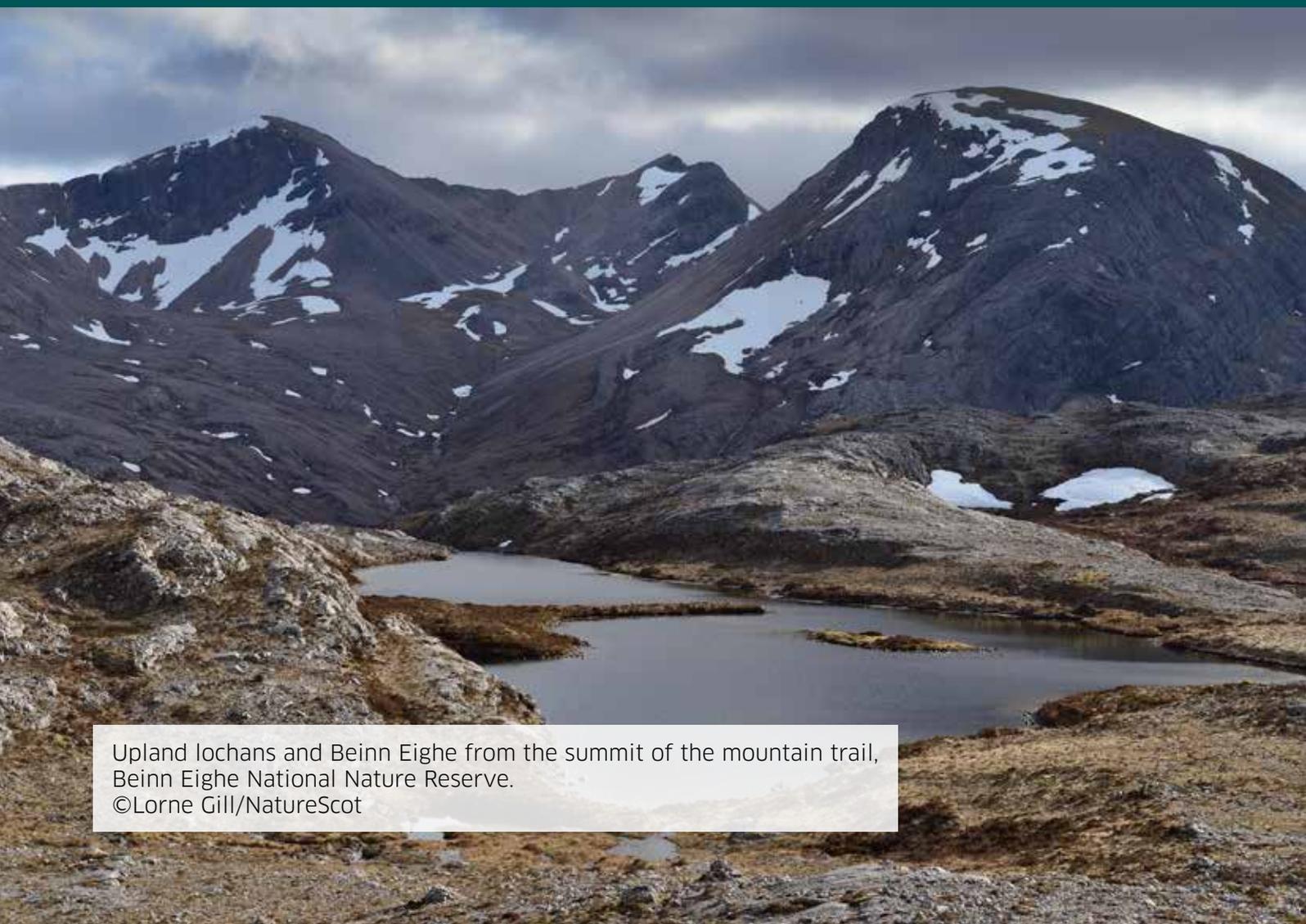
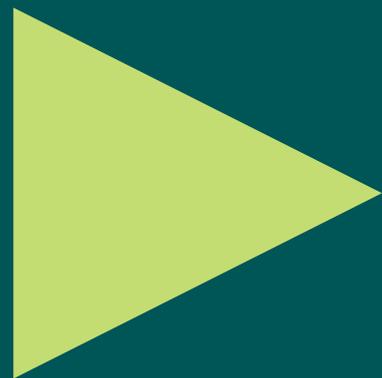


Re-opened flood channel - River Muick -  
image credit: Dee DSFB and River Dee Trust



Large woody structure - River Muick -  
image credit: Dee DSFB and River Dee Trust

# Chapter 3



Upland lochans and Beinn Eighe from the summit of the mountain trail,  
Beinn Eighe National Nature Reserve.  
©Lorne Gill/NatureScot

## 3. Strategic Vision And Outcomes

The previous chapter outlined the scale and scope of the of the biodiversity crisis and the growing international consensus that urgent and deep rooted action is needed to halt biodiversity loss and bend the curve to ensure a **nature positive** future. The strategy's vision sets out Scotland's response to the challenge:

By **2045**, Scotland will have restored and regenerated biodiversity across our land, freshwater and seas.

Our natural environment, our habitats, ecosystems and species, will be diverse, thriving, resilient and adapting to climate change.

Regenerated biodiversity will drive a sustainable economy and support thriving communities and people will play their part in the stewardship of nature for future generations.

This Vision encapsulates three core ideas: that urgent action is needed at scale across our land and seascapes; that we are looking to the future – regenerating biodiversity and building resilience to climate change; and that people and communities are central to a **nature positive** future.

Underneath the 2045 term vision sits a key milestone of **halting biodiversity loss by 2030**, in line with the [Leaders' Pledge for Nature](#). This milestone will enable us to assess whether we are on track to achieving the longer term vision.

### 3.1 Outcomes - what does success look like?

Delivering this Vision will mean a Scotland that looks substantially different to what we are familiar with today. To help define what success looks like we have identified, in conjunction with experts and stakeholders, a set of **Outcomes** which capture how our land and seascapes will need to evolve.

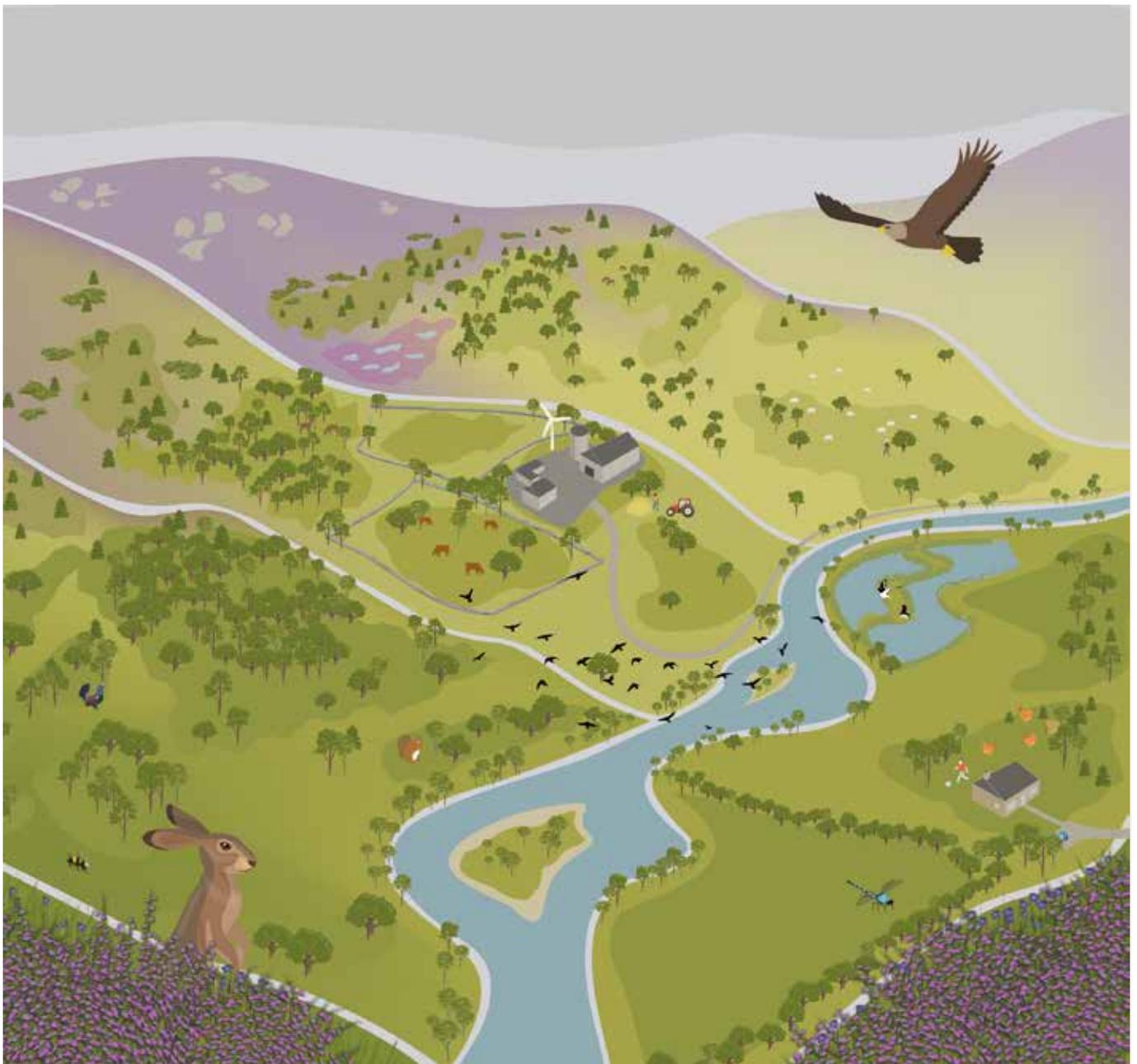
#### **By 2045 across our land and seascapes:**

- ▶ **Ecosystems** will be diverse, healthy, resilient and deliver a wide range of ecosystem services
- ▶ **Protected areas** will be larger, better connected and in good condition
- ▶ The **abundance and distribution of species** will have recovered and there will be no loss of diversity within species
- ▶ Scotland's internationally **important species** will have increased in numbers and have healthy resilient populations
- ▶ **Natural capital** will be embedded in policy making
- ▶ **Nature-Based Solutions**, such as tree-planting, peatland and blue carbon habitat restoration, will be central to our efforts to deliver NetZero and adapt to climate change

- ▶ Harmful **invasive non-native species** (INNS) will be managed so that established INNS no longer degrade native habitats and species or impede their restoration and regeneration and new introductions are managed quickly and effectively
- ▶ **Biodiversity** as a concept will be understood and valued across the population and embedded in educational curriculums

## **On land by 2045**

- ▶ **Nature Networks** across our landscapes will underpin the resilience and health of species and habitats
- ▶ **Farmland** practices will have resulted in a substantial regeneration in biodiversity, ecosystem and soil health and significantly reduced carbon emissions while sustaining high quality food production
- ▶ Management of deer ranges, grouse moors and upland agriculture will be contributing to the regeneration of biodiversity in **upland areas**



Upland Landscape 2045

Extensive heaths are diverse, with deer and sheep numbers in balance with the environment. Native tree planting has been targeted to maximise biodiversity and avoid rare and vulnerable habitats. The mosaic of open and wooded habitats are home to healthy populations of iconic species such as capercaillie, curlew, mountain hare, emperor moth and golden eagle. Restored alpine peatlands have dunlin and golden plover, and adjoining heaths and plains have nesting dotterel and ptarmigan.

Windfarms are situated where their impacts upon peatland, birds and other wildlife are minimised. Upland moorland and peatland soils retain and capture vast amounts of carbon in their peat layers, and support a diversity of fungal hyphae (threads). Small mammals, worms, springtails, mites and spiders are abundant.

Areas of actively growing peatland are retained as open habitat, capturing carbon with restored natural pools and increased cover of Sphagnum mosses.

- ▶ Forest and **woodland** management will have led to sustainable natural regeneration; a greater diversity of woodland species; increased woodland cover with a healthy understorey, enhanced woodland connectivity; and improved integration of trees into other land uses
- ▶ **Soil health** will have been improved by tackling loss of organic carbon, erosion, compaction, and the impacts of grazing, air pollution and climate change, and will function as a nature-based solution to flooding, erosion and biodiversity loss
- ▶ The actions we take to improve biodiversity will create new **green jobs** and economic opportunities to supporting thriving communities
- ▶ **Towns and cities** will include nature-rich environments close to all communities, contributing to Nature Networks and measurable increases in urban biodiversity
- ▶ Multi-functional **urban** nature-based solutions will enable people and biodiversity to adapt to our changing climate by cooling the urban environment and managing extreme rainfall events, with **blue and green infrastructure** designed and managed to benefit biodiversity, provide habitats and allow wildlife to move through urban areas



Urban landscape 2045

Patches of species-rich grassland and wee forests have replaced short amenity grassland, with an increase in insect populations benefitting birds species such as blackbirds and robins. Grassland sown with native wild flowers and grass species is not mown until the flowers have either set seed or been eaten by birds such as house sparrows.

Children enjoy the urban outdoors both as a place to play and an outdoor classroom. New urban ponds and existing ponds are colonised by wild plants and animals such as yellow iris and dragonflies. Gardens are enjoyed for flowers, wild birds, animals and insects which control pests, entertain and pollinate. Community gardens allow people to grow and pick their own food and connect with nature.

Buildings incorporate nest boxes for swifts, house martins and bats; green walls and roofs; rooftop gardens; and window boxes. Vertical rain gardens and ponds help reduce flash flooding and make neighbourhoods more attractive. Green areas join up to allow pollinators and larger animals such as hedgehogs and frogs to travel across the urban environment.

Trees and other plants help clean the air and provide shade reducing the urban heat island effect. Impermeable surfaces have been replaced with species-rich grassland and urban woodland to increase soil biodiversity and capture carbon within the soil. People benefit from clean air and access to species-rich green or blue spaces.

## In rivers, lochs and wetlands by 2045

- ▶ The extent of restored **catchments** and improvements in ecological status of rivers, lochs and wetlands will have increased with waterbodies in good condition
- ▶ **Riparian woodland** will have expanded reducing the average temperature of our rivers and burns, leading to increases in freshwater fish species and other wildlife



Autumnal woodland by the River Gaur, Bridge of Gaur, Rannoch.  
©Lorne Gill/NatureScot

- ▶ A substantial, widespread and ongoing programme of **peatland restoration** will have led to the majority of Scotland's peatlands being in good condition, a net sequester of carbon with thriving wildlife and biodiversity
- ▶ The extent, condition, connectivity and resilience of **wetlands**, including floodplain wetlands and pond habitats will have significantly improved
- ▶ Beavers, salmon recovery and riparian woodland will be established as key ecological components of restored rivers and wetlands

## In marine and coastal environments by 2045

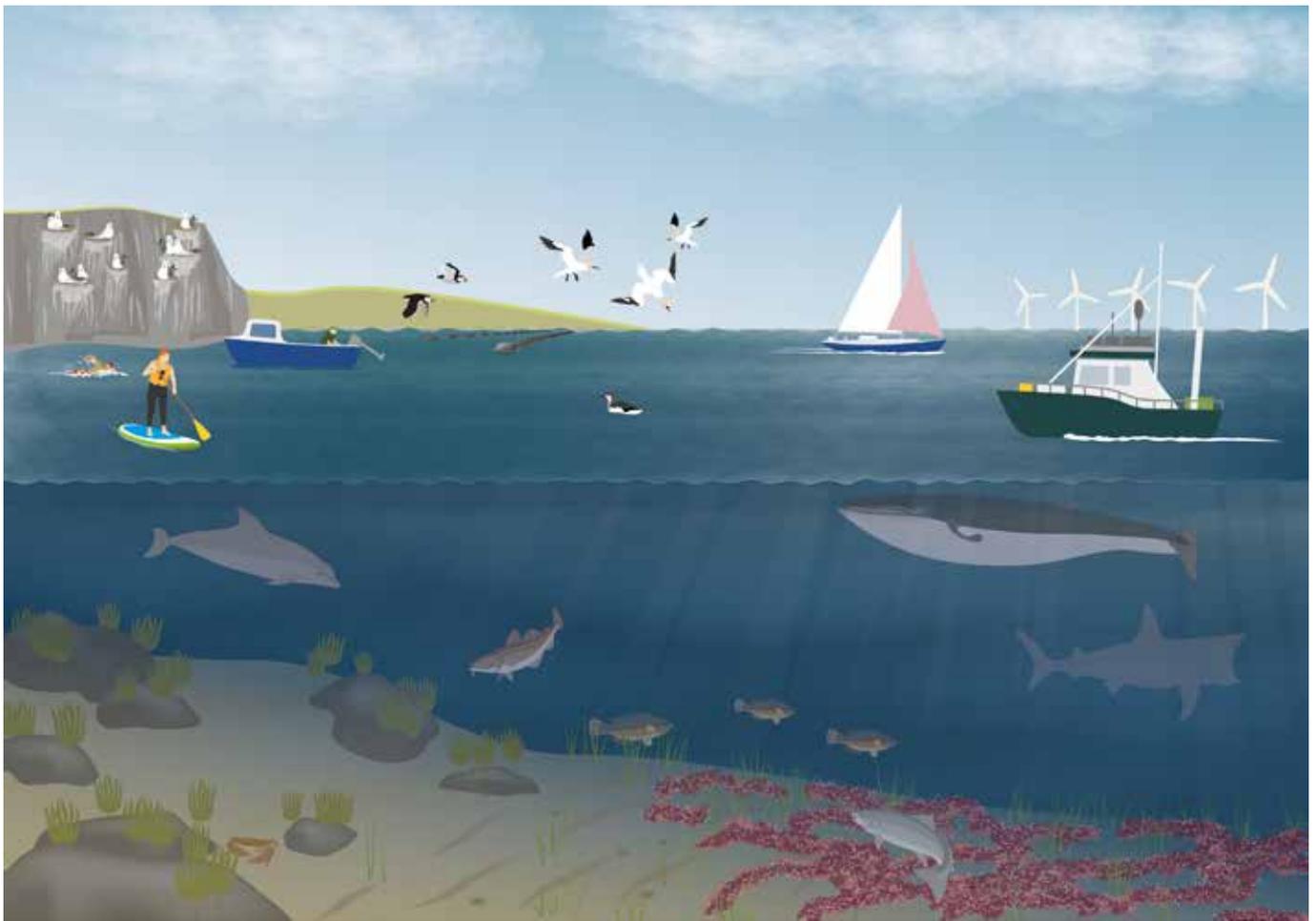
- ▶ The health, condition, and resilience of **pelagic, coastal, shelf, and deep sea marine habitats** will have been restored, supporting wider ecosystem function, providing increased benefits to society, and contributing to climate resilience and adaptation through nature-based solutions



Coastal Landscape 2045

Soft coasts such as beaches, tidal flats and saltmarshes are appreciated as natural defences and allowed to respond naturally to changes in sea level. Most infrastructure that inhibited natural change in these habitats has been removed. Coastal soils support low intensity grazing, which helps maintain grassland vegetation rich in wildflowers and insects such as burnet moths and dingy skipper butterflies.

Chains of coastal wetlands provide freshwater and brackish habitats for birds and opportunities for species to move in response to climate change. Tidal flats and saltmarsh provide a stopover point for migratory water birds such as knot, dunlin and bar-tailed godwit and over-wintering for species such as curlew, redshank and oystercatcher. The ability of flourishing coastal habitats such as saltmarshes and tidal flats to provide significant carbon sequestration and storage is acknowledged and protected. Highly valued for recreation, the coast provides an opportunity to connect with nature.



Marine Seascape 2045

Clean seas are the foundation of our inshore and offshore fishing fleets, cementing Scotland's reputation as a world-class source of sustainable seafood. Fisheries are in balance with biodiversity, the seabed is largely intact and the environmental food chain supports species from tiny plankton to massive fin whales. Industries have incorporated environmentally-friendly management practices, eliminating pollution and reducing their carbon footprint through new technologies.

Marine mammals and species such as basking shark are a frequent sight in Scottish seas. Seabird populations are vibrant and guillemots, gannets and kittiwakes find abundant food throughout the year. Undisturbed, important blue carbon habitats can regenerate naturally capturing and storing carbon at their full potential. Carefully situated marine renewables provide a valued contribution towards [Scotland's net zero targets](#).

## 3.2 Priority Actions for 2030

Five year Delivery Plans will set out in detail the actions needed to deliver these outcomes. The first plan will be published in conjunction with the final strategy. Work on the delivery plan has begun and from this we have distilled a set of **priority actions**. Cumulatively these will drive the transformation needed to ensure Scotland is on track to meet the 2030 milestone of halting biodiversity loss and being **Nature Positive**. It will also ensure that Scotland is seen as a **global leader** in fulfilling its international obligations.

### 1. Accelerate restoration and regeneration

If we are to achieve our Vision and Outcomes, we need to address restoration of our degraded landscapes and ecosystems more urgently and at greater scale than we have done up to now. By 2030, to accelerate the rates of restoration we will:

- ▶ **Introduce Statutory Nature Restoration Targets** to drive cross sectoral action which will include targets for species abundance, distribution and extinction risk, and habitat quality and extent
- ▶ Introduce a **programme of ecosystem restoration** across land and sea to deliver stronger functioning ecosystem health, resilience and ecosystem services, increased diversity and abundance of species, and soil and seabed health, using **National Parks** as exemplars of ecosystem restoration and regeneration
- ▶ Take action, through implementation of the Deer Working Group recommendations and greater use of regulation and incentives, to continue to drive down and deliver **substantially reduced deer densities** across our landscapes
- ▶ **Ensure livestock grazing** is sustainable and leads to a reduction in overall herbivore impact, in order that ecosystem health as a whole improves
- ▶ Implement **Scottish Plan for INNS surveillance, prevention and control**, and secure wider support measures to enable effective INNS removal at scale across our land, freshwater and marine environment
- ▶ Ensure **grouse-moor management sustains healthy biodiversity** especially with regard to muirburn, legal predator control and diversification of habitat to create a more diverse upland landscape
- ▶ Develop a policy and investment framework for restoring **Scotland's Atlantic Rainforest**

These Key Actions support our efforts to meet CBD Goal A and Targets 2, 6 and 9<sup>9</sup>.



Sunart oakwoods in springtime, near Salen, Ardnamurchan.  
©Lorne Gill/NatureScot/2020VISION

## 2. Expand protected areas to 30% and improve connectivity and condition

Much of our special biodiversity is found in protected areas. These are among the 'jewels in the crown' – this biodiversity is rare, sometimes endangered and globally significant. By 2030 we will:

- ▶ **Expand our Protected Areas** to at least 30% of the land surface
- ▶ Ensure that every local authority area has a **nature network** of locally driven projects improving ecological connectivity across Scotland
- ▶ Ensure **positive effects on biodiversity** from our National Planning Framework (NPF4) and that Nature Networks are integrated into the urban fabric, ecologically coherent and are prominent in school, health, neighbourhood and community spaces. Development proposals will contribute to the enhancement of biodiversity including, where relevant, restoring degraded habitats and building and strengthening nature networks
- ▶ Deliver fisheries management measures for **existing Marine Protected Areas (MPAs)** where these are not already in place
- ▶ Add to the existing MPA network by designating a world-leading suite of **Highly Protected Marine Areas (HPMAs)** covering at least 10% of our seas
- ▶ Introduce at least one **new National Park** and strengthen their leadership role for nature recovery and just transition to net zero in their areas
- ▶ Realise the potential of **National Nature Reserves** as key assets for building landscape-scale approaches and increasing nature connectedness

These Key Actions support our efforts to meet CBD Goal A and Targets 1, 2, and 3

### 3. Nature-friendly farming, fishing and forestry

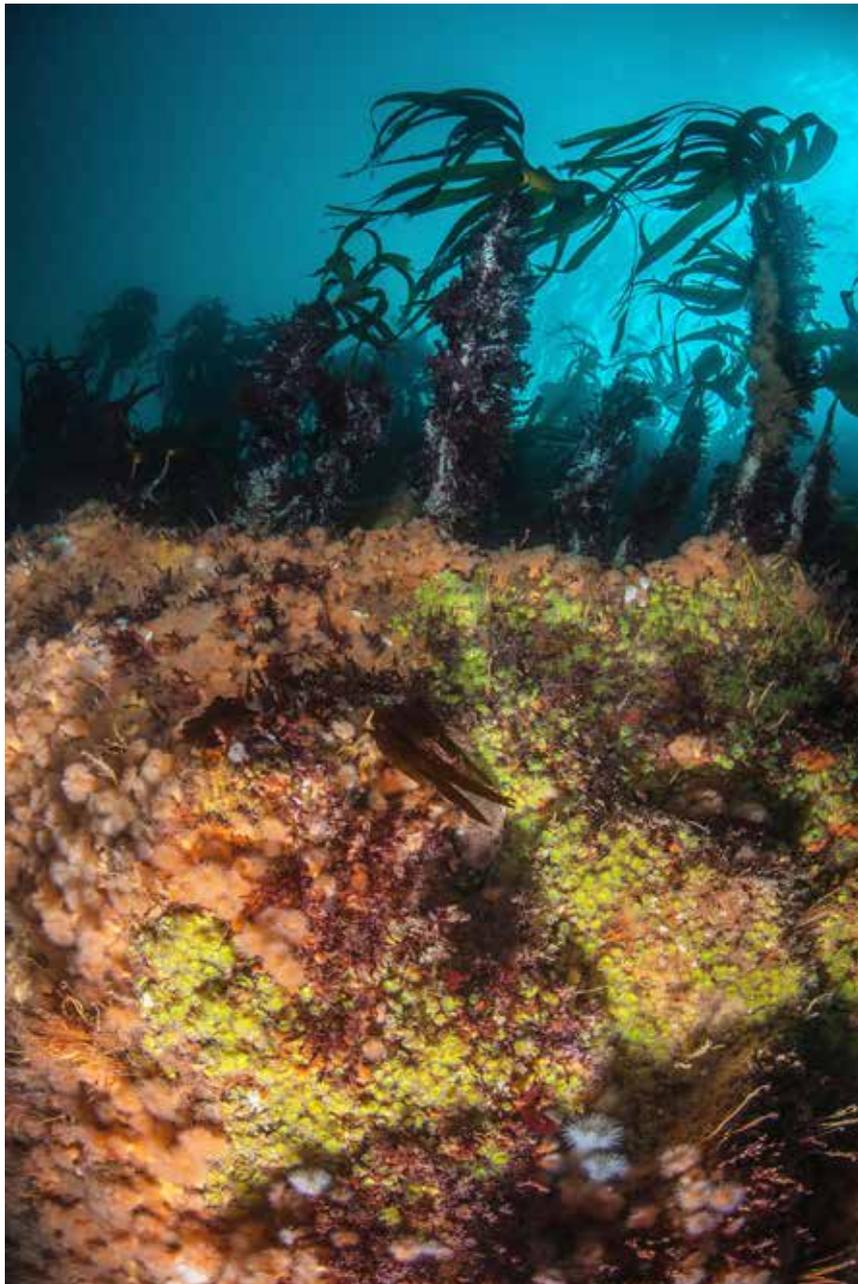
Areas under agriculture, fisheries and aquaculture, and forestry must be managed more sustainably, in particular through the conservation and sustainable use of biodiversity, increasing the productivity and resilience of these production systems. By 2020, we will:

- ▶ Put in place measures to ensure that farmland practices result in increased uptake of **high diversity, nature-rich, high soil carbon, low intensity farming methods** while sustaining high quality food production;



Lapwing on the Uist machair.  
©Lorne Gill/NatureScot

- ▶ Design and **introduce an agricultural future support framework** which delivers for nature restoration and biodiversity as well as high quality food production, climate mitigation and adaptation
- ▶ Shift **half of all funding for farming and crofting from unconditional to conditional** support by 2025, with targeted outcomes for biodiversity gain and a drive towards low carbon approaches which improve resilience, efficiency and profitability
- ▶ Ensure that productive forests and woodlands are designed and managed in ways that deliver **increased biodiversity and habitat connectivity whilst sustaining timber production and carbon sequestration** to meet the climate crisis and reduce their vulnerability to climate risks
- ▶ Take action to improve the status of **marine biodiversity** through: (i) further fisheries measures for vulnerable marine ecosystems and Priority Marine Features outside of MPAs; and (ii) an ecosystem based approach to management of sea fisheries, based on the best available scientific advice, and avoiding adverse impacts on non-target species



Jewel anemones and plumose anemones with hydroids below the kelp zone, Neil's Cave, St Kilda.  
©George Stoye/NatureScot

These Key Actions support our efforts to meet CBD Goal A and Targets 1, 2, 3, 4 and 6

#### **4. Recover and protect vulnerable and important species**

Scotland is home to significant populations of species which are at risk from the threats outlined in this Strategy. Climate change will mean that the profile of species and populations in Scotland will need to adapt but we must make every effort to prevent the extinction of globally threatened species. By 2030 we will:

- ▶ Continue effective **species recovery, reintroduction and reinforcement programmes**, and targeted measures to restore important groupings and concentrations of species, such as the ferns, lichens, fungi and mosses characteristic of Scotland's rainforest and the wading birds associated with our uplands and wetlands

- ▶ Take action to improve the status of **marine biodiversity** through: (i) Effective management of existing and emerging pressures to improve the conservation status of seabirds; (ii) Responding to pressures facing marine mammals to maintain or improve their status; and (iii) Implementation of measures to protect and recover Scotland's wild Atlantic salmon and migratory fish populations
- Revise the **Scottish Biodiversity List** of species and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland
- Support surveillance and monitoring to support managing risks around **pathogens and disease in wild bird populations**



Auks, Isle of May National Nature Reserve.  
©Lorne Gill/NatureScot

These Key Actions support our efforts to meet CBD Goal A and Target 4.

## Case Study: Species on the Edge



The multi-partner<sup>10</sup> Species on the Edge Programme, is a five and a half year programme of work with an overall cost of £6.3 million led by NatureScot. It comprises nine species recovery projects delivering action for 37 threatened species:

**Coastal Treasures of the Eastern Solway:** amphibians, primarily natterjack toads;

**Bees on the Edge:** great yellow bumblebee, moss carder bee, northern colletes mining bee;

**Invertebrates on the Edge:** tadpole shrimp, medicinal leech, narrow-mouthed whorl snail, bordered brown lacewing, short-necked oil beetle, plantain leaf beetle;

**Jewels of the north:** Scottish primrose, purple oxytropis, Irish lady's tresses, eyebrights, curved sedge, oysterplant, autumn gentian;

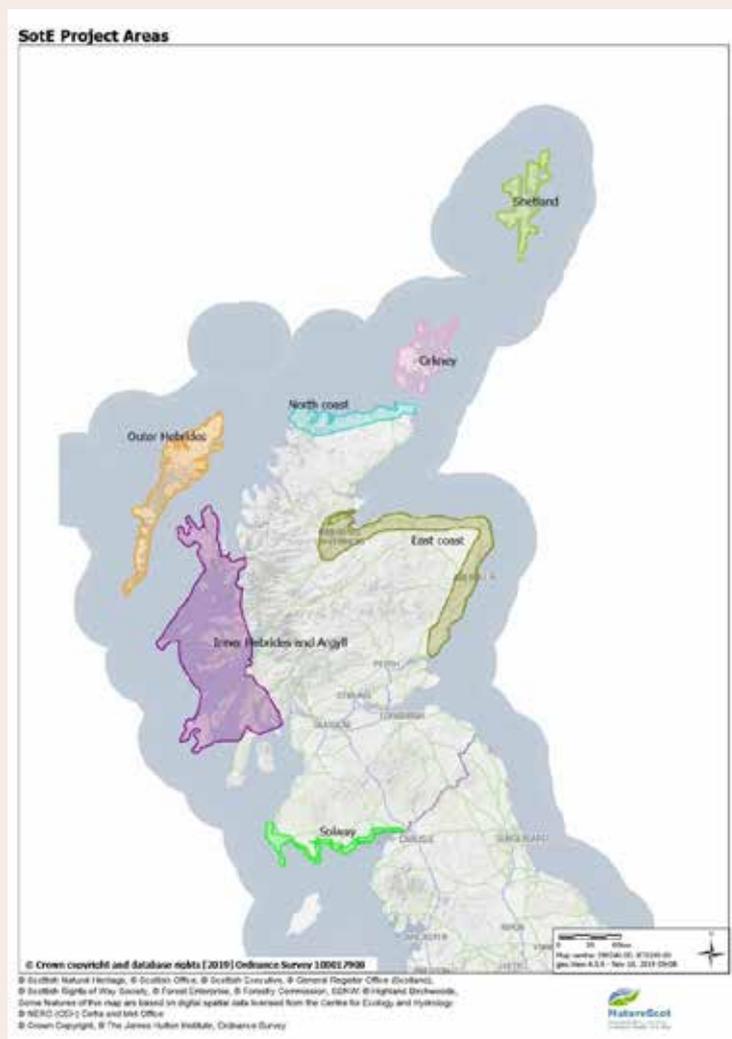
**Rockin' the blues:** small blue and northern brown argus;

**Protecting Scotland's island wonders:** common pipistrelle, soprano pipistrelle, brown long-eared bat and Daubenton's bat;

**Farming horizons:** Greenland white-fronted goose, red-billed chough, lapwing, curlew, dunlin, red-necked phalarope, twite and corncrake;

**Terning the tide:** arctic tern, sandwich tern and little tern; and

**A brighter future for herb-rich pastures:** marsh fritillary, new forest burnet moth, slender scotch burnet moth, transparent burnet moth and talisker burnet moth.



10 Amphibian and Reptile Conservation; Bat Conservation Trust; Bumblebee Conservation Trust; Buglife Scotland; Butterfly Conservation Scotland; Plantlife; RSPB Scotland; with funding from the National Lottery Heritage Fund.

## 5. Invest in nature

The finance gap for nature in Scotland for the next decade has been estimated to be £20 billion<sup>11</sup>. The biggest gaps relate to biodiversity protection and enhancement (£8 billion) and climate change mitigation through bio-carbon (£9 billion). It will be absolutely crucial that we quickly find ways to bridge this finance gap and provide certainty of investment in order to deliver the changes we are seeking. Green-investing is a growth area globally and Scotland is well placed to take a leading role offering investors the opportunity to play a part in enhancing ecosystems while generating sustainable returns. We will:

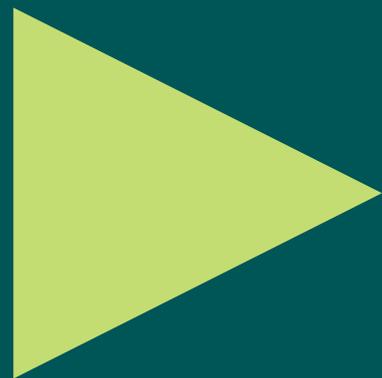
- ▶ Maintain and **seek to increase investment in nature restoration** through our £65 million Nature Restoration Fund
- ▶ Develop a **Biodiversity Investment Plan** to set out how we will address the Finance Gap for nature
- ▶ Establish a values-led, high-integrity market for **responsible private investment** in natural capital, supported by a national project pipeline for nature-based solutions
- ▶ Provide direction on and investment in **green skills and local economic opportunities**
- ▶ Continue to develop and enhance the woodland and peatland carbon codes to attract and assist additional investment



Oblong-leaved sundew growing at The Flows National Nature Reserve, Forsinard, Caithness.  
©Lorne Gill/NatureScot/2020VISION

11 i.e. the difference between required spending and planned spending on the delivery of nature-related outcomes

# Chapter 4



Wildflower planting for pollinators and biodiversity, Perth.  
©Lorne Gill/NatureScot

# 4. Enabling Conditions For Success

This Strategy establishes an ambitious vision and a set of outcomes which will deliver that vision. But we don't just need bold words – we need to ensure we drive the transformative change that will deliver this vision. In developing the strategy we have identified factors which have limited the success of previous strategies.

## 4.1 Lessons

Scotland published its first Biodiversity Strategy in 2004. Although there is evidence of some good work on specific habitats and species, the ongoing decline of biodiversity demonstrates that we must do a great deal more and at scale to bend the curve of biodiversity loss. Key lessons include the need to:

- ▶ Work more strategically and scale
- ▶ Focus on ecosystem health and land and seascape-scale regeneration rather than on management for individual species
- ▶ Systematically mainstream biodiversity across sectors and the wider policy landscape (e.g. energy, housing, industry, education, health and transport)
- ▶ Ensure sufficient investment – and appropriately blend public and private funding
- ▶ Strengthen accountability for delivery – including evidence based monitoring frameworks and statutory targets to hold us to account

## 4.2 Scotland's Biodiversity Delivery Framework

This Strategy represents the first element in **Scotland's Biodiversity Delivery Framework**. This has been developed to ensure that we move beyond ambitious words and a strategy that sits on a shelf to a point where we mobilise actions and investment of sufficient scale and scope to deliver a **nature positive** future. The framework has been developed through engagement with a range of stakeholders, including land managers, environmental organisations, local authorities and other partners. The Framework comprises five elements:

1. A high-level **Strategy** setting out a 2045 Vision for biodiversity in Scotland, a set of Outcomes which articulates what 'success looks like' and a set of Priority Actions. Driven by political leadership at the highest level, as exemplified by the establishment of the First Minister's Environment Council.
2. A **Natural Environment Bill** which will contain provisions to put in place statutory targets for nature restoration that cover land and sea and a framework for setting, monitoring, enforcing and reporting on those targets. These targets, like our climate targets, will form an important part of our Accountability Framework, driving action across Government. They will be based on the overarching goal of this Strategy, of halting biodiversity loss by 2030, and restoring Scotland's natural environment by 2045. The targets will be achievable and challenging, developed in consideration of available evidence and through consultation. They are expected to include outcome targets that accommodate species abundance, distribution and

extinction risk and habitat quality and extent. The targets will reflect the challenges of a changing climate.

3. A series of five year rolling **Delivery Plans** which will set out in detail the range of actions needed to deliver the outcomes and vision. The delivery plans will incorporate a fundamental programme of mainstreaming biodiversity across Government. We will pursue policy reforms which promote better understanding of the multiple values of nature's contributions, deal with the causes of environmental harm and offer the potential to both conserve nature, generate economic benefits and support thriving communities. This will mobilise key sectors and policy areas and ensure coherence and alignment with key strategies.

Delivery plans will set out a participatory and inclusive 'whole-of-society' approach that engages: a wide range of delivery partners including local authorities and non-governmental organisations (NGOs); local communities; business, especially land- and water-based businesses; and the scientific and research community. They will be inclusive, engaging and empower stakeholders and communities through local and regional institutions.



Fly agaric fungi growing in woodland.  
©Lorne Gill/NatureScot

4. An **Investment Plan** which will set out our assessment of the investment required to deliver a nature positive future and the actions needed to mobilise public, private and philanthropic finance. As set out in our [Interim Principles for Responsible Investment in Natural Capital](#), our aim is to develop markets that also deliver benefits for local communities and wider society, in line with Scotland's

Just Transition principles and land reform objectives. The Biodiversity Investment Plan will:

- Provide a coherent overview of the range of known public and private (charitable, philanthropic, investment) funding sources for biodiversity restoration
- Identify funding gaps, and the potential new and existing funding sources to address these gaps
- Align with the National Strategy for Economic Transformation public sector partnership programme for responsible private investment in natural capital in order to develop a market for responsible private investment in biodiversity restoration
- Drive efficiency in the use of public funds, reducing overlap and encouraging partnership in the development of projects designed to deliver transformative change on a landscape scale

Scotland will align with the highest global standards, such as the UN Principles for Responsible Investment and use transparent metrics that inspire investor confidence and engender trust from all stakeholders. Crucial to this approach is the ability to access 'investment grade' data which demonstrate the outcomes promised by investment. Our membership of the Taskforce for Nature-related Financial Disclosures will help us inform and learn from international best practice.

5. A **Reporting Framework**. The Scottish Government is required to report to Parliament every three years on the implementation of the Strategic Framework for Biodiversity in Scotland. The Scottish Government also reports voluntarily to the CBD on delivery against the international Goals and Targets as set out in the Global Biodiversity Framework and has made a commitment to maintain broad alignment with standards and obligations in the EU, including the EU biodiversity strategy.

We will build a reporting framework around the structure outlined in the CBD's Global Biodiversity Framework which will be designed around Scotland's particular needs and circumstances including enabling assessment of our progress towards achieving the targets to be delivered through the Natural Environment Bill. This approach provides multiple advantages:

- high standards of scrutiny and peer review
- transparency, and clarity on indicators and metrics which reflect increases in biodiversity
- cost effectiveness
- maintain and increase global influence
- compare performance, share what has worked and learn from others to improve continuously

This includes ensuring we are aligned with our European neighbours, that we address the damage to biodiversity caused by past industry and land-use, and that the benefits of nature are shared by all.

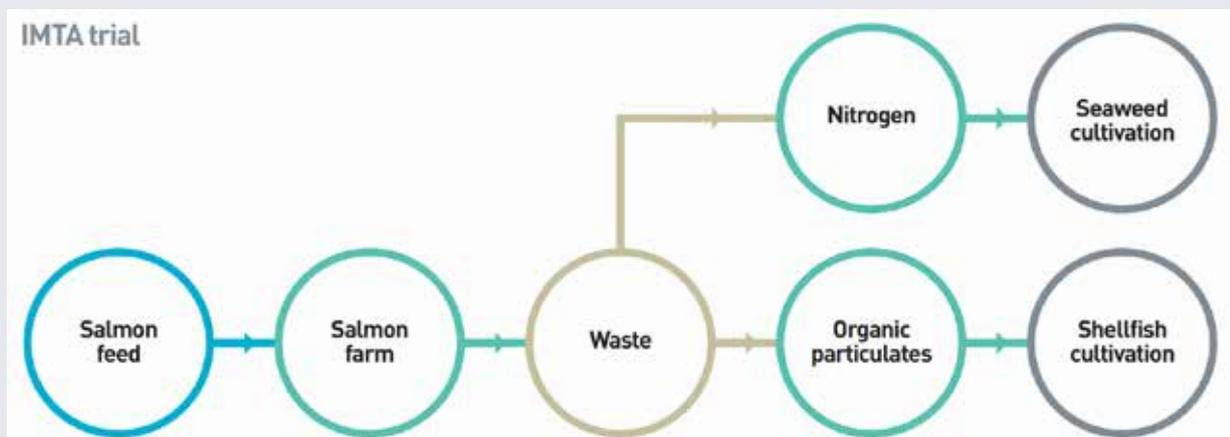
## Case Study: Circular Economy



A circular economy is about keeping materials in use, either as a product or as components or raw materials. This way, nothing becomes waste and the value of materials is retained. Two examples of a circular economy in the natural environment:

**Integrated Multi-Trophic Aquaculture (IMTA).** The by-products of one aquatic species provide food for another in a trial of IMTA which took place in Loch Fyne<sup>12</sup>. IMTA is common in small scale aquaculture in China as a traditional technique. However, it is a new approach for salmon farming, the dominant aquaculture in Scotland.

In conventional salmon farming, around 60% of the nitrogen in salmon feed is lost to the wider loch ecosystem and can have negative ecological impacts. In the IMTA trial, seaweed and shellfish (including: mussels, oysters, queen scallops, and sea urchins) are grown close to the salmon in order to maximise uptake of the waste nutrients from the salmon farming. The shellfish benefit from the organic particulates and the seaweed from the soluble nutrients. Early results show significantly higher growth rates in both the seaweed and shellfish.



Shellfish cultivation in Scotland has significant potential for growth. These trials demonstrate a productive and sustainable cultivation method that embraces the principles of a circular economy by making use of the nutrients present in otherwise wasted resources. Some of the seaweed and shellfish outputs could also be used as ingredients for salmon feeds. Nitrogen recycling is especially important as nitrogen is a valuable resource requiring high energy inputs to manufacture. IMTA makes use of a free source of nitrogen otherwise wasted.

<sup>12</sup> The IMTA trial in Loch Fyne was progressed by the Scottish Salmon Company and the Loch Fyne Oyster Company in conjunction with the Scottish Association for Marine Sciences (SAMS). The four-year trial was part of IDREEM, a wider European level research programme.

**Insect Farming.** Detritivores, such as Black Soldier Fly and Mealworms have evolved over around 66 million years to effectively upcycle food waste to a nutrient dense protein like soy meal or fish meal. The insects can be live fed to any animal with particularly surprising effects in poultry via natural behaviours and antimicrobial effects etc. In addition to a sustainable protein we also get

- ▶ an oil which is rich in critical amino acids for weaning piglets (more soy displaced/better welfare/higher productivity)
- ▶ cheaper/more accessible chitin and chitosan for applications in bioplastics amongst various other functions (water treatment etc)
- ▶ the residual material, the manure (termed frass) is an excellent soil conditioner with significant reductions in requirement for fertilisers and insecticides

## 4.3 Governance

The provisional Governance structure is set out below. The strategy will be delivered through a three-tiered model comprising:

- ▶ a high-level body which will agree priorities, review and approve delivery plans and troubleshoot issues
- ▶ a delivery board to oversee the delivery plan; supported by
- ▶ a suite of topic based delivery working groups covering, at a minimum:
  - terrestrial (rural and urban)
  - freshwater
  - marine ecosystems
  - cross cutting issues such as financing, evidence and implementation issues

This three-tiered approach will facilitate the required link between the high level strategic framework and activities at the operational level. An independent body will assess and report on progress towards meeting the statutory targets.

The Cabinet Sub-Committee on Climate Change will provide high-level oversight of the biodiversity strategy as a political forum for ensuring biodiversity is mainstreamed across key policy areas and will review progress towards the statutory targets established by the Natural Environment Bill.



The **Strategic Biodiversity Council** will meet at least annually and will be chaired by the appropriate Minister who will report to the Cabinet Sub-Committee on Climate Change. The Council will be accountable for the delivery of the Biodiversity Strategy and specifically, the Minister (on behalf of the Government) will be accountable to Parliament for meeting the statutory biodiversity targets established by the Natural Environment Bill.

Membership of the Strategic Biodiversity Council will be at a senior (Chair/Chief Executive) level and at the invitation of the Minister but will not be a formal public appointment. The Council will convene a wide range of interested parties and provide a steering function, driving delivery of key milestones and reviewing progress on delivery plans, and approving new plans, including investment plans<sup>13</sup>.

The key governance and accountability body for delivery will be the **Operational Delivery Board**. The Board will prepare delivery plans for approval by the Council, will be co-chaired by the Scottish Government and NatureScot and invite attendance from a wide range of key delivery partners. In addition to the core delivery working groups set out above, the Operational Delivery Board will establish short or longer term working groups to address particular issues as they arise, and/or task individuals or groups to work with other groups towards particular outcomes.

<sup>13</sup> Noting that investment approval in individual programmes and projects will have to remain the responsibility of individual organisations for accountability reasons.

The Board will appoint Chairs of the **Delivery Working Groups**, who will determine the most appropriate membership of those Groups to ensure that the Delivery Plan actions are achieved. Each Delivery Working Group will develop implementation plans to take forward the actions allocated to them.

## 4.4 Public Engagement and Communications plan

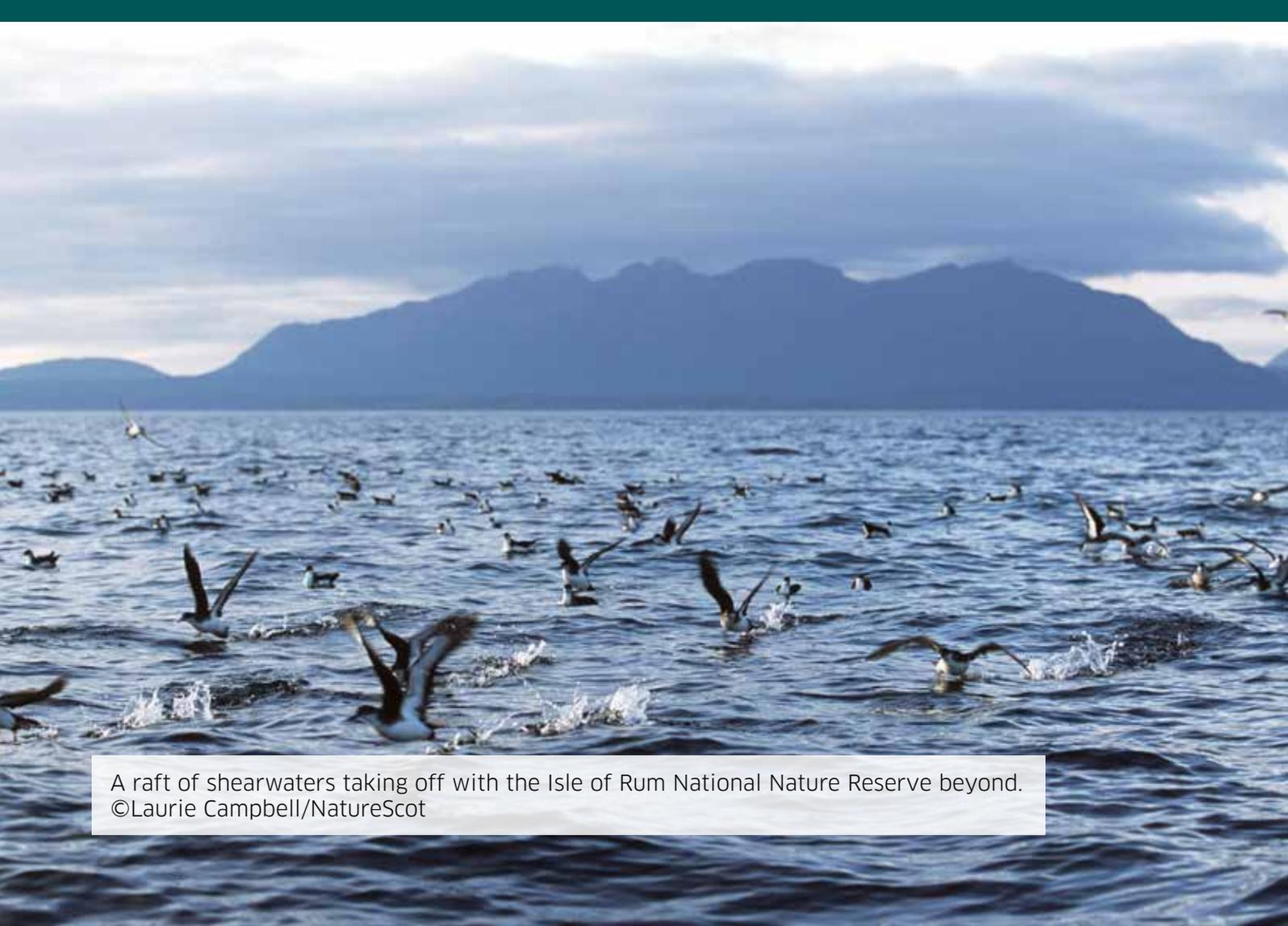
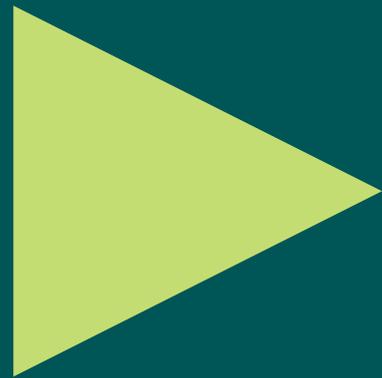
We will need to mobilise actions by individuals, organisations, small, medium and large businesses and adopt a whole-of-society approach to deliver a nature positive Scotland. We will initiate a programme of public engagement to increase understanding of the nature of the biodiversity crisis and the drivers of loss including those associated with peoples' consumption and production choices. Leading through our Curriculum for Excellence, we will mobilise our whole wider education and skills development system to promote increased understanding of our relationship with nature and positive action to secure its sustainable use.

We will work with businesses through our Delivery Working Groups to

- ▶ identify and eliminate incentives that are harmful to biodiversity
- ▶ identify and overcome other obstacles to achieving our goals
- ▶ help society understand the impact they have on biodiversity both in Scotland and, through their supply chains, the rest of the world
- ▶ develop new frameworks for private sector investment and innovation
- ▶ enable them to comply with new reporting requirements

We want all levels of government to participate fully in the delivery of our goals for biodiversity, in line with the principles identified in the Edinburgh Process led by the Scottish Government for the CBD for CoP15, and with the Edinburgh Declaration. In particular, cities and local authorities play key roles in conserving, restoring and reducing threats to biodiversity, in meeting people's needs through sustainable use and equitable benefit-sharing, in developing the tools and solutions needed for implementing biodiversity protection actions, and in monitoring and reporting. Their actions in mainstreaming biodiversity ensure that support is in place at all levels. They are uniquely positioned to deliver the outreach, awareness, and uptake of our goals for biodiversity across the whole of society, facilitating engagement with key stakeholders to implement our Strategic Framework.

# Chapter 5



A raft of shearwaters taking off with the Isle of Rum National Nature Reserve beyond.  
©Laurie Campbell/NatureScot

# 5. Monitoring Framework

## 5.1 How we will know if and when we have halted biodiversity loss?

Statutory nature recovery targets will set out our ambition for halting biodiversity loss and substantially restoring it by 2045. A range of considerations will shape the development of a monitoring framework to track our progress.

We already monitor the three strands of biodiversity identified in the Convention on Biological Diversity: ecosystems, species and genetic diversity. In line with the CBD, we will also monitor people's attitudes to nature and the benefits they gain from it.

Additional indicators will be needed which reflect nature recovery at scale. An extensive suite of connected protected areas improving and in good health will be paramount. This will allow species to adapt to climate change and ensure that diversity within species is not lost. Increases in soil and water health, habitat condition and species richness and abundance outwith protected areas should be evident to the extent that differences across protected area boundaries are small. Soils and species indicators will point to ecosystem health improvements and reveal which drivers are working positively or negatively across habitats and areas. Non-native invasive species, plant and animal pathogens, and deer and other herbivores suppressing nature regeneration, will be well controlled and contained.



Sunart oakwoods in springtime, near Salen, Ardnamurchan.  
©Lorne Gill/NatureScot/2020VISION

Our suite of indicators will need to reveal how biodiversity is responding to the various pressures. Headline indicator changes alone can sometimes reflect the halting of biodiversity loss and subsequent recovery. However, such are the vagaries of changes in nature, we will need long-term data covering many species, habitats and influences to be clear on when and where loss has been halted, and real improvements have been made. We will also need to be able to drill down to individual species and habitats to focus conservation where it is most needed.



Tadpoles of the common frog.  
©Lorne Gill/NatureScot

The [Marine and Terrestrial Species Indicators](#) (continuing to be developed) will show changes across a suite of species. Species for which Scotland is internationally important require special monitoring efforts. These include oceanic lichens, bryophyte, seabirds, and species associated with seagrass and maerl beds. This will help us understand and act to protect these species. The Marine and Terrestrial Species Indicators will allow us to analyse data by habitat and to look in detail at groups like pollinators, thereby helping direct conservation effort where it is most needed.

Genetic diversity gives organisms the ability to adapt to new situations, such as climate change or novel pests and pathogens. Diversity within species, measured by the [Genetic Diversity Scorecard](#), will show a decrease in the threats faced by native species. This will be the result of both better habitat connectivity and targeted efforts such as [Gene Conservation Units](#).

Indicators will be required which demonstrate that the extent of land and sea under protected areas and Other Effective Area-based Conservation Measures (OECMs), and the condition of protected and managed features are increasing to at least meet the global target of 30% of land and sea protected. Key habitats – wetlands, woodlands, grasslands, rivers and lakes, upland and lowland heaths and scrub, rocky habitats, estuaries and lagoons, and dunes and many marine features - will have improved in condition and increased in extent. Across catchments, there will be greater connectivity between heath, woodlands, marsh and grassland habitats to sustain large-scale nature restoration.

By taking this rounded approach covering the core strands of biodiversity, we will be using the best available information to help us halt and then reverse biodiversity loss.

## 5.2 How will we monitor?

Data gathering and analysis can be expensive. In Scotland, we rely heavily on citizen scientists for much of our data. **Citizen science** gives us access to larger sets of data than could be funded otherwise. It also emphasises that nature is owned by citizens: it is not the preserve of the Government or of professional scientists. We will continue to rely on citizen science for much of our species data. We currently present several sets of species data and the multi-taxon [Marine and Terrestrial Species Indicators \(MTSI\)](#), all of which are based on citizen science.

Advances in technology have increased our power to monitor biodiversity. In Scotland, we are already monitoring species using **eDNA** (environmental DNA - genetic material from shed skin or excrement obtained directly from environmental samples such as soil, sediment, or water, and thus reducing disturbance to wildlife). **Aerial imagery** from satellites, aircraft and drones is also used in habitat monitoring and in mapping people's ability to access green and blue spaces. Assessments of ecosystems should include both quantity and quality (low impacts from the drivers identified by IPBES and high levels of connectivity). We are working with partners to develop ecosystems monitoring and reporting that will meet Scotland's needs domestically and as a global citizen.

We also use **surveys** and other social science tools to assess people's attitudes to nature and the benefits they gain from it. These are brought together with other sources of information in [Scotland's Natural Capital Asset Index](#), a composite index which tracks changes in the capacity of Scotland's terrestrial ecosystems to provide benefits to people. Surveys should also be used to assess citizens' engagement with biodiversity: only when people are taking an active role can we be confident of success.

## 5.3 Evidence-based good practice and monitoring is essential

[Evidence-based conservation](#) is at the heart of the Scottish Biodiversity Strategy. We need to monitor biodiversity at a local and a Scotland-wide level if we are to ensure our actions are effective in delivering our Vision and Outcomes. Both the methods used to monitor and the results of that monitoring must be transparent and publicly available.

Monitoring<sup>14</sup> enables us to track progress, to demonstrate performance against targets, and informs regular review of our approach in response to changes, be they environmental (e.g. climate change), technological (e.g. improved techniques) or socio-economic (e.g. green finance).

Overall, none of the targets set by the Convention on Biological Diversity (CBD) CoP in Aichi, Japan in 2010 was met at a global level and most countries missed more targets than they achieved ([Scotland](#) met 9/20). CBD parties are now keen to develop targets that are both challenging and 'SMART'.<sup>15</sup> The EU's proposed [Nature Restoration Law](#) will also contain 'ambitious and binding targets' and the EU may provide both standardised methodologies and reporting templates in order to simplify reporting processes.

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14 The systematic observation, recording and analysis of the state of biodiversity

15 Specific, Measurable, Achievable, Relevant and Time-bound

Scotland aims to deliver strongly on its international obligations and was one of the first countries to align with the United Nations' Sustainable Development Goals. We have also committed to maintain a broad alignment with the EU's environmental standards. There are therefore advantages to alignment of our monitoring framework with these global frameworks, including:

- ▶ Targets, metrics and indicators which are subject to high standards of scrutiny and peer review
- ▶ The methods behind them are transparent
- ▶ Efficiency - development and administration of a full suite of dedicated Scottish indicators could be costly and no more effective than using existing indicators freeing resource to influence globally
- ▶ Comparing performance with other nations allows us to share what has worked and also to learn from others to improve continuously



Pair of Gannets mutual preening, Bass Rock.  
©Peter Cairns/2020VISION

# Conclusion

Although Scotland's biodiversity is highly degraded, there is also evidence that we can reverse the declines and reverse biodiversity loss. We have a renewed understanding of the need to prioritise actions to restore and regenerate biodiversity across government and wider society.

This Strategy and the supporting Framework for biodiversity in Scotland provides a path to deliver our Vision and Outcomes for 2045.

We all benefit from – depend on – biodiversity to stay alive and we all contribute to biodiversity loss through our actions and choices – so the Nature Emergency really is everybody's problem. At the same time, however, that means it's in our hands to make the choices which will reverse biodiversity loss in Scotland by 2045.

# Annex 1

## CBD Indicators Proposed (Shortlist In Bold)

NB both the EU and CBD Goals, Targets and Indicators outlined in this document are still being negotiated and this part of the document will therefore need to be updated following the conclusion of CoP15 and subsequent publication of the new global biodiversity framework.

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Goal A</b> The integrity of all ecosystems is enhanced, with an increase of at least 15 per cent in the area, connectivity and integrity of natural ecosystems, supporting healthy and resilient populations of all species, the rate of extinctions has been reduced at least tenfold, and the risk of species extinctions across all taxonomic and functional groups, is halved, and genetic diversity of wild and domesticated species is safeguarded, with at least 90 per cent of genetic diversity</p> <p><b>Milestone A.1</b> Net gain in the area, connectivity and integrity of natural systems of at least 5 per cent.</p>	<p><b>Extent of natural ecosystems by type (HI16 1)</b></p>	<p>1. Extent - <a href="#">HabMoS</a></p> <p>2. Connectivity - <a href="#">Connectivity and extent of woodland, heathland, grassland and marsh</a> by <a href="#">EUNIS habitat type</a></p>	<p>1.</p>
<p><b>Milestone A.2</b> The increase in the extinction rate is halted or reversed, and the extinction risk is reduced by at least 10 per cent, with a decrease in the proportion of species that are threatened, and the abundance and distribution of populations of species is enhanced or at least maintained.</p>	<p><b>Red List Index (species) (HI 2)</b></p>	<p><a href="#">IUCN Red List Index</a></p>	<p>1.</p>
<p><b>Milestone A.3</b> Genetic diversity of wild and domesticated species is safeguarded, with an increase in the proportion of species that have at least 90 per cent of their genetic diversity maintained. within all species maintained.</p>	<p><b>The proportion of populations within species with an effective population size &gt; 500 (HI 3)</b></p>	<p>Tracked through <a href="#">Scorecard</a></p>	<p>NA but related to 2, 6</p>

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Goal B</b> Nature's contributions to people are valued, maintained or enhanced through conservation and sustainable use supporting the global development agenda for the benefit of all;</p> <p><b>Milestone B.1</b> Nature and its contributions to people are fully accounted and inform all relevant public and private decisions.</p> <p><b>Milestone B.2</b> The long-term sustainability of all categories of nature's contributions to people is ensured, with those currently in decline restored, contributing to each of the relevant Sustainable Development Goals.</p>	<p><b>Functions and services provided by ecosystems, by service type (HI 4)</b></p>	<p><a href="#">Scottish Natural Capital Accounts</a> and Wellbeing index</p>	<p>NA</p>
	<p><b>Ecological Footprint (HI 5)</b></p>	<p><a href="#">Ecological Footprint</a></p>	<p>NA</p>
<p><b>Goal C</b> The benefits from the utilization of genetic resources are shared fairly and equitably, with a substantial increase in both monetary and non-monetary benefits shared, including for the conservation and sustainable use of biodiversity.</p> <p><b>Milestone C.1</b> The share of monetary benefits received by providers, including holders of traditional knowledge, has increased.</p> <p><b>Milestone C.2</b> Non-monetary benefits, such as the participation of providers, including holders of traditional knowledge, in research and development, has increased.</p>	<p><b>Indicator on monetary benefits tbc (HI 6)</b></p>	<p>Income from Access and Benefit Sharing (ABS) agreements</p>	<p>NA</p>
	<p><b>Indicator on non-monetary benefits tbc (HI 7)</b></p>	<p>Number of research &amp; development products from an ABS agreement</p>	<p>NA</p>

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Goal D</b> The gap between available financial and other means of implementation, and those necessary to achieve the 2050 Vision, is closed.</p> <p><b>Milestone D.1</b> Adequate financial resources to implement the framework are available and deployed, progressively closing the financing gap up to at least US \$700 billion per year by 2030.</p> <p><b>Milestone D.2</b> Adequate other means, including capacity-building and development, technical and scientific cooperation and technology transfer to implement the framework to 2030 are available and deployed.</p> <p><b>Milestone D.3</b> Adequate financial and other resources for the period 2030 to 2040 are planned or committed by 2030</p>	<p><b>ODA for biodiversity (SDG 15.a.1) (HI 8)</b></p>	<p>Reserved matter for State Party indicator</p>	<p>n/a</p>
	<p><b>Public and private expenditure (HI 9)</b></p>		

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Target 1</b> Ensure that all land and sea areas globally are under integrated biodiversity-inclusive spatial planning addressing land- and sea-use change, retaining existing intact and wilderness areas.</p>	<p>No additional dedicated HI proposed. Use other relevant component of complementary indicators or other national indicators. Possible binary/tick-list indicator</p>		
<p><b>Target 2</b> Ensure that at least 20 per cent of degraded freshwater, marine and terrestrial <b>ecosystems are under restoration</b>, ensuring connectivity among them and focusing on priority ecosystems.</p>	<p><b>Area under restoration (HI 10)</b></p>	<p>Follow EU methodology</p>	<p>1,3,5,6,7</p>
<p><b>Target 3</b> Ensure that at least 30 per cent globally of land areas and of sea areas, especially areas of particular importance for biodiversity and its contributions to people, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures (OECMs), and integrated into the wider landscapes and seascapes.</p>	<p><b>Coverage of protected areas and OECMs, by effectiveness, KBA17s &amp; ecosystems (HI 11)</b></p>	<p>% of land and sea covered by protected areas and OECMs.  Effective management metric to be defined by CBD</p>	<p>1</p>

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Target 4</b> Ensure active management actions to enable the <b>recovery and conservation of species</b> and the genetic diversity of wild and domesticated species, including through ex situ conservation, and effectively manage human-wildlife interactions to avoid or reduce human-wildlife conflict.</p>	<p>No additional dedicated HI proposed. HI 2 &amp; HI 3 are relevant. Use other relevant component or complementary indicators or other national indicators</p>		
<p><b>Target 5</b> Ensure that the <b>harvesting, trade and use of wild species</b> is sustainable, legal, and safe for human health.</p>	<p><b>Proportion of fish stocks within biologically sustainable levels (HI 12)</b></p>	<p><a href="#">Sustainability of fish stocks NPI</a></p>	<p>6</p>

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Target 6</b>            Manage pathways for the introduction of <b>invasive alien species</b>, preventing, or reducing their rate of introduction and establishment by at least 50 per cent, and control or eradicate invasive alien species to eliminate or reduce their impacts, focusing on priority species and priority sites.</p>	No additional dedicated HI proposed. Use other relevant component or complementary indicators or other national indicators. Possible binary/tick-list indicator: No of countries with legislation and resources for prevention and control of IAS		
<p><b>Target 7</b>            Reduce <b>pollution</b> from all sources to levels that are not harmful to biodiversity and ecosystem functions and human health, including by reducing nutrients lost to the environment by at least half, and pesticides by at least two thirds and eliminating the discharge of plastic waste.</p>	<b>Index of coastal eutrophication potential (SDG 14.1.1a) (HI 13)</b>	Method: <a href="#">SDG 14.1.1a</a>	6

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Target 8</b>  Minimize the impact of climate change on biodiversity, contribute to mitigation and adaptation through ecosystem-based approaches, contributing at least 10 GtCO<sub>2</sub>e per year to global mitigation efforts, and ensure that all mitigation and adaptation efforts avoid negative impacts on biodiversity.</p>	<p>No additional dedicated HI proposed. HI 4, 5, 10, 11 &amp; 17 are relevant. Use other component or complementary indicators or other national indicators. Possible binary/tick-list indicator: No of countries with nationally determined contributions, long-term strategies, national adaptation plans reflecting biodiversity.</p>		

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Target 9</b> Ensure benefits, including nutrition, food security, medicines, and livelihoods for people especially for the most vulnerable through <b>sustainable management of wild terrestrial, freshwater and marine species</b> and protecting customary sustainable use by indigenous peoples and local communities.</p>	<p>No additional dedicated HI proposed. HI 2 &amp; 5 are relevant. Use other relevant component or complementary indicators or other national indicators.</p>		
<p><b>Target 10</b> Ensure all <b>areas under agriculture, aquaculture and forestry are managed sustainably</b>, in particular through the conservation and sustainable use of biodiversity, increasing the productivity and resilience of these production systems.</p>	<p><b>Proportion of agricultural area under productive and sustainable agriculture (SDG 2.4.1) (HI 14)</b></p>	<p>Method; <a href="#">SDG 2.4.1</a>. Updated UK and Scottish figures not yet available following method change by UN</p>	5
	<p><b>Progress towards sustainable forest management (SDG 15.2.1(4,5)) (HI 15)</b></p>	<p><a href="#">SDG 15.2.1</a> for Scotland and UK</p>	3

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Target 11</b> Maintain and enhance nature’s contributions to <b>regulation of air quality, quality and quantity of water</b>, and protection from hazards and extreme events for all people.</p>	<p>No additional dedicated HI proposed. HI 5 is relevant. Use other relevant component or complementary indicators or other national indicators.</p>		
<p><b>Target 12</b> Increase the area of, access to, and <b>benefits from green and blue spaces</b>, for human health and wellbeing in urban areas and other densely populated areas.</p>	<p>Average share of the built-up area of cities that is green/blue space for public use for all (SDG 11.7.1) (HI 16)</p>	<p><a href="#">SDG 11.7.1</a> for Scotland and UK</p>	<p>4</p>
<p><b>Target 13</b> Implement measures at global level and in all countries to facilitate access to genetic resources and to ensure the fair and equitable sharing of <b>benefits arising from the use of genetic resources</b>, and as relevant, of associated traditional knowledge, including through mutually agreed terms and prior and informed consent.</p>	<p>Goal C indicators (HI 6 &amp; 7) also apply to target 13. Possible binary/tick-list indicator: No of countries with legislation, administrative or policy frameworks for ABS.</p>		

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Target 14</b> Fully <b>integrate biodiversity values into policies, regulations</b>, planning, development processes, poverty reduction strategies, accounts, and assessments of environmental impacts at all levels of government and across all sectors of the economy, ensuring that all activities and financial flows are aligned with biodiversity values.</p>	<p>No additional dedicated HI proposed. HI 9, 19 &amp; 20 are relevant. Use other relevant component or complementary indicators or other national indicators. Possible Binary/tick-list indicator: No of countries with policies, regulations, planning, development processes etc to integrate values of biodiversity</p>		
<p><b>Target 15</b> All <b>businesses</b> (public and private, large, medium and small) <b>assess and report on their dependencies and impacts on biodiversity</b>, from local to global, and progressively reduce negative impacts, by at least half and increase positive impacts, reducing biodiversity-related risks to businesses and moving towards the full sustainability of extraction and production practices, sourcing and supply chains, and use and disposal.</p>	<p><b>Dependencies and impacts of businesses on biodiversity/ disclosures (HI 17)</b></p>	<p>Corporate reporting currently reserved</p>	<p>NA</p>

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Target 16</b> Ensure that people are encouraged and enabled to make responsible choices and have access to relevant information and alternatives, taking into account cultural preferences, to reduce by at least half the <b>waste</b> and, where relevant the overconsumption, of food and other materials.</p>	<p><b>Ecological footprint (HI 5) or global environmental impacts of consumption (HI 18)</b></p>	<p>See HI5</p>	
<p><b>Target 17</b> Establish, strengthen capacity for, and implement measures in all countries to prevent, manage or control potential <b>adverse impacts of biotechnology</b> on biodiversity and human health, reducing the risk of these impacts.</p>	<p>No additional dedicated HI proposed. Use other relevant component or complementary indicators or other national indicators. Possible binary/tick-list indicator: No of countries with capacity and measures in place to prevent, manage and control potential impacts of LMOs/ biotechnology</p>		

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Target 18</b> Redirect, repurpose, reform or <b>eliminate incentives harmful for biodiversity</b>, in a just and equitable way, reducing them by at least US\$ 500 billion per year, including all of the most harmful subsidies, and ensure that incentives, including public and private economic and regulatory incentives, are either positive or neutral for biodiversity.</p>	<p><b>Value/% of subsidies and other incentives harmful to biodiversity re-directed, re-purposed or eliminated (HI 19)</b></p>	<p>Value of direct and indirect subsidies to activities harmful to biodiversity</p>	
	<p><b>Positive incentives in place to promote biodiversity conservation and sustainable use (HI 20)</b></p>	<p>Value of direct and indirect subsidies to activities which promote biodiversity &amp; sustainable use</p>	
<p><b>Target 19.1</b> <b>Increase financial resources</b> from all sources to at least US\$ 200 billion per year, including new, additional and effective financial resources, increasing by at least US\$ 10 billion per year international financial flows to developing countries, leveraging private finance, and increasing domestic resource mobilization, taking into account national biodiversity finance planning, and strengthen capacity-building and technology transfer and scientific cooperation, to meet the needs for implementation, commensurate with the ambition of the goals and targets of the framework.</p>	<p>Goal D indicators (HI 8 &amp; 9) apply to target 19.1. HI 19 &amp; 20 are also relevant.</p>		

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Target 19.2</b></p>	<p>No additional dedicated HI proposed. Use other relevant HI, component and complementary indicators and national indicators. Possible binary/ checklist indicator</p>		
<p><b>Target 20</b>            Ensure that relevant knowledge, including the traditional knowledge, innovations and practices of indigenous peoples and local communities with their free, prior, and informed consent, guides decision-making for the effective management of biodiversity, enabling monitoring, and by promoting awareness, education and research.</p>	<p>No additional dedicated HI proposed. Use other relevant HI, component and complementary indicators and other national indicators. Possible binary/ tick-list indicator</p>		

Draft CBD Goals and Targets	Name of indicator	Metric	Related EU Restoration target
<p><b>Target 21</b>            Ensure <b>equitable and effective participation</b> in decision-making related to biodiversity by indigenous peoples and local communities, and respect their rights over lands, territories and resources, as well as by women and girls, and youth.</p>	<p><b>Proportion of total adult population with secure tenure rights to land (SDG Indicator 1.4.2) (HI 21)</b></p>	<p><a href="#">SDG 1.4.2</a> for UK, no Scotland breakout available. Indicator under development</p>	
<p><b>Target 22</b></p>	<p>No additional dedicated HI proposed.            Binary/tick-list indicator: No of countries with legal framework guaranteeing women's equal rights to land ownership and/or control (SDG 5.a.2)</p>		

## Proposed EU Nature Restoration Law Targets

1. **targets based on existing legislation** (for each of the following habitats: improving and re-establishing biodiverse habitats on a large scale, and bringing back species populations by improving and enlarging their habitats)
  - 1.1. wetlands,
  - 1.2. forests,
  - 1.3. grasslands,
  - 1.4. river and lakes,
  - 1.5. heath & scrub,
  - 1.6. rocky habitats and
  - 1.7. dunes) -
2. **pollinating insects -**
  - 2.1. reversing the decline of pollinator populations by 2030; and
  - 2.2. achieving an increasing trend for pollinator populations, with a methodology for regular monitoring of pollinators.
3. **forest ecosystems -**
  - 3.1. achieving an increasing trend for standing and lying deadwood;
  - 3.2. uneven aged forests;
  - 3.3. forest connectivity;
  - 3.4. abundance of common forest birds ;and
  - 3.5. stock of organic carbon.
4. **urban ecosystems -**
  - 4.1. no net loss of green urban space by 2030; and
  - 4.2. an increase in the total area covered by green urban space by 2040 and 2050.
5. **agricultural ecosystems -**
  - 5.1. increasing grassland butterflies;
  - 5.2. increasing farmland birds;
  - 5.3. the stock of organic carbon in cropland mineral soil (tonnes of organic carbon/ha);
  - 5.4. the share of agricultural land with high-diversity landscape features; and
  - 5.5. restoring drained peatlands under agricultural use.

## 6. **marine ecosystems** -

- 6.1. restoring marine habitats such as seagrass beds or sediment bottoms that deliver significant benefits, including for climate change mitigation;, and
- 6.2. restoring the habitats of iconic marine species such as dolphins and porpoises, sharks and seabirds.

## 7. **river connectivity** -

- 7.1. identifying and removing barriers that prevent the connectivity of surface waters, so that at least 25 000 km of rivers are restored to a free-flowing state by 2030

# Annex 2

## Glossary of Biodiversity Terms

Definitions are taken from accepted international sources where practical such as the Convention on Biological Diversity ([CBD Glossaries](#)) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services ([IPBES Glossary](#)).

Where these definitions have been modified, this is noted e.g. replacing “animals and plants” with “organisms” in order to include other taxa such as fungi, shortening particularly long definitions or adding examples for clarity. Other definitions are taken from Levin (ed) Encyclopedia of biodiversity or as stated.

### Agri-Environment Scheme

Schemes that provide funding to farmers and land managers to farm in ways that supports biodiversity, enhance the landscape, and improve the quality of water, air and soil (see also agroecology as integral to such schemes). (IPBES)

### Alien species

A species occurring in an area outside of its historically known natural range as a result of intentional or accidental dispersal by human activities (also known as an exotic or introduced species). (CBD)

### Aquaculture

The farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants, involving interventions such as regular stocking, feeding, protection from predators, to enhance production. (IPBES)

### Baseline

A minimum or starting point with which to compare other information (e.g. for comparisons between past and present or before and after an intervention). (IPBES)

### Biodiversity

Short for biological diversity, the diversity of life in all its forms—the diversity of species, of genetic variations within one species, and of ecosystems. (CBD)

Plants, animals and micro-organisms in a given area or volume. (IPBES)

### Carbon cycle

The process by which carbon is exchanged among the ecosystems of the Earth. (IPBES)

### Carbon sequestration

The long-term storage of carbon in plants, soils, geologic formations, and the ocean. Carbon sequestration occurs both naturally and as a result of anthropogenic activities and typically refers to the storage of carbon that has the immediate potential to become carbon dioxide gas. (IPBES)

## **Carbon storage**

The biological process by which carbon in the form carbon dioxide is taken up from the atmosphere and incorporated through photosynthesis into different compartments of ecosystems, such as biomass, wood, or soil organic carbon. Also, the technological process of capturing waste carbon dioxide from industry or power generation, and storing it so that it will not enter the atmosphere. (IPBES)

## **Circular economy**

A model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. (EU)

## **Co-design**

A participatory approach to design, in which community members are treated as equal collaborators in the design process

## **Conservation**

The management of human use of nature so that it may yield the greatest sustainable benefit to current generations while maintaining its potential to meet the needs and aspirations of future generations. (CBD)

## **Conservation of Biodiversity**

The management of human interactions with genes, species, and ecosystems so as to provide the maximum benefit to the present generation while maintaining their potential to meet the needs and aspirations of future generations; encompasses elements of saving, studying, and using biodiversity. (CBD)

## **Corridor**

A geographically defined area which allows species to move between landscapes, ecosystems and habitats, natural or modified, and ensures the maintenance of biodiversity and ecological and evolutionary processes. (IPBES)

## **Driver**

The factors that, directly or indirectly, cause changes in nature, anthropogenic assets, nature's contributions to people and a good quality of life.

- ▶ Direct drivers of change can be natural and/or anthropogenic. Direct drivers have direct physical (mechanical, chemical, noise, light etc.) and behaviour-affecting impacts on nature. They include, inter alia, climate change, pollution, different types of land use change, invasive alien species and zoonoses, and exploitation
- ▶ Indirect drivers are drivers that operate diffusely by altering and influencing direct drivers, as well as other indirect drivers. They do not impact nature directly. Rather, they do it by affecting the level, direction or rate of direct drivers
- ▶ Interactions between indirect and direct drivers create different chains of relationship, attribution, and impacts, which may vary according to type, intensity, duration, and distance. These relationships can also lead to different types of spill-over effects

- ▶ Global indirect drivers include economic, demographic, governance, technological and cultural ones. IPBES give special attention among indirect drivers, to the role of institutions (both formal and informal) and impacts of the patterns of production, supply and consumption on nature, nature's contributions to people and good quality of life. (IPBES – modified)

## **Ecology**

A branch of science concerned with the interrelationship of organisms and their environment; the study of ecosystems. (CBD)

## **Ecosystem**

Communities of organisms interacting with each other and with their non-living environment—forests, wetlands, mountains, lakes, rivers, deserts and agricultural landscapes. (CBD - modified)

## **Ecosystem approach**

The Ecosystem Approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. The Ecosystem Approach places human needs at the centre of biodiversity management. It aims to manage the ecosystem, based on the multiple functions that ecosystems perform and the multiple uses that are made of these functions. The ecosystem approach does not aim for short-term economic gains, but aims to optimize the use of an ecosystem without damaging it. (CBD)

## **Ecosystem diversity**

The variety of ecosystems that occurs within a larger landscape, ranging from biome (the largest ecological unit) to microhabitat. (CBD)

## **Ecosystem Health**

Ecosystem health is a metaphor used to describe the condition of an ecosystem, by analogy with human health. Note that there is no universally accepted benchmark for a healthy ecosystem. Rather, the apparent health status of an ecosystem can vary, depending upon which metrics are employed in judging it, and which societal aspirations are driving the assessment. (IPBES)

## **Ecosystem services**

Processes by which the environment produces benefits useful to people, akin to economic services. (CBD)

## **Eco Tourism**

Travel undertaken to witness sites or regions of unique natural or ecologic quality, or the provision of services to facilitate such travel that have the least impact on biological diversity and the natural environment. (CBD)

## **Endangered species**

A technical definition used for classification referring to a species that is in danger of extinction throughout all or a significant portion of its range. IUCN The World Conservation Union defines species as endangered if the factors causing their vulnerability or decline continue to operate. (CBD)

## **Ex situ conservation**

A conservation method that entails the removal of germplasm resources (seed, pollen, sperm, individual organisms, from their original habitat or natural environment. Keeping components of biodiversity alive outside of their original habitat or natural environment. (CBD) e.g. botanic gardens, zoos, biobanks.

## **Extinction**

The evolutionary termination of a species caused by the failure to reproduce and the death of all remaining members of the species; the natural failure to adapt to environmental change. (CBD)

## **Extirpation**

The local or regional loss of a species that stills exists elsewhere. This is sometimes referred to as local extinction.

## **Functional connectivity (Landscape connectivity)**

The degree to which the landscape facilitates the movement of organisms (animals, plant reproductive structures, pollen, pollinators, spores, etc.) and other environmentally important resources (e.g., nutrients and moisture) between similar habitats. Connectivity is hampered by habitat fragmentation (q.v.). (IPBES – for Landscape connectivity)

## **Gene**

The functional unit of heredity; the part of the DNA molecule that encodes a single enzyme or structural protein unit. (CBD)

## **Genetic diversity**

The variety of genes within a particular population, species, variety, or breed. (CBD)

## **Geodiversity**

The variety of the geological and physical elements of nature, such as minerals, rocks, soils, fossils and landforms, and active geological and geomorphological processes. (IUCN)

## **Habitat**

A place or type of site where an organism or population naturally occurs. (CBD)

## **Habitat degradation**

The diminishment of habitat quality, which results in a reduced ability to support organisms. Human activities leading to habitat degradation include polluting activities and the introduction of invasive species. Adverse effects can become immediately noticeable, but can also have a cumulative nature. Biodiversity will eventually be lost if habitats become degraded to an extent that species can no longer survive. (CBD - modified)

## **Habitat fragmentation**

Fragmentation of habitats occur when a continuous has become divided into separate, often isolated small patches interspersed with other habitats. Small fragments of habitats can only support small populations and these are more vulnerable to extirpation. The patches may not even be habitable by species occupying the original undivided habitat. The fragmentation also frequently obstructs species from migrating. Habitat fragmentation stems from geological processes that slowly alter the lay out of the physical environment or human activities such as land clearing, housing, urban development and construction of roads or other infrastructure. Adverse effects sometimes are not immediately noticeable and sufficient habitats may ostensibly be maintained. However inbreeding, lack of territories and food shortage are some of the problems small populations can encounter. Fragmentation of habitats is therefore expected to lead to losses of species and genetic diversity in the longer term. (CBD - modified)

## **Habitat loss**

The outcome of a process of land use change in which a 'natural' habitat-type is removed and replaced by another habitat-type, such as converting natural areas to production sites. In such process, species that previously used the site are displaced or destroyed. Generally this results in a reduction of biodiversity. (CBD - modified)

## **Indicator**

Observed value representative of a phenomenon to study. In general, indicators quantify information by aggregating different and multiple data. The resulting information is therefore synthesised. In short, indicators simplify information that can help to reveal complex phenomena. (EEA)

## **In situ conservation**

A conservation method that attempts to preserve the genetic integrity of gene resources by conserving them within the evolutionary dynamic ecosystems of the original habitat or natural environment. (CBD)

## **Invasive species**

Invasive species are those that are introduced—intentionally or unintentionally—to an ecosystem in which they do not naturally appear and which threaten habitats, ecosystems, or native species. These species become invasive due to their high reproduction rates and by competing with and displacing native species that naturally appear in that ecosystem. Unintentional introduction can be the result of accidents (e.g. when species escape from a zoo), transport (e.g. in the ballast water of a ship); intentional introduction can be the result of e.g. importing animals or plants or the genetic modification of organisms. (CBD)

## **Just transition**

Introducing changes in the economy to deliver environmental benefits in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind. This involves maximising the social and economic opportunities of climate action, while minimising and carefully managing any challenges – including through effective social dialogue among all groups impacted, and respect for fundamental labour principles and rights. (ILO)

## **Keystone species**

A species that has a disproportionately large effect on its environment relative to its abundance. (Paine 1995, the term's originator)

## **Landscape**

An area as perceived by people, whose character is the result of the action and interaction of natural and/or human factors. (EU - European Landscape Convention)

## **Land-use**

The socio-economic purpose of the land. Areas of land can be used for residential, industrial, agricultural, forestry, recreational, transport etc. purposes. Land use/cover area frame statistical survey, abbreviated as LUCAS, is a European field survey programme funded and executed by Eurostat, which applies standardised types of land use. (EU - Eurostat - modified)

## **Mitigating measures (Mitigation)**

Measures that allow an activity with a negative impact on biodiversity, but reduce the impact on site by considering changes to the scale, design, location, process, sequencing, management and/or monitoring of the proposed activity. It requires a joint effort of planners, engineers, ecologists, other experts and often local stakeholders to arrive at the best practical environmental option. An example is the unacceptable impact on biodiversity of the construction of a certain road that is mitigated by the construction of a wildlife viaduct. (CBD - modified)

## **Native species**

Plants, animals, fungi, and micro-organisms that occur naturally in a given area or region. (CBD)

## **Nature (Natural environment)**

All living and non-living things, and processes that occur naturally on Earth. (CBD - modified)

## **Nature-based solution**

Actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human wellbeing and biodiversity benefits. (IUCN)

## **Nature network**

A collection of high-quality and well-connected areas that allow wildlife to thrive and cope with climate change, as well as enhancing natural beauty and delivering benefits for people such as flood alleviation. (Natural England)

## **Nature positive**

Halting and reversing nature loss by 2030, measured from a baseline of 2020. (Locke et al. 2020)

## **Red List**

The IUCN Red List of Threatened Species provides taxonomic, conservation status and distribution information on taxa that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction. (CBD - modified)

## **Regeneration**

The process of assisting the recovery of ecosystem processes serving and/or enhancing biodiversity and ecosystem resilience. This may not necessarily be the original habitat type or include the original species communities. In woodland, regeneration is the spontaneous recovery of native tree species that colonise and establish in abandoned fields or natural disturbances; this process can also be assisted through human interventions such as fencing to control livestock grazing, weed control, and fire protection. (Crouzeilles et al 2017)

## **Regenerative farming (agriculture)**

An approach to farming that uses soil conservation as the entry point to regenerate and contribute to multiple ecosystem services. (Schreefel et al. 2020)

Note that Schreefel et al. (2020) found multiple definitions of Regenerative Agriculture.

## **Restoration**

The process of assisting the recovery of an ecosystem towards or to good condition, as a means of conserving and/or enhancing biodiversity and ecosystem resilience; for habitat types listed in Annexes I and II, restoration means the process of assisting their recovery to the highest level of condition attainable. (EU - proposed)

## **Restoration measure**

Any measure assisting ecosystem recovery actively or passively towards or to good condition and enhancing biodiversity, including measures taken for the improvement of the condition of an ecosystem or for the re-establishment of natural and semi-natural ecosystems, as well as measures to improve the connectivity of natural and semi-natural ecosystems, and to enhance species populations, also across national borders. (EU - proposed)

## **Soil health**

The continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. (USDA). The concept connects agricultural and soil science to policy, stakeholder needs and sustainable supply-chain management (Lehmann et al 2020)

## **Species**

A group of organisms capable of interbreeding freely with each other but not with members of other species. (CBD)

## **Species diversity**

The number and variety of species found in a given area in a region. (CBD)

## **Sustainable development**

Development that meets the needs and aspirations of the current generation without compromising the ability to meet those of future generations. (CBD from Bruntland Commission Report, 1987)

## **Wild species**

Organisms captive or living in the wild that have not been subject to breeding to alter them from their native state. (CBD)

## **Wildlife**

Living, non-domesticated animals. Some experts consider plants also as part of wildlife. (CBD)



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