

Scottish Biodiversity Strategy Report to Parliament 2017 – 2019

June 2020



Scottish Government
Riaghaltas na h-Alba
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Scottish Biodiversity Strategy. Report to Parliament: 2017 – 2019

Laid before the Scottish Parliament by the Scottish Ministers on 26 June 2020 as required under the Nature Conservation (Scotland) Act 2004.

SG/2020/110

Contents

Ministerial Foreword

Preface	5
1. Introduction.....	6
2. Action delivery and progress	17
3. Outcome 1: Healthy Ecosystems	18
4. Outcome 2: Natural Capital.....	25
5. Outcome 3: Biodiversity, health and quality of life	28
6. Outcome 4: Wildlife, habitats and protected places.....	35
7. Outcome 5: Land and freshwater	42
8. Outcome 6: Marine and coastal.....	46
9. Outcome 7: Measuring progress.....	50
10. Next Steps – The 2020 Challenge for Scotland’s Biodiversity	52
Annex 1 - Links between Aichi Targets and the Scottish Biodiversity Strategy 2020 Challenge Outcomes.....	54
Annex 2 - Natural Heritage, Biodiversity, People Engagement and Ecosystem Health Indicators	57
Annex 3 Acronyms.....	61

Ministerial Foreword



This is the fifth Progress Report to the Scottish Parliament on the Scottish Biodiversity Strategy. I am grateful to Scottish Natural Heritage and other specialist staff in our public bodies for their work in preparing the report and, together with colleagues across the public, private and third sectors, in working to deliver the 2020 Challenge for Scotland's Biodiversity.

When I wrote to the Parliament's Environment, Climate Change and Land Reform Committee in December 2019 on the Global Biodiversity Assessment published earlier that year by the

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), governments around the world were focused on the twin global crises of climate change and biodiversity loss and preparing for 2020 to host international conferences on biodiversity, in Kunming, China, and on climate change, in Glasgow. Those events have been postponed until 2021 due to the COVID-19 pandemic and governments have had to focus attention and resource on taking comprehensive action to save lives and to map out a route to restart and recovery. Whatever we may yet learn about the connections between global biodiversity loss and the risk of zoonotic pandemics, it is sobering to reflect on the impact of the ongoing global health crisis on human health.

We remain committed to tackling biodiversity loss and climate change and to seizing the opportunity – the necessity – to do things differently as we emerge from the COVID19 pandemic. We must redouble our efforts to ensure that the benefits people derive from nature are recognised and protected. Wherever possible we must identify ways in which we can address both climate change and biodiversity loss together, since they are so clearly interlinked. This work will play a key part in our 'green recovery' and in our endeavour to create a more resilient environment in which we and nature may prosper to mutual benefit. Nature-based solutions founded on investing in activity such as peatland restoration, woodland creation, sustainable management of the seas and coast and revived greenspace offer great prospects for revival.

I set out in detail in my letter to Committee last December the range of activities, initiatives and investments we are undertaking across our public sector and wider society to address biodiversity loss – I must thank all of those engaged in that work, and those who have contributed to this report. I also acknowledged that we must do more. In Scotland, as in much of the world, we have spent hundreds of years shaping and reshaping our natural environment to support our lives and our families, and we will continue to do so. It is not, therefore, going to be straightforward, or quick, to deliver substantial improvements. But with every year that passes we understand more about living more sustainably with nature, and the indicators reported here are a crucial part of understanding that picture.

It is clear that we know a lot about what we can do to protect our biodiversity – and our analysis of the possible policy pathways proposed by the IPBES Global

Assessment demonstrates that we are doing many of the right things already. We are developing a more circular economy; coherent networks of protected areas on land and in our seas; tackling pollution; and preventing the arrival of non-native invasive species. We have published The Environment Strategy for Scotland: vision and outcomes, and are participating actively with the Convention on Biological Diversity and sub-national governments to influence the development of a new international Global Biodiversity Framework.

And so, in summary, these are challenging times, but I am optimistic for the future, for people and for nature, in Scotland and around the world, provided that we hold fast to the path that we have started to map out and proceed in partnership and collaboration.

Roseanna Cunningham MSP

Cabinet Secretary for Environment, Climate Change and Land Reform

Preface

This is the fifth report detailing progress on the implementation of the Scottish Biodiversity Strategy. It covers the period 2017 to 2019. The Nature Conservation (Scotland) Act 2004 requires a report on the implementation of the Scottish Biodiversity Strategy to be laid in Parliament at the end of every three year period following its adoption. Previous progress reports were laid in 2007, 2010, 2014 and 2017.

The report was compiled by Scottish Natural Heritage on behalf of the Scottish Government. An agreed set of biodiversity and engagement indicators are used to describe progress resulting from the actions and projects implemented by many agencies, organizations, businesses and individuals across the whole of Scotland's land and sea.

Most of the indicators and data referenced here have been published elsewhere. This report provides a synthesis and overview of progress over the last three years, and looks ahead to emerging ambition for biodiversity post-2020.

Many agencies, organisations and individuals have contributed information used in this report, with the Scottish Environment Protection Agency (SEPA), Marine Scotland, and Scottish Forestry providing up to date data as well as specialist quality assurance.

1. Introduction

The 2020 Challenge for Scotland's Biodiversity¹ was published in 2013 to take into account the international Aichi Targets agreed by the Conference of the Parties to the Convention on Biological Diversity in 2010 and the requirements of the European Union Biodiversity Strategy² published in 2011. The 2020 Challenge refreshed the previous strategy - Scotland's biodiversity: it's in your hands (2004)³, and both documents together constitute the 'Scottish Biodiversity Strategy'.

This report begins with an introduction to the background and scope of the Scottish Biodiversity Strategy illustrating how it complements the UN Sustainable Development Goals, the EU Biodiversity Strategy, and the UK Biodiversity Framework. This includes a summary of recent findings on the connections between biodiversity and climate change, a short overview of Scotland's changing biodiversity, and a summary of the three Aims and seven Outcomes of the Scottish Biodiversity Strategy.

Following this, the report assesses progress in meeting the seven outcomes. Each of these assessments begins with a table listing the key steps set out for that outcome, followed by a summary of key activities addressing the outcome during this reporting period 2017 – 2019. Tables of indicators for monitoring progress are provided, and trends are shown where available. Annex 2 provides a complete list and assessment status of all the indicators.

The report concludes with an outline of preparations for developing a new biodiversity framework post-2020.

Further detail on some of the work reported here is provided in the SNH progress report on implementation of specific projects, in Scotland's Biodiversity: A Route Map to 2020⁴, published in 2019.

1.1 International framework and obligations

The Scottish Biodiversity Strategy sits within a broad framework encompassing global, EU, UK and Scottish conventions, legislation and policy – see Box 1.

Box 1. The policy framework for biodiversity

The UN Sustainable Development Goals

Scotland was one of the first countries in the world to sign up the UN Sustainable Development Goals (SDGs)⁵ that seek common action to tackle poverty and inequality and promote sustainable development across the globe. Progress with the Scottish Biodiversity Strategy will contribute to many of the 17 SDGs, with two directly related to biodiversity conservation itself.

¹ <http://www.gov.scot/Resource/0042/00425276.pdf>

² https://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm

³ <https://www.gov.scot/publications/scotlands-biodiversity---its-in-your-hands/>

⁴ <https://www.nature.scot/biodiversity-route-map-2020-3rd-year-report-2017-2019>

⁵ <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

The Convention on Biological Diversity

At the UN Conference on Environment and Development in Rio de Janeiro, Brazil in 1992 the first global strategy for biodiversity was ratified. At the tenth meeting of the Conference of the Parties in October 2010, a revised and updated Strategic Plan for Biodiversity, including the Aichi Biodiversity Targets⁶, covering 2011-2020 was adopted.

The European Union Biodiversity Strategy

The European Union Biodiversity Strategy⁷ published in May 2011 builds on achievements to 2010 but also recognises that more needs to be done. It introduced a new approach to maintaining biodiversity by aiming to reduce high rates of species extinctions by 2020, to restore natural ecosystems in the EU as far as possible, and to contribute more to averting a global problem.

The UK Biodiversity Framework

Since the publication in 2007 of Conserving Biodiversity – the UK approach⁸, the context in which the Convention on Biological Diversity (CBD) is implemented in the UK has changed. The UK Post-2010 Biodiversity Framework⁹ identifies the activities needed to galvanise and complement country strategies, in pursuit of the Aichi Targets and coordinated reporting at a UK level.

The Scottish Biodiversity Strategy

Scotland's Biodiversity: it's in your hands¹⁰, 2004 was supplemented in 2013 by the 2020 Challenge for Scotland's Biodiversity¹¹ as a response to the new international Aichi Targets. Scotland's Biodiversity: a Route Map to 2020¹² published in 2015, identified large-scale collaborative action required to help deliver the Scottish Biodiversity Strategy outcomes.

⁶ <http://www.cbd.int/sp/targets>

⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011DC0244&from=EN>

⁸ <https://www.gov.uk/government/publications/conserving-biodiversity-the-uk-approach>

⁹ http://jncc.defra.gov.uk/pdf/UK_Post2010_Bio-Fwork.pdf

¹⁰ <https://www.gov.scot/publications/scotlands-biodiversity---its-in-your-hands/>

¹¹ <http://www.gov.scot/Resource/0042/00425276.pdf>

¹² <https://www.gov.scot/publications/scotlands-biodiversity-route-map-2020/>

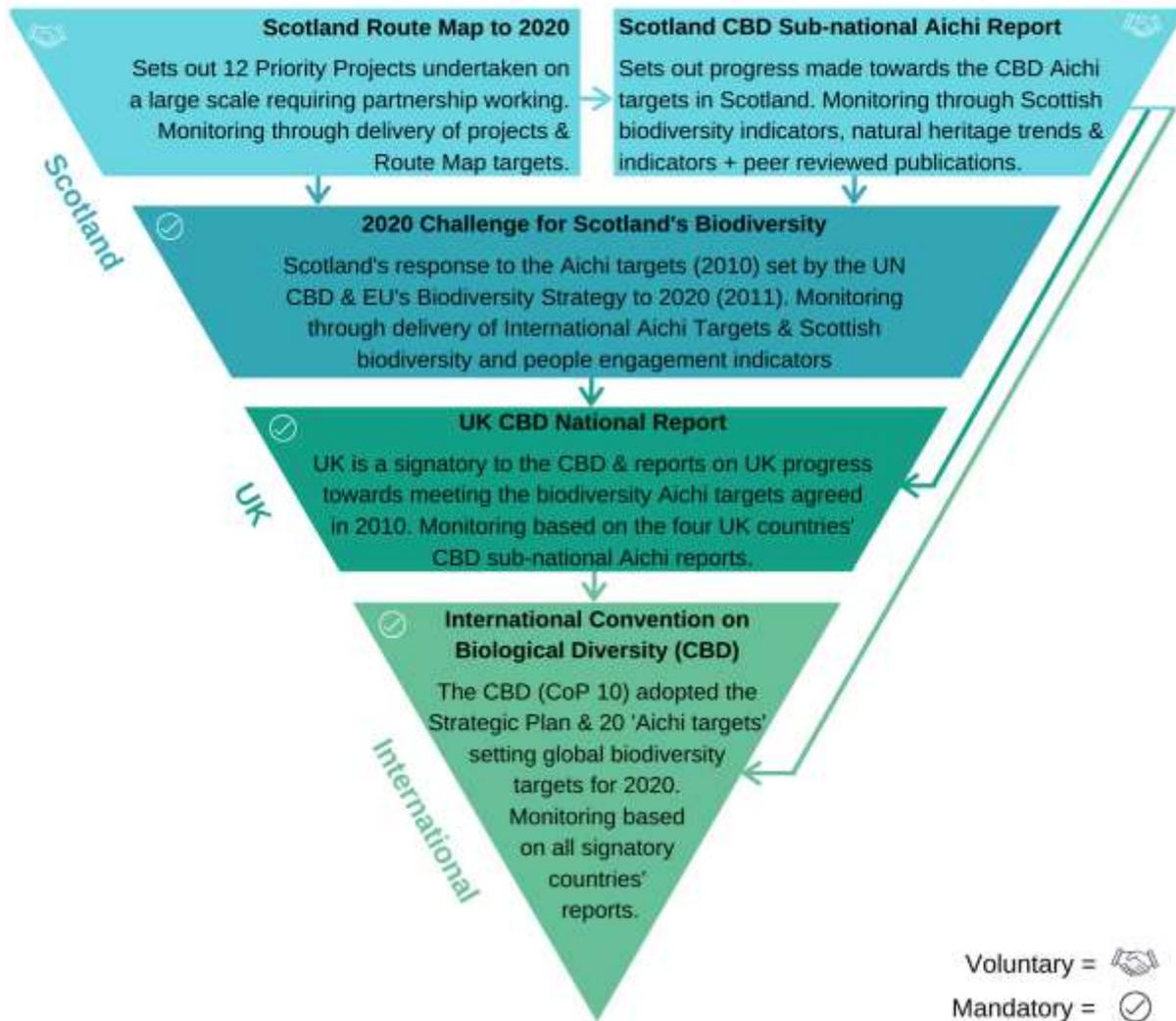
1.2 International biodiversity reporting

Scotland was the first sub-national government and the first country in the world to complete and submit a full report on all 20 Aichi targets to the CBD in 2016. Scotland has also contributed to the metrics which underpin this reporting through the development of a new method for compiling and reporting genetic diversity as required under Aichi Target 13. This method has been approved by IUCN and recommended to the CBD as an approved method suitable for use across the world. Details are described in Box 2.

Scotland also reports progress against the European Union and the Convention on Biological Diversity (CBD) targets as part of the UK's official processes. In addition Scotland has developed a series of reports detailing progress against the International biodiversity targets set under the CBD known as the 'Aichi Targets'. These targets were approved by the Convention's Conference of the Parties (COP) in 2010 in the province of Aichi in Japan. This report is one of a number of reporting requirements on biodiversity, as set out in Figure 1.

Figure 1. The relationships between global, European, UK and Scotland reporting on biodiversity

Scotland's biodiversity reporting



Frequency of reporting

	Scotland Route Map to 2020	Scotland CBD Sub-national Aichi Report	Scotland 2020 Challenge for Scotland's Biodiversity	UK CBD National Report	International Convention on Biological Diversity (CBD)
Frequency of reporting	Annually	Annually	Every 3 years	One-off	One-off
	Final report to Scottish Government in December 2020	Next report to Scottish Government in November 2020	Next report to Scottish Parliament in June 2020	Submitted in early 2019	All signatory countries' reports (Global Outlook 5) to be published in 2020

Box 2. Working internationally

Conservation of genetic diversity

In Scotland and in the UK baseline mechanisms are well-established for assessing and reporting on genetic diversity in species of agricultural importance (e.g. rare livestock breeds, crop wild relatives), and a methodology has been established for ornamental plants. A new [Strategy for UK Forest Genetic Resources](#)¹³ was launched in 2019, creating a framework for better understanding, protection and use of the genetic diversity in the UK's trees, and this will enable trees to be included in genetic conservation reporting. Scotland also announced the UK's first Gene Conservation Unit at Beinn Eighe National Nature Reserve in 2019.

However, with no clear strategy to deal with the genetic diversity of 'other species of socio-economic importance' in Scotland, the UK or indeed elsewhere, a new national approach, that is applicable world-wide has been developed in Scotland, through funding from the [SEFARI Gateway](#)¹⁴ (Scottish Environment, Food and Agriculture Research Institutes).

A set of criteria for defining terrestrial and freshwater species of socio-economic importance in Scotland has been developed and an initial list of 26 species were selected.¹⁵

The selection criteria are:

- National conservation priority wild species.
- Species of national cultural importance.
- Species providing key ecosystem services.
- Species of importance for wild harvesting (food and medicine).
- Economically important game species.

The development of a scorecard approach allows for the collation of structured expert opinion covering: demographic decline; hybridisation; restrictions on regeneration and turnover of genetic material, and seed bank viability and collection status.

The development of a "genetic scorecard" for other species of socio-economic, commercial and cultural importance particularly marine species, ensures that this methodology will be relevant to the post-2020 CBD targets that focus on genetic diversity.

Scotland also contributes to, and reports on progress against other agreements, initiatives and conventions to safeguard nature conservation across the United Kingdom, Europe and world-wide; such as The Ramsar Convention of Wetlands of International Importance, The Bern Convention on

¹³ <https://www.forestresearch.gov.uk/research/uk-forest-genetic-resources-strategy/>

¹⁴ <https://sefari.scot/sefari-gateway>

¹⁵ <https://www.nature.scot/scotlands-biodiversity-progress-2020-aichi-targets-aichi-target-13-genetic-diversity-maintained>

the Conservation of European Wildlife and Natural Habitats and Natura reporting under the Habitats directive and the Birds Directive.

Through conservation measures to safeguard internationally important populations of species of sea birds and habitats such as blanket bog, Scotland also contributes through internationally renowned conservation research.

1.3 Biodiversity and climate change

In 2019 a number of significant reports were published detailing changes in global biodiversity and the need for substantial changes to policy and targets in order to help reduce biodiversity loss and meet the Paris Agreement on climate change.

The Global Assessment of Biodiversity and Ecosystem Services (IPBES Report 2019) found that climate change is a direct driver of biodiversity loss and it is increasingly exacerbating the impacts from the other drivers through:

- Increased average temperatures;
- Increased frequency and intensity of extreme weather events;
- Changes in the chemistry of the ocean, such as deoxygenation and acidification; and
- Rises in sea level by 21mm (max.) since 1900; increasing by 3mm per decade since 1970.

The IPCC Climate Change and Land report¹⁶ highlights the significant changes that will be needed in relation to how we grow food and use the land to address climate change. The IPCC Special Report on the Oceans and Cryosphere in a Changing Climate¹⁷ highlights the significant impacts that climate change is having on our oceans and cryosphere. These reports highlight the importance of combining action to avert climate change and losses of nature.

Nature Based Solutions play a vital role in helping us achieve our net-zero target by 2045 and will be central in delivering a Green Recovery, post COVID-19. Major programmes of work on peatland restoration, woodland regeneration and coastal resilience are excellent examples of these solutions.

1.4 Scotland's approach to conserving biodiversity

Scotland is very much defined by its nature and landscapes. Our range of habitats on land and sea, which support some 90,000 species¹⁸, are a significant part of what makes Scotland special. They inspire much of our art and literature. They support our health, well-being and economic development. They provide for us the ecosystem services that sustain life and underpin Scotland's economy. The quality of our environment and the products that come from it give Scotland a trading advantage as a small European nation. Activities which depend directly on the

¹⁶ <https://www.ipcc.ch/srccl/>

¹⁷ <https://www.ipcc.ch/srocc/>

¹⁸ Usher, MB. 1997. Scotland's biodiversity: an overview. In Fleming, LV, Newton, A., Vickery, J. and Usher, MB. (Eds) Biodiversity in Scotland: Status, Trends and Initiatives. The Stationery Office, Edinburgh, 5—20.

natural environment are estimated to realise £17.1 billion a year, or 11% of total Scottish output and support 242,000 jobs, or 14% of all full time jobs in Scotland¹⁹.

The effective conservation and enhancement of biodiversity therefore plays an essential role in meeting the Scottish Government's vision of a smart, sustainable and successful Scotland. It is an integral aspect of Scotland's Economic Strategy²⁰, the Land Use Strategy 2016-2021²¹, the National Planning Framework 3²² and Scotland's National Marine Plan²³. Through many international conventions and agreements Scotland also works with other countries to protect and enhance biodiversity.

1.5 Biodiversity Duty Reporting

The Nature Conservation (Scotland) Act 2004 placed a duty on "every public body and office holder, in exercising any functions, to further the conservation of biodiversity so far as it is consistent with the proper exercise of those functions". The duty was complemented by a further duty introduced through the Wildlife and Natural Environment (Scotland) Act 2011 to report once every three years on compliance with the biodiversity duty.

SNH provides a wide range of Guidance on the Biodiversity Duty²⁴ to help Scotland's 139 public bodies comply and report. Research commissioned by Scottish Government on the first round of Biodiversity Duty reports, which covered the period 2012 – 2014 found that 61 (44%) of all public bodies produced a report, including 30 out of the 32 local authorities, and that the activities identified in the reports contributed to 12 of the 20 Aichi Targets.

The second round of reporting on the Biodiversity Duty covered the period 2015-2017 with rates of reporting similar to round one for local authorities (30 of 32) and with a small increase in the number of reports submitted by other public bodies from 31 to 36. The next round of reports, covering the period 2018 – 2020 are due on 1st January 2021.

1.6 Scotland's changing biodiversity

Scotland's biodiversity continues to change. In October 2019 the State of Nature Report for Scotland was published by a partnership including many NGOs and Scottish Natural Heritage (SNH). A number of species are doing well and others are extending their range across and into Scotland as a result of climate change, habitat management and restoration, and a range of positive conservation measures for species. However, long-term data (1970-2016) show that the abundance and distribution of Scotland's species has on average declined over recent decades and most measures indicate this decline has continued in the most recent decade. Overall there has been no reduction in the net loss of nature in Scotland.

¹⁹ <https://www.nature.scot/valuing-our-environment-economic-impact-scotlands-natural-environment>

²⁰ <http://www.gov.scot/Resource/0047/00472389.pdf>

²¹ <https://www2.gov.scot/landusestrategy>

²² <http://www.gov.scot/Resource/0045/00453683.pdf>

²³ <http://www.gov.scot/Resource/0047/00475466.pdf>

²⁴ <https://www.nature.scot/scotlands-biodiversity/biodiversity-duty>

- 24% decline in average species' abundance. The indicator of average species' abundance of 352 terrestrial and freshwater species has fallen by 24% since 1994. There has been very little change in the rate of decline in the last 10 years.
- 14% decline in average species' distribution. The indicator of average species' distribution, covering 2,970 terrestrial and freshwater species over a broad range of taxonomic groups, has fallen by 14% since 1970, and is 2% lower than in 2005.
- 32% decline in the Scottish breeding seabird indicator between 1986 and 2017, with stabilisation observed in recent years. On-going analysis draws on more recently collected data. Studies show that many seabird populations were at their peak during the 1980s. A better understanding is required of how current populations relate to levels prior to this peak, and the factors that have driven and continue to drive changes.
- The abundance indicators for key commercial fish species, both pelagic and demersal, show some signs of recovery from deep historic lows in the Celtic and North Seas.

There are some successes where there has been focused action, for example Greenland barnacle geese²⁵ are doing well and corn bunting populations in north east Scotland have stabilised after a number of years of decline. Reintroduced populations of species such as red kites and sea eagles are now established and beginning to extend their ranges. Some species of plants associated with woodlands, grassland and heath, such as green shield-moss and lesser butterfly-orchid, have benefited through a better understanding of their distribution and requirements and in some cases improved protection by identifying new sites.

It is clear that many of the impacts of pressures on biodiversity have not abated, with a full listing of those affecting Scotland included in the Scotland's Biodiversity: a Route Map to 2020²⁶. The Global Assessment on Biodiversity and Ecosystems Services²⁷ published in May 2019 by the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES) identifies and ranks the following direct drivers of biodiversity loss at a global level, whilst recognising the inter-relationships between the different drivers:

- **Land use and management** – agricultural expansion and intensification and increased infrastructure and built development can lead to a reduction of diversity, quality and connectivity of landscapes and habitats.
- **Direct exploitation** - marine fisheries are the primary and most wide-spread exploitation of the biological resources of the sea. Fisheries have the capacity to cause profound changes in marine ecosystems through their effects on target and non-target species populations and through modification of seabed habitats.
- **Marine management** - the use of our seas is increasingly diverse and complex, ranging from long-standing activities such as shipping/transport and coastal infrastructure, to aquaculture and, most recently, the development of renewable energy at sea.

²⁵ Trinder, M. 2014. Status and population viability of Greenland barnacle geese on Islay. Scottish Natural Heritage Commissioned Report No. 568. <https://www.nature.scot/snh-commissioned-report-632-population-modelling-greenland-white-fronted-geese-potential-impacts>

²⁶ <https://www.gov.scot/publications/scotlands-biodiversity-route-map-2020/>

²⁷ <https://ipbes.net/global-assessment>

- **Climate change** is causing a shift in weather patterns which is affecting nature across Scotland. The seas are warming and sea levels are rising, with acidification becoming evident. It is predicted that increased rainfall and more intense and potentially more frequent extreme weather events will alter conditions, especially in the west. This may change the space in which nature lives more rapidly than nature can adapt. In addition the effects of climate change are increasingly exacerbating the impacts of all the other direct drivers on people and on nature.
- **Pollution** from industry, agriculture and road traffic still impact on waterways, uplands, air quality and sensitive habitats across Scotland although air and water pollution have reduced markedly in the last 25 years. There is growing concern over the potential environmental impacts of plastic pollution, especially microplastics in the aquatic and marine environment, although no evidence yet exists of widespread ecological risk.
- **Invasive non-native species** which out-compete native species and can bring new pathogens and diseases resulting in depleted native biodiversity. Invasive non-native species can have significant effects on the ecology of native terrestrial, marine and coastal habitats and species.

The story of biodiversity change in Scotland is complex, with success requiring a long-term approach to managing environmental change that maximises the benefits to people while protecting wildlife and restoring habitats.

1.7 Aims and outcomes of the Scottish Biodiversity Strategy

Against this background, the 2020 Challenge for Scotland's Biodiversity sets out three aims to be achieved through seven outcomes. A suite of biodiversity and people engagement indicators are used to describe progress across the Strategy outcomes.

The three aims provide a broad framework which supports the Scottish Government's purpose of creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth:

- Protect and restore biodiversity on land and sea, and through action to support healthier ecosystems and restore species and habitats.
- Connect more people with the natural world, for their health and well-being and to involve more of them in decisions about their environment.
- Maximise the benefits of a diverse natural environment and the range of social and economic goods and services it provides.

To achieve these aims, the Strategy identifies seven outcomes:

Outcome 1: Scotland's ecosystems are restored to good ecological health so that they provide robust ecosystem services and build our natural capital.

Outcome 2: Natural resources contribute to stronger sustainable economic growth in Scotland, and we increase our natural capital to pass on to the next generation.

Outcome 3: Improved health and quality of life for the people of Scotland, through investment in the care of green space, nature and landscapes.

Outcome 4: The special value and international importance of Scotland's nature and geodiversity is assured, wildlife is faring well, and we have a highly effective network of protected places.

Outcome 5: Nature is faring well, and ecosystems are resilient as a result of sustainable land and water management.

Outcome 6: Scotland's marine and coastal environments are clean, healthy, safe, productive and biologically diverse meeting the long-term needs of people and nature.

Outcome 7: A framework of indicators that we can use to track progress.

1.8 A Route Map to 2020 - delivery through partnership and collaboration

There is a wide range of activity required to implement the Strategy. A cornerstone of Scotland's approach to biodiversity is partnership working and collaboration between individuals and organisations, and across the public and private sectors.

To provide greater focus and to coordinate large-scale collaborative working Scotland's Biodiversity: a Route Map to 2020²⁸ was published in 2015. It contains an ambitious programme of activity structured around 12 Priority Projects and Targets, supported by 71 Actions and 8 elements of supporting work. Collectively the work involves a large number of organisations as well as many individual land managers, NGOs and other natural resource stakeholders. Regular progress reports²⁹ have been published since September 2016 to help ensure that delivery remains on track.

SNH is leading the co-ordination and delivery of the Route Map to 2020 and chairs a co-ordination group and supporting working groups to assist it in this task. A number of delivery agreements with key organisations have also been developed. New governance has been put in place to reflect the importance of the work to deliver and improve biodiversity in Scotland and the links with climate change. A Scottish Biodiversity Programme Board was established in 2019, co-chaired at senior level by Scottish Government and Scottish Natural Heritage, supported by an Advisory Group and a Stakeholders Group.

Local Biodiversity Action Partnerships (LBAPs) were established across Scotland in response to the first UK Biodiversity Action Plan in 1994 and they continue to play a critical role in bringing together local stakeholders including local authorities, environmental NGOs, communities and volunteers. These partnerships operate at a local level to raise awareness, and to organise projects and actions to conserve and enhance biodiversity around national and local priorities. The breadth of their work across Scotland is illustrated in a publication that accompanied a Scottish Parliament event celebrating 20 years of LBAP³⁰ activity in 2016. However, with increasing pressure on local authority budgets there is a diminishing level of support for the LBAP officers who play a critical role in maintaining effective local biodiversity partnerships.

Many young people care passionately about the environment: in order to harness this enthusiasm and creativity SNH has worked with Young Scot (Scotland's youth

²⁸ <https://www.gov.scot/publications/scotlands-biodiversity-route-map-2020/>

²⁹ <https://www.nature.scot/biodiversity-route-map-2020-3rd-year-report-2017-2019>

³⁰ http://www.taysidebiodiversity.co.uk/wp-content/uploads/2016/11/20-YoSBP_Full-booklet_RT.pdf

information and citizenship charity) and ReRoute – Scotland’s Biodiversity Youth Panel which conducted a detailed assessment of the Route Map to 2020 and produced a report³¹ identifying young people’s aspirations for biodiversity in Scotland, how they can be engaged and what actions are required. A second phase of work with a new Reroute Panel has taken forward this work, including the development of a route map for young people on “20 things you can do to help nature”³².

The following sections of this report describes progress on each of the SBS outcomes and a sub-set of relevant indicators is used to assist in reporting. Annex 1 shows how each of the outcomes is linked to the international Aichi Targets.

³¹ <https://young.scot/get-informed/national/reroute-reports>

³² <https://young.scot/get-informed/national/20-things-you-can-do-to-help-nature>

2. Action delivery and progress

The following sections provide an overview of biodiversity action across the seven outcomes over the last three years and describes the progress that has been made in meeting the outcomes of the Scottish Biodiversity Strategy 2020 Challenge.

This assessment is supported by a series of biodiversity state and people engagement indicators, which were produced by a working group chaired by RSPB following the publication of the Scottish Biodiversity Strategy in 2004. These indicators, alongside other data and trends, provide an evidence base from which to prioritise and develop actions. A suite of Ecosystem Health Indicators has also been developed and published, providing further information on the status of our environment at national and regional scales, which are discussed below in section 3.12.

The following keys should be used to understand the indicators presented in this assessment.

Indicator Performance Rating Key

	Performance Improving
	Performance Maintaining
	Performance Worsening
	Performance to be confirmed
	Indicator in development

A Summary of the status of all indicators is provided in Annex 2.

In reading this section, it should be noted that measurable environmental change often takes place over a number of years. Some data collection used for indicators and trends are therefore collated on relatively long timeframes and as such not all indicators have been updated during this reporting period. The latest data are identified in the 'Updated Date column'. Indicator data require quality assurance and analysis and this too can add a time delay between data being recorded and incorporated into indicators. Some indicators have been archived and others superseded.

3. Outcome 1: Healthy Ecosystems

Scotland's ecosystems are restored to good ecological health so that they provide robust ecosystem services and build our natural capital.

Key steps

- Encourage and support ecosystem restoration and management (also relevant to key steps under section 4: Outcome 2 Natural Capital).
- Use assessments of ecosystem health at a catchment level to determine what needs to be done.
- Government and public bodies will work together towards a shared agenda for action to restore ecosystem health at a catchment-scale.
- Establish plans and decisions about land-use based on an understanding of ecosystems. Take full account of land-use impacts on the ecosystem services that underpin social, economic and environmental health.

3.1 Ecosystem restoration

Restoration of ecosystems has been a primary focus of activity, ensuring they support biodiversity and deliver important services for society, such as flood management and climate change mitigation. Targets for restoration of peatlands, freshwaters and native woodlands are identified as priorities in the Route Map to 2020. There has been a considerable amount of activity and effort across many organisations and partnerships to restore these ecosystems.

There are many landscape-scale projects completed and still underway to restore ecosystems across Scotland. These include projects close to urban populations in the central belt such as EcoCo Life+³³ and the suite of Inner Forth Landscape Partnership³⁴ projects. Projects in other areas of Scotland include the Coigach & Assynt Living Landscape³⁵ and the Flows to the Future project³⁶ in Sutherland. The Scottish Biodiversity Strategy Landscape Scale Conservation Working Group³⁷ organises workshops and provides information to support this activity.

Local authorities have led successful regional land use pilots in the Scottish Borders and Aberdeenshire, with lessons learnt feeding into proposals for further development of this approach in the Land Use Strategy 2016 to 2021 and the Programme for Government commitment to develop Regional Land Use Partnerships.

³³ <https://www.ecocolife.scot/>

³⁴ <http://www.innerforthlandscape.co.uk/>

³⁵ <http://coigach-assynt.org/>

³⁶ <https://www.theflowcountry.org.uk/flows-to-the-future/>

³⁷ <https://www.environment.gov.scot/our-environment/people-and-the-environment/landscape-scale-conservation/>

Reversing ecosystem degradation, loss and fragmentation are key aims of the Scottish Biodiversity Strategy. Considerable efforts have been made on restoration of some of Scotland's most threatened habitats over the past few years. In particular, peatlands and rivers have seen focused efforts which help towards Scotland's climate change targets. Rivers have seen continuous improvement in condition over the last 25 years. The area of woodland has more than trebled since 1900, much of this being commercial forestry rather than native woodland.

3.2 Peatlands

Over 19,000 hectares of peatland across Scotland have been improved through restoration management since 2013, funded through the Scottish Government's Peatland Action Fund of £14 million and managed by SNH. Demonstration events to share best practice have helped to support additional restoration work.

The Flows to the Future project has been working with many partners in Caithness and Sutherland to restore extensive areas of blanket bog. A World Heritage Site status application for this important area was supported by The Peatland Partnership. A Technical Evaluation application was submitted to the UK government in early January 2020 as part of the package to be considered for proposing as the World Heritage Site nomination.

3.3 Native woodland

The Native Woodland Survey of Scotland was carried out from 2006-2013 and this provided the first authoritative picture of the extent and condition of Scotland's native woodlands. The field-based survey results were released in February 2014 by Forestry Commission Scotland (FCS) and provided valuable data to assist land managers and deer management groups identify the potential actions they could take to help restore native woodlands in Scotland.

The National Forest Inventory (NFI) map was established in 2010 and is updated annually. It is based on aerial photography and satellite imagery, and covers all forests and woodlands over 0.5 ha with a minimum of 20% canopy cover (or the potential to achieve it), including new planting, clear-felled sites and restocked sites. The NFI field survey assesses a large, stratified-random sample of woodlands on a 5-year rolling cycle using a standardised protocol. The first cycle of survey took place between January 2010 and January 2016 and this provides a baseline against which future results can be compared. As a sample survey, this does not produce site-based data, but is a valuable source of data that can be used to assess trends in woodland condition.

New native woodlands have been planted, mainly with support through the Scottish Rural Development Programme (SRDP) totalling 8,240ha between April 2017 and April 2019, meeting the Route Map to 2020 target of 3-5,000ha per year.

Herbivore impacts, particularly from deer, have been highlighted as a serious issue in relation to native woodland condition. The Native Woodland Survey of Scotland (NWSS) identified that 46% of native woodlands were in good condition. There has been no follow up survey since 2013 but a narrower dataset on the condition of woodland features on Protected Areas is used as a proxy measure for the condition of the wider woodland resource. It shows an overall decline in woodland condition between 2017 and 2020, with 33% of features now assessed as unfavourable, an increase of 2%. Evidence from Site Condition Monitoring (SCM) shows that

herbivores are at least partially the cause for 63 of the 82 declining woodland features. Invasive non-native species, either in combination with pressures such as over-grazing or individually, account for 42 out of the 82 declining woodland features.

3.4 Freshwaters

SEPA's most recent condition assessment for rivers and lochs (2018)³⁸ shows that there is variation in the condition of freshwaters across Scotland. For Scotland as a whole, 65.7% of our surface and groundwater water bodies are at good or better status (as defined in the Water Framework Directive). This is a slight increase from 2017 (64.9%) while 57.1% of water bodies (rivers, canals and lochs) meet the required EU standard of being of 'Good' or 'High' status. In some regions, such as the Western and Northern Isles, Argyll and North Highland water bodies are in much better condition than the national average.

Four water bodies have improved due to real changes in the environment. These are because of improvement measures to reduce rural diffuse pollution and action to tackle barriers to fish migration. There are four downgrades due to real changes in the environment; one is due to a complex diffuse pollution event, one because of a new confirmed record of invasive North American signal crayfish, and two are due to newly authorised hydropower developments. The CCCF (Current Condition and Challenges for the Future) Report was published in December 2019 for consultation, is due to be published in December 2020, followed by the draft 3rd River Basin Plan in 2020. These reports will provide a more detailed analysis of improvements and predicted success of measures.

Current work to improve freshwater quality is detailed in the second river basin management plan (RBMP) for Scotland 2015-2027³⁹. This focuses on regulation activities and alignment of objectives into land use planning and flood risk management, with five six topic areas for focused RBMP actions⁴⁰:

- Improving water quality – including waste water discharges and rural diffuse pollution
- Improving physical condition
- Improving access for fish migration
- Improving water levels and flows
- Preventing the spread of invasive non-native species

Further information is available on the Water Environment Hub⁴¹ data tool. Progress on actions to deliver the current RBMP are being utilised to inform the third RBMP due for publication in December 2021.

3.5 Assessing progress towards this outcome

A suite of indicators developed in 2006 enable reporting against this outcome and progress against each of them is shown in Table 1.

³⁸<https://www.sepa.org.uk/media/484107/state-of-scotlands-water-environment-2018-summary-report.pdf>

³⁹ <https://www.sepa.org.uk/environment/water/river-basin-management-planning/>

⁴⁰<https://www.sepa.org.uk/environment/water/river-basin-management-planning/actions-to-deliver-rbmp/>

⁴¹ <https://www.sepa.org.uk/data-visualisation/water-environment-hub/>

Table 1. Indicators relevant to monitoring progress on Outcome 1 – Healthy Ecosystems

Indicator	Start	Updated	Trend/ status
EUNIS Land cover Scotland ⁴²	2015		
Improve the condition of terrestrial & freshwater protected nature sites ⁴³	2005	2018	
Native woodland condition ⁴⁴	2013		
High Nature Value Farming ⁴⁵	2009		
Terrestrial Breeding Bird index ⁴⁶	1994	2018	
	2017	2018	
River water quality indicator ⁴⁷	1992	2018	

3.6 Eunis Land Cover Scotland

The Habitat Map of Scotland was produced by Scottish Natural Heritage with data from national surveys reclassified to match the European Nature Information System (EUNIS)⁴⁸. The Habitat Map plots habitats at a broad scale across the country⁴⁹ for use at national and regional scales. An interactive map and all the datasets are freely available through Scotland’s Environment Web⁵⁰ and from Natural Spaces⁵¹ on the SNH website. Work is underway to improve the data resolution for the upland regions of Scotland and new data will be added when it is available.

3.7 Protected nature sites (terrestrial and freshwater)

There are 1,866 terrestrial and freshwater protected sites in Scotland (although some of their boundaries overlap) and they host a total of 5,355 designated natural

⁴²<https://www.environment.gov.scot/our-environment/state-of-the-environment/ecosystem-health-indicators/condition-indicators/indicator-1-land-cover/>

⁴³ <https://www2.gov.scot/About/Performance/scotPerforms/indicator/naturesites>

⁴⁴<https://www.environment.gov.scot/our-environment/state-of-the-environment/ecosystem-health-indicators/condition-indicators/indicator-3-forests/>

⁴⁵<https://www.environment.gov.scot/our-environment/state-of-the-environment/ecosystem-health-indicators/condition-indicators/indicator-4-farming-and-nature/>

⁴⁶ <https://www.nature.scot/information-hub/official-statistics/official-statistics-terrestrial-breeding-birds>

⁴⁷ <https://www.sepa.org.uk/environment/water/aquatic-classification/river-water-quality-indicator/>

⁴⁸ <https://www.eea.europa.eu/data-and-maps/data/eunis-habitat-classification>

⁴⁹ <https://www.nature.scot/eunis-land-cover-scotland-elcs-briefing-note-may-2015>

⁵⁰ <https://www.environment.gov.scot/data/data-analysis/ecosystem-health-indicators/>

⁵¹ <http://gateway.snh.gov.uk/natural-spaces/index.jsp>

features, as of 31st March 2017. In March 2019 78.7% of designated natural features were assessed to be in favourable condition. This figure represents a decrease of 0.8 percentage points from 2018 but a slight increase between 2010 and 2019⁵².

3.8 Native woodland condition

The native woodland condition indicator⁵³ has been developed by Forest Research and Scottish Forestry using measures from the Native Woodland Survey of Scotland carried out between 2006 and 2013. The indicator combines four attributes; canopy cover, percentage of canopy comprising native species, herbivore impact, and invasive species. Native woodlands in satisfactory condition cover 143,163 ha (39.3%) of all native woodland, while those in unsatisfactory condition cover 167,991 ha (46.1%), with much of the remaining area covering 39,672ha (10.9%) comprising Plantations on Ancient Woodland Sites (PAWS), most of which have now been planted with non-native commercial conifers.

Forest Research, together with a team including SNH and Scottish Forestry, have also developed a Woodland Ecological Condition (WEC) indicator⁵⁴ using National Forest Inventory survey data. This uses a set of 15 indicators to classify sample squares as favourable, intermediate or unfavourable. The results are extrapolated to report on native, non-native and 'other' woodland.

Native woodland in favourable condition covers 14,000ha (3%), with 409,000ha (94%) in intermediate and 11,000ha (2.5%) in unfavourable condition.

3.9 High Nature Value Farming

High Nature Value (HNV) Farming⁵⁵ refers to farming systems where the overall management characteristics of the system provide a range of environmental benefits, particularly maintaining and enhancing a wide range of habitats and species (such as butterflies and birds) that are of high nature conservation importance at a Scottish, UK and European level.

The area of Scotland estimated as being under HNV farming has ranged between 2.3 and 2.4 million hectares of agricultural land between 2007 and 2013. This equates to a range of between 40% and 44% of the total amount of agricultural land in Scotland⁵⁶. This will provide the baseline measurement for assessing HNV delivered through SRDP for the period 2014-2021. This indicator has therefore not been updated during this reporting period.

⁵² <https://www.nature.scot/information-hub/official-statistics/official-statistics-protected-sites>

⁵³ https://www.environment.gov.scot/data/data-analysis/ecosystem-health-indicators/?indicator=Native_woodland

⁵⁴ <https://www.forestresearch.gov.uk/tools-and-resources/national-forest-inventory/what-our-woodlands-and-tree-cover-outside-woodlands-are-like-today-8211-nfi-inventory-reports-and-woodland-map-reports/nfi-woodland-ecological-condition/>

⁵⁵ <https://www.webarchive.org.uk/wayback/archive/20170113173237/http://www.gov.scot/Publications/2014/03/8273/downloads#res447178>

⁵⁶ <https://www.webarchive.org.uk/wayback/archive/20170113173237/http://www.gov.scot/Publications/2014/03/8273/downloads#res447178>

3.10 Species diversity – bird populations

In Scotland, annual monitoring of terrestrial breeding birds⁵⁷ is achieved primarily through the Breeding Bird Survey (BBS). Randomly located 1km survey squares are visited by volunteers twice in each breeding season (April to July). In addition scarce species are assessed using targeted surveys.

Since 1994 the smoothed all-species index steadily increased, peaking in 2007 then becoming more variable after this time. In 2018 it was 12% above the baseline and 9% below the peak in 2007. Between 2017 and 2018 the all-species and woodland bird indicators decreased, whilst the upland and farmland bird indicators were stable. The decline since 2017 probably has multiple causes, but there is evidence that the harsh winter of 2017-18 was a factor.

3.11 River water quality indicator

The standards for measuring water quality were modified in 2013 and the impacts of this are described in the [river water quality indicator](#)⁵⁸. SEPA's most recent (2018) condition assessment for rivers and lochs⁵⁹ shows that there is variation in the condition of freshwaters across Scotland. For Scotland as a whole, 65.7% of our surface and groundwater water bodies are at good or better status (as defined in the Water Framework Directive). This is a slight increase from 2017 (64.9%) while 57.1% of water bodies (rivers, canals and lochs) meet the required EU standard of being of 'Good' or 'High' status. In some regions, such as the Western and Northern Isles, Argyll and North Highland water bodies are in much better condition than the national average.

3.12 The Ecosystem Health Indicators

Since the previous SBS progress report 2014-2016 a suite of Ecosystem Health Indicators (EHIs)⁶⁰ has been published which identifies the attributes to measure the health of ecosystems, and going forward will allow identification of areas requiring restoration. This is a major achievement, which was developed through a partnership between government agencies, research institutes and NGOs. They are useful to policy-makers, planners and land managers as they show where intervention is needed to halt damage to, or restore, ecosystem health. They also show stakeholders where progress is being made and where more effort may be needed.

At this early stage some of the EHIs provide baseline data only while others have many years of data associated with them. In the coming years trends data will become available for all these indicators. The two most recently developed indicators⁶¹ use Scotland's diversity of mosses and liverworts to create the world's first bryophyte indicator. These sensitive species confirm reductions in nitrogen pollution across Scotland and also show some of the adverse effects of climate

⁵⁷ <https://www.nature.scot/information-hub/official-statistics/official-statistics-terrestrial-breeding-birds>

⁵⁸ <https://www.sepa.org.uk/environment/water/aquatic-classification/river-water-quality-indicator/>

⁵⁹ <https://www.sepa.org.uk/media/484107/state-of-scotlands-water-environment-2018-summary-report.pdf>

⁶⁰ <https://www.environment.gov.scot/our-environment/state-of-the-environment/ecosystem-health-indicators/explore-ecosystem-health-indicators/>

⁶¹ Pakeman et al 2019. Using species records and ecological attributes of bryophytes to develop an ecosystem health indicator. *Ecological indicators*, 104, pp.127-136.

<https://www.sciencedirect.com/science/article/pii/S1470160X19303310>

change on our native flora. The EHIs are brigaded into three groups; condition, function, and resilience; with individual indicators listed below.

3.12.1.1 Condition indicators

The condition indicators listed below provide information about the *state* of ecosystems. They can be considered on their own, or together with functional and resilience indicators, they can help to provide a broader picture. At the moment they provide a baseline, and in future, we will be able to track changes in the state of ecosystems over time. The links below are to Scotland's Environment Web, where more detail on each indicator is provided.

- [Land cover](#)
- [Protected nature sites](#)
- [Forests](#)
- [Farming and nature](#)
- [Species diversity – bird populations](#)
- [Freshwater](#)
- [Soil carbon](#)

3.12.1.2 Function indicators

Function indicators (listed below) provide information on how habitats are connected and how well they can carry out their natural functions (for example, dispersal, pollination, decomposition, assimilation, predation, reproduction and growth). There are currently two function indicators: connectivity, and habitats at risk from acidification and eutrophication, and these can be considered on their own or together with condition and resilience indicators to gain a broader picture of our ecosystems. These indicators form a baseline and in the future, we will be able to show changes of time.

- [Connectivity](#)
- [Acid and nitrogen pollution](#)

3.12.1.3 Resilience indicators

Resilience is a property which allows an ecosystem to maintain its characteristics under the impact of human activities. These may be either positive, such as habitat restoration, or negative, such as climate change or deliberate or accidental introduction of invasive non-native species. The suite of resilience indicators (listed below) provides an understanding of how well ecosystems in Scotland are coping with the pressures placed on them.

- [Habitat restoration](#)
- [Invasive non-native species](#)
- [Climate change adaptation](#)
- [Soil sealing](#)
- [Bryophyte nitrogen](#)
- [Bryophyte summer temperatures](#)

4. Outcome 2: Natural Capital

Natural resources contribute to stronger sustainable economic growth in Scotland, and we increase our natural capital to pass on to the next generation.

Key steps

- Encourage wider acceptance and use of the Natural Capital Asset Index (2012) including comparable measures for the marine environment
- Use this index to influence decision-making and market-based approaches, so that wider monetary and non-monetary values for ecosystem services are recognised and accounted for
- Undertake a major new programme of conservation, management and restoration (described in Section 3: Outcome 1 Healthy Ecosystems)

There is a clear recognition in Scotland that natural capital contributes to economic growth, and investment in natural capital is identified as a priority in *Scotland's Economic Strategy*⁶². The natural environment is one of Scotland's greatest assets. It attracts businesses and individuals to live and work in Scotland. The SNH *Valuing our environment report*⁶³ reveals the economic value of the environment. Its sustainable use supports 11% of Scotland's total economic output – worth £17.2 billion a year and one in seven full-time jobs. A recent natural capital assessment found that the partial value of Scotland's natural capital was worth £107 billion⁶⁴.

4.1 The Natural Capital Asset Index

The Scottish Natural Capital Asset Index⁶⁵ (NCAI) was developed by Scottish Natural Heritage to provide a robust and consistent framework for monitoring changes in Scotland's natural capital, helping us to make better-informed decisions, based on an awareness of the relationship between nature, human well-being and economic activity. The National Performance Framework (NPF) includes 55 Scottish Government National Indicators that together provide a mechanism for monitoring progress across all government. The NCAI now constitutes one of the Economy indicators in the NPF as the National Indicator of natural capital⁶⁶.

When the NCAI was launched in 2011, Scotland became the first country in the world to publish such a detailed attempt to monitor annual changes in natural capital. The NCAI was reviewed by experts in 2014, and has been subsequently revised.

⁶² <https://www2.gov.scot/Resource/0047/00472389.pdf>

⁶³ <https://www.nature.scot/valuing-our-environment-economic-impact-scotlands-natural-environment>

⁶⁴ <https://www.ons.gov.uk/economy/environmentalaccounts/articles/scottishnaturalcapitalaccounts/2020#provisioning-services>

⁶⁵ <https://www.nature.scot/professional-advice/planning-and-development/social-and-economic-benefits-nature/natural-capital-asset-index>

⁶⁶ <https://nationalperformance.gov.scot/natural-capital>

The method was published as a peer-reviewed paper in 2019⁶⁷. It continues to be updated to further refine its methodology and improve the data on which it is based.

4.2 Business and biodiversity

The Central Scotland Green Network (CSGN) undertook research in late 2015 with over 300 senior business decision-makers in central Scotland⁶⁸. Over six in ten businesses that responded indicated that Scotland's natural capital was important to them and should be protected and enhanced. Over 70% considered that action to protect and enhance natural capital was urgent or extremely urgent. These findings correlate with the earlier Scottish Natural Capital Survey⁶⁹ conducted by the Scottish Forum for Natural Capital in 2014.

4.3 Natural Capital Accounting

SNH has tested a Natural Capital Accounting⁷⁰ approach on land that it owns or substantially manages, mainly as National Nature Reserves. Where possible monetary values were attributed to benefits from nature. SNH also worked with The Crown Estate and other organisations to trial the use of the Natural Capital Protocol for land-based businesses⁷¹. The trial identified reliance, impacts, risks and opportunities of these businesses on natural capital. Further trials are ongoing.

4.4 Assessing progress towards this outcome

The National Capital Asset Index (NCAI) monitors the quality and quantity of terrestrial habitats in Scotland, according to their potential to deliver ecosystem services now and into the future. It is a composite index, using a wide range of measures. The overall stock of natural capital in 2018 has had small improvements since the Index began in 2000 as shown in Diagram 2.

A back-casting exercise was carried out to create a more rudimentary version of the NCAI back to 1950. The exercise highlighted that Scotland's natural capital was in long-term decline until the early 1990s, with the extent and condition of most habitats deteriorating, especially peatlands and grassland. Since 2000, the delivery of provisioning services –direct products such as food, fuel and water - has stabilised or slightly improved. The capacity to provide other ecosystem services, including cultural services (such as recreation, education, art, and sense of place) and regulation and maintenance services (such as air filtration or flood protection) has also increased, albeit at a slower pace.

Inland surface water delivers a wide range of ecosystem services, including drinking water, flood management and recreation. The recovery of this habitat is a major contributor to the positive trends in Scotland's natural capital. Woodland also provides a variety of services, and the area of woodland has increased since 2000. It is this, rather than improvements in condition, which has driven improvements in

⁶⁷ McKenna et al. (2019). Scotland's natural capital asset index: Tracking nature's contribution to national wellbeing. *Ecological Indicators*, 107, p.105645.

<https://www.sciencedirect.com/science/article/abs/pii/S1470160X19306375>

⁶⁸<http://www.centalscotlandgreennetwork.org/news-and-events/news/1082-business-benefits-from-investing-in-green-infrastructure>

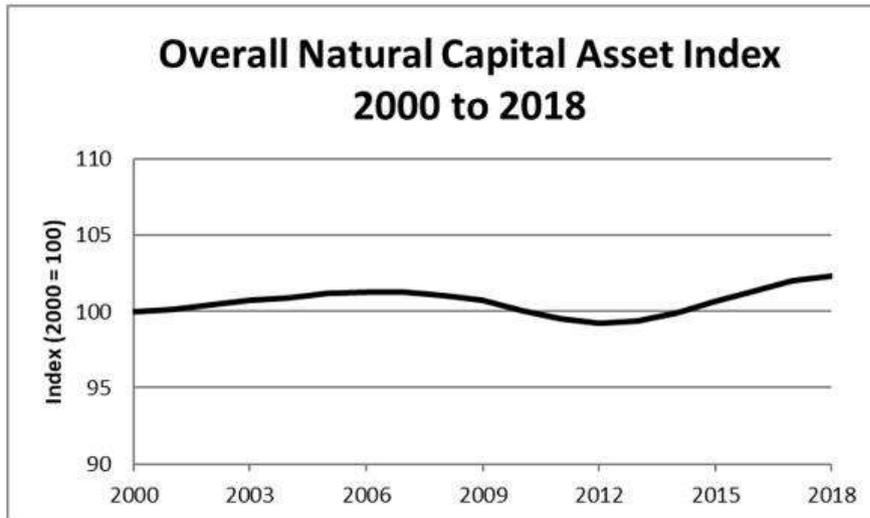
⁶⁹http://naturalcapitalscotland.com/docs/070_342__scottishnaturalcapitalsurvey2014_fullresults_scottishforumonnaturalcapital_1459954033.pdf

⁷⁰ <https://www.nature.scot/snh-research-report-1144-testing-natural-capital-approach-snh-land>

⁷¹ <https://www.crownestatescotland.com/maps-and-publications#download-194>

woodland natural capital stocks. However, deterioration in the condition of uplands (including peatlands and heathland) has partially offset these improvements, especially with respect to regulation and maintenance services, although our knowledge of uplands outside of protected areas is limited.

Figure 2. The Natural Capital Asset Index from 2000 to 2018



From Scotland's Natural Capital Asset Index – Update summary 2020⁷²

In 2019 Scottish Natural Heritage published a Feasibility study for a Marine Natural Capital Asset Index for Scotland⁷³. This report showed that a marine natural capital asset index is possible. The data and indicators are not sufficiently developed for it to be immediately feasible, although work could be done on creating one, with a coastal and intertidal index as an achievable intermediate goal.

⁷² <https://www.nature.scot/scotlands-natural-capital-asset-index-2019-update-summary>

⁷³ <https://www.nature.scot/snh-research-report-1071-feasibility-study-marine-natural-capital-asset-index-scotland>

5. Outcome 3: Biodiversity, health and quality of life

Improved health and quality of life for the people of Scotland, through investment in the care of green space, nature and landscapes.

Key steps

- Provide opportunities for everyone to experience and enjoy nature regularly, with a particular focus on disadvantaged groups
- Support local authorities and communities to improve local environments and enhance biodiversity using greenspace and green networks, allowing nature to flourish and enhancing the quality of life for people who live there
- Build on good practice being developed by the NHS and others to encourage greenspace, green exercise and social prescribing initiatives that will improve health and well-being through connecting people with nature
- Increase access to nature within and close to schools and support teachers in developing the role of outdoor learning across the Curriculum for Excellence
- Encourage public organisations and businesses to review their responsibilities and actions for biodiversity

Green and blue infrastructure contribute to a range of social, economic and environmental objectives and are increasingly seen as an essential part of place-making. Outdoor activity entailing physical activity and contact with nature has been shown to have a positive impact on our physical and mental health and well-being. Local greenspaces are important resources for regular outdoor learning, while the care and management of nature can help to build the skills and capacity of individuals and communities.

5.1 Greenspace and green networks

The Central Scotland Green Network Trust (CSGNT) continues to develop momentum and is currently developing a new Delivery Plan which will provide a much stronger direction for the initiative to ensure it meets the Central Scotland Green Network (CSGN) Vision for 2050. The Plan builds on the costing work and work strands covering seven areas of activity: recreational greenspace, functional green infrastructure, vacant and derelict land, community growing, habitats, active travel and a pan-CSGN strand covering policy, communications and engagement. Working with partners, SNH led on the Habitat Network workstream of the current CSGNT Delivery Plan and has produced a draft Opportunity Map showing priority areas for action to reconnect fragmented habitat networks across the CSGN area. The Opportunity Map is to be launched later in 2020.

Since 2011, an annual CSGN development fund⁷⁴ supported by Scottish Government, Scottish Forestry, Transport Scotland and SNH has provided funding to a large number of projects across all relevant local authorities for woodland creation, habitat enhancement, greenspace improvement, active travel provision and community development projects, although the scale of this work is now reducing.

5.2 Green Infrastructure

SNH is the lead partner for the Green Infrastructure Strategic Intervention (GISI)⁷⁵, part of the Scottish ERDF 2014-2020 programme. The GISI funds green infrastructure in deprived areas of urban Scotland which improves habitats and biodiversity, transforms derelict land, addresses flood risk and creates new community spaces. A total of £15 million of ERDF has been committed through two challenge funds - the Green Infrastructure Fund⁷⁶ and the Green Infrastructure Community Engagement Fund⁷⁷. The total investment (ERDF and match funding) will amount to around £40 million. Fourteen capital projects will be delivered creating multifunctional greenspace in some of our most deprived areas, alongside eleven smaller community engagement projects which focus on working with local communities to help them make the most of their local greenspaces.

The GISI's first phase of projects will be completed in 2020. These include sites in Glasgow and Aberdeen. Seven new projects, in Glasgow, Bishopbriggs and Dunfermline, will start in 2020 and will finish by June 2022.

Studies in Scotland have shown that green infrastructure can provide habitats for a range of wildlife including invertebrates and amphibians, as well as giving people the chance to experience nature.^{78,79}

5.3 Paths and recreation

There are increasing opportunities for people to experience and enjoy nature in Scotland with an expanding National Walking and Cycling Network (NWCN)⁸⁰. This work builds on existing path and trail networks such as Scotland's Great Trails⁸¹, the National Cycle Network⁸² and canal towpaths⁸³, and is a partnership between SNH, Sustrans and Scottish Canals. Between April 2018 and March 2019 £3.5 million of investment was provided to improve 132 km of paths⁸⁴.

The on-going investment in the NWCN is closing key gaps, upgrading connecting routes, linking to public transport and promoting shared use of paths. Active travel and recreation will be easier and more accessible as a result, which is good for our

⁷⁴ <http://www.centralscotlandgreennetwork.org/resources/funding/csgn-development-fund>

⁷⁵ <https://www.greeninfrastructurescotland.scot/>

⁷⁶ <https://www.greeninfrastructurescotland.scot/profiles/green-infrastructure-fund-projects>

⁷⁷ <https://www.greeninfrastructurescotland.scot/green-infrastructure-community-engagement-fund>

⁷⁸ Briers (2014). Invertebrate communities and environmental conditions in a series of urban drainage ponds in Eastern Scotland: implications for biodiversity and conservation value of SUDS. *Clean–Soil, Air, Water*, 42(2), pp.193-200.

⁷⁹ Miró et al. (2018). Links between ecological and human wealth in drainage ponds in a fast-expanding city, and proposals for design and management. *Landscape and Urban Planning*, 180, pp.93-102.

⁸⁰ <https://www.nature.scot/enjoying-outdoors/routes-explore/national-walking-and-cycling-network>

⁸¹ <https://www.scotlandsgreattrails.com/>

⁸² <https://www.sustrans.org.uk/national-cycle-network/>

⁸³ <https://www.scottishcanals.co.uk/activities/>

⁸⁴ <https://www.nature.scot/national-walking-and-cycling-network-annual-report-2018-2019>

health and well-being and helps to connect people with nature. Better routes also attract more visitors and tourism, which is good for local businesses and the wider economy.

Scottish Natural Heritage has also been working with the Scottish Government Rural Payments and Inspections Division (RPID) to support land managers to create and improve more than 100 miles of paths across Scotland. This £8.5 million of investment⁸⁵ covers 138 projects providing opportunities for walkers, wheelchair users, cyclists, horse riders and buggy users. The new and improved paths will connect towns and villages and provide a great variety of ways to explore the outdoors in coastal areas, along riverbanks, to viewpoints and around farmland.

5.4 Developing Scotland's Natural Health Service

Working with a range of partners from both the health and environment sector, SNH has led on the development of an ambitious our natural health service programme⁸⁶ to complement and help support the existing National Health Service. The programme seeks a step change in the use of the outdoors within the health sector, and includes interventions around green infrastructure, local green health partnerships and NHS greenspace, that could achieve a population-level change in activity in the outdoors across Scotland.

Four Green Health Partnerships⁸⁷ in North Ayrshire, Dundee, Highland, and Lanarkshire have now been established to test this approach in practice. Each is led locally by health boards and local authorities. They are focusing on public health priorities around place, mental health and physical activity and involve cross sector working and a whole system approach to tackling health inequalities. Early work has focused in mapping/facilitation and support for local green health interventions / opportunities as part of existing physical activity, mental health, social prescribing and lifestyle pathways and programmes. A range of communication projects inspiring the public to get their daily dose of nature have also been produced.

The NHS greenspace demonstration project⁸⁸ continues to work with area health boards to develop the potential of the NHS outdoor estate to deliver better outcomes for health, nature and climate. The first phase of work resulted in greenspace improvements across a range of new and existing hospital and health centre sites in mainland Scotland. Overall, nearly 90 hectares of greenspace have been created or improved in this first phase including 46 hectares of woodland brought back into sustainable management; 11,000 trees planted; 4 therapeutic gardens created; 1.4 hectares of wildflower meadow created and 20km of new or upgraded paths and active travel routes. A further phase of work is looking to activate the use of the NHS estate through the development and promotion of activity programmes including health walks, community garden projects and environmental conservation work. Embedded staff from TCV and Cyrenians are supporting this work at Ayr and Ailsa, Gartnavel, New Craigs, and Royal Edinburgh.

⁸⁵ <https://www.nature.scot/100-miles-new-paths-celebrated-across-scotland>

⁸⁶ [https://www.nature.scot/sites/default/files/2020-04/Our Natural Health Service leaflet - April 2020.pdf](https://www.nature.scot/sites/default/files/2020-04/Our%20Natural%20Health%20Service%20leaflet%20-%20April%202020.pdf)

⁸⁷ <https://www.nature.scot/professional-advice/contributing-healthier-scotland/our-natural-health-service/green-health-partnerships>

⁸⁸ [https://www.nature.scot/sites/default/files/2019-11/NHS Greenspace Phase 1 report - Executive Summary.pdf](https://www.nature.scot/sites/default/files/2019-11/NHS%20Greenspace%20Phase%201%20report%20-%20Executive%20Summary.pdf)

5.5 Outdoor learning

Curriculum for Excellence and the Learning for Sustainability agenda have embedded environmental awareness and understanding alongside outdoor learning within mainstream education so that all Scottish pupils can now expect to enjoy learning outdoors and experiencing more of Scotland's nature and landscapes. Consequently, teachers are developing new skills and confidence to take learning outdoors across all areas of the curriculum.

Many public and third sector organisations provide funding, advice, practical support and training for outdoor learning; an Outdoor Learning Directory⁸⁹ has been developed by a partnership of public bodies to help facilitate access to these resources. Facilitated by Inspiring Scotland, an Outdoor Play and Learning⁹⁰ coalition has been created with over 100 partners, including member of the public, and representatives from the third sector and academic bodies.

The Route map target for outdoor learning has been delivered through the Learning in local greenspace⁹¹ partnership project. This SNH-led project is providing practical support to schools serving 20% of Scotland's most disadvantaged communities by helping them to access and use local greenspaces within walking distance, and to embed their use throughout the school and across the curriculum. 115 schools in 12 local authority areas have signed up to the project and are working with SNH and various partner organisations with support from the SNH-managed Outdoor Learning in Nature Challenge Fund.

A number of helpful resources have been made available online⁹² to support learning in local greenspaces, for example Beyond your boundary: easy steps to learning in local greenspace, and the GTCS accredited award-winning Teaching in Nature⁹³ programme continues to provide a structured approach to professional development in Outdoor Learning for teachers and other educators.

5.6 Volunteering

The range of volunteering opportunities has generally been maintained, with SNH and Scottish Government funding used to support key volunteering in bodies such as The Conservation Volunteers, Volunteering Matters and the John Muir Trust. Voluntary organisations such as RSPB and NTS continue to run their own volunteer programme while SBS Route Map projects on invasive species and species conservation draw heavily on volunteer effort. These experiences are available across Scotland, offering a chance for people to get close to nature, contribute to its care and learn new skills. There are also many social benefits to be gained through friendship, shared achievement and individual challenge; all help to build resilient communities and restore nature. Volunteer Scotland⁹⁴ provides a portal for people to explore many volunteering opportunities, including nature conservation.

⁸⁹ <https://outdoorlearningdirectory.com/>

⁹⁰ <https://www.inspiringscotland.org.uk/news/scotland-commits-life-enhancing-outdoor-play/>

⁹¹ <https://www.nature.scot/professional-advice/education/learning-local-greenspace>

⁹² <https://www.nature.scot/learning-local-greenspace-downloads>

⁹³ <https://www.nature.scot/professional-advice/education/career-long-professional-learning-educators>

⁹⁴ <https://www.volunteerscotland.net/>

5.7 Assessing progress towards this outcome

The relevant indicators developed for reporting on the 2020 Challenge for Scotland's Biodiversity are presented in Table 2. All these indicators have been updated during this reporting period with the exception of E2 - Greenspace, for which the original indicator has been archived and a new indicator is under development with Ordnance Survey.

Table 2. Indicators relevant to monitoring progress on Outcome 3 – Biodiversity, Health and Quality of Life

No.	Indicator	Start	Updated	Trend since 2010
E1	Attitudes to biodiversity ⁹⁵	2006	2019	
E2	Greenspace ⁹⁶	2007	2015	Archived
	OS - spatial greenspace ⁹⁷	2017		
E3	Visits to the outdoors ⁹⁸	2012	2018	
E4	Involvement in biodiversity conservation ⁹⁹	2010	2015	
E5	Membership of biodiversity NGOs ¹⁰⁰	of 2007	2013	
	Membership of environmental organisations ¹⁰¹	2013	2019	

5.8 Attitudes to biodiversity

In 2019, 71% of adults living in Scotland expressed some interest or concern about biodiversity or feel it has some personal relevance to them⁴¹. These proportions have shown some variation over time, but some of the lowest levels of engagement have been recorded in the most recent research, particularly since 2012. Perhaps critically, only 19% of the population now feel biodiversity is very relevant to their lives.

⁹⁵ <https://www.nature.scot/scottish-nature-omnibus-summaries-public-engagement-biodiversity-and-natural-environment>

⁹⁶ <https://www.nature.scot/engagement-indicators>

⁹⁷ <https://www.ordnancesurvey.co.uk/documents/osmm-greenspace-layer-product-guide.pdf>

⁹⁸ <https://www.gov.scot/publications/scotlands-people-annual-report-results-2018-scottish-household-survey/>

⁹⁹ <https://www.gov.scot/publications/scotlands-people-annual-report-results-2018-scottish-household-survey/>

¹⁰⁰ Data used for previous reporting from 2007 and 2009 was absolute member numbers provided by NGOs. Since 2013 the Scottish Nature Omnibus survey now includes a question relating to membership of an organisation which looks after the environment and is expressed as a % of the population.

¹⁰¹ <https://www.nature.scot/snh-research-report-1198-scottish-nature-omnibus-2019>

5.9 Greenspace

The original greenspace indicator developed in 2007 was archived following publication of Scotland's Greenspace Map. Subsequently with the development of the Ordnance Survey Greenspace dataset in 2017, a new spatial indicator is under development using this new dataset. The indicator is intended to measure the number of people living within 500m of publicly accessible greenspace in every urban data zone in Scotland. In 2018, data from the Scottish Household Survey indicated that 65% of adults considered that they have accessible greenspace within a 5 minute walk of their home, this remains unchanged since 2016.

5.10 Visits to the outdoors

In previous reports to Parliament, data have been used that measure the percentage of adults visiting the outdoors at least once in the previous 12 months. The data now used instead identify those adults in Scotland who visit the outdoors at least once per week. Table 3 below shows recent changes in adults visiting the outdoors, with a significant increase since 2013 in weekly participation in outdoor recreation.

Table 3. Adults visiting the outdoors – 2013, 2015 and 2018

Measure Adults visiting the outdoors	2013	2015	2018	Trend
Once per week	46%	49%	59%	
Not at all	16%	14%	11%	

In 2013/14 'lack of time' and 'poor health' were the main reasons given by respondents who rarely or never participated in outdoor recreation. Those more likely to mention 'lack of time' included younger people (aged under 55), people working full-time and those with children in their household. Those more likely to mention 'poor health' included older people (aged 55 and over), people in the DE social grade and those who were retired or not working.

The last ten years or so have seen an increase in the proportion of shorter duration visits and visits taken close to home, suggesting that more people are finding opportunities to enjoy the nature on their doorstep. While this is a significant and positive trend, the data also suggest that more effort is still needed to increase use of the outdoors by people from disadvantaged communities. There are opportunities to encourage a wider diversity of communities in Scotland to engage with nature, which we keep constantly under review.

5.11 Involvement in biodiversity conservation

The Scottish Household Survey includes a question on volunteering, the results show that the proportion of adults in Scotland doing any sort of volunteering has remained stable over the last few years (27% in 2014 and 26% in 2018), as has the proportion of adults involved in environmental volunteering. In 2014 and 2018, 6% of

all volunteers said they had done some environmental volunteering in the previous year¹⁰².

5.12 Membership of biodiversity NGOs

In 2013 an additional question was added to the Scottish Nature Omnibus survey (managed by SNH), which asks respondents if they were a member of any organisation that helps to look after wildlife or the natural environment. As shown in the reports published by SNH¹⁰³, 11% of adults were members of an environmental organisation in 2019, which remains similar to the figure for 2013 (10%).

¹⁰² <https://www.gov.scot/publications/scotlands-people-annual-report-results-2018-scottish-household-survey/pages/11/>

¹⁰³ <https://www.nature.scot/scottish-nature-omnibus-summaries-public-engagement-biodiversity-and-natural-environment>

6. Outcome 4: Wildlife, habitats and protected places

The special value and international importance of Scotland's nature and geodiversity is assured, wildlife is faring well, and we have a highly effective network of protected places.

Key steps

- Ensure that management of protected places for nature also provides wider public benefits
- Align habitat restoration in protected areas with national goals for improving ecosystem health, with local priorities determined at the catchment or landscape scales
- Integrate protected areas policy with action for wider habitats to combat fragmentation and restore key habitats
- Develop a wildlife management framework to address the key priorities for sustainable species management, conservation and conflict issues, including reintroductions and invasive non-native species
- Involve more people than at present in this work and improve our understanding of the poorly known elements of nature

Much of the activity to address this Outcome focuses on protected areas, and specifically on species requiring targeted actions. Tackling invasive species and wildlife crime, as detailed in the Route Map to 2020, are also key means of addressing this Outcome, as are the landscape-scale projects described above in section 3 on Healthy Ecosystems.

Partnership and collaboration have been at the heart of all of this work, thus ensuring that we maximise the skills and resources available across many organisations. Mechanisms such as the SRDP (described further in section 7.1) and other sources of funding including EU Life+, the National Lottery Heritage Fund, SNH, Scottish Government, SEPA, many charitable trusts, and contributions from conservation organisations through both their time and donations have enabled much to be achieved.

However, there are still challenges for some species in Scotland most notably breeding seabirds, upland waders and alpine plant communities. Understanding the reasons for changes in the extent and distribution of species populations is important, particularly if downward trends are to be reversed.

6.1 Assessing progress towards this outcome

The relevant indicators developed for reporting on the 2020 Challenge for Scotland's Biodiversity are presented in Table 4. All these indicators have been updated during

this reporting period with the exception of S6 - vascular plant diversity, and S12 - otters.

Table 4. Indicator summaries relevant to monitoring progress on Outcome 4 – Wildlife, habitats and protected areas

No.	Indicator	Start	Updated	Trend
S3	Abundance of terrestrial breeding birds¹⁰⁴	1994	2018	
S4	Wintering waterbirds¹⁰⁵	1975	2018	
S5	Breeding seabirds¹⁰⁶	1986	2018	
S6	National Plant Monitoring Scheme¹⁰⁷	2015	2020	
S8	Terrestrial insect abundance - Butterflies¹⁰⁸	1979	2019	
S9	Trends of moths in Scotland - abundance¹⁰⁹	1965	2019	
	Trends of moths in Scotland - occupancy¹¹⁰	1965	2019	  Divergent
NPI	Proportion of nature sites in favourable condition¹¹¹		2019	
S10	Notified species in favourable condition¹¹²	1999	2019	

¹⁰⁴ [https://www.nature.scot/sites/default/files/2019-11/Official Statistics - Terrestrial Breeding Birds - Index of abundance 1994-2018 - 2019.pdf](https://www.nature.scot/sites/default/files/2019-11/Official%20Statistics%20-%20Terrestrial%20Breeding%20Birds%20-%20Index%20of%20abundance%201994-2018%20-%202019.pdf)

¹⁰⁵ [https://www.nature.scot/sites/default/files/2018-09/Scottish Biodiversity Indicator - S004 - Abundance of Wintering Waterbirds.pdf](https://www.nature.scot/sites/default/files/2018-09/Scottish%20Biodiversity%20Indicator%20-%20S004%20-%20Abundance%20of%20Wintering%20Waterbirds.pdf)

¹⁰⁶ <https://www.nature.scot/scotlands-indicators-birds>

¹⁰⁷ <http://www.npms.org.uk/>

¹⁰⁸ <https://www.nature.scot/scotlands-indicators-terrestrial-insects>

¹⁰⁹ <https://www.nature.scot/trend-notes-scottish-moths>

¹¹⁰ <https://www.nature.scot/trend-notes-scottish-moths>

¹¹¹ <https://www.nature.scot/information-hub/official-statistics/official-statistics-protected-sites>

¹¹² [https://www.nature.scot/sites/default/files/2019-05/Official Statistics - Protected sites - proportion in favourable condition 2019.pdf](https://www.nature.scot/sites/default/files/2019-05/Official%20Statistics%20-%20Protected%20sites%20-%20proportion%20in%20favourable%20condition%202019.pdf)

S11	Notified habitats in favourable condition ¹¹³	1999	2019	
S12	Otter – trend data ¹¹⁴	1977	2015	Not updated this reporting period

6.2 Abundance of terrestrial breeding birds

Scotland's terrestrial breeding birds include those commonly associated with woodland, farmland and upland habitats. Some are closely associated with one habitat type while others utilise more than one. Of the 66 bird species surveyed in 2018 there were 40 species that increased in abundance and 24 that declined, compared to 35 increasing and 25 declining in 2015.

- Woodland birds increased significantly by 58% since 1994.
- Farmland birds increased steadily up to the late-2000s, peaking at 25% above the 1994 index value. It is currently 12% higher than in 1994.
- Upland birds decreased significantly by 15% overall since 1994.

6.3 Wintering waterbirds

Overall waterbird numbers (41 species/populations) peaked in 1997/98 at 153% of the 1975/76 level, and then gradually declined. In 2015/16 the indicator was 18% higher than the baseline winter of 1975/76.

Relative to the baseline set in winter 1975/76:

- Goose numbers (7 populations) have increased to 287%
- Ducks and swans (wildfowl) numbers (16 species) have increased by 14%
- Wader numbers (14 species) have been declining since 1996/97 and in 2015/16 were 21% lower than in 1975/76, making this the lowest levels on record.

The wintering waterbird index¹¹⁵ has fluctuated over time with sustained declines for waders since the late 1990s. The individual species trends reveal a range of fortunes for Scotland's wintering waterbirds.

Scotland is an important destination for migratory wading birds in the East Atlantic Flyway¹¹⁶. Thousands of waders use Scotland's estuaries, coasts and inland waters as a place to winter or stopover on their way to other destinations on the flyway. Waders, as a group, have declined the most, in terms of both the combined trend and the individual species trends. Eight species have declined – turnstone, ringed plover, redshank, purple sandpiper, dunlin, knot, golden plover and lapwing. Their trends follow a similar pattern to each other, peaking between 1994/95 and 1999/99 then declining from 2002/03. Some species may shift in response to climate change,

¹¹³ [https://www.nature.scot/sites/default/files/2019-05/Official Statistics - Protected sites - proportion in favourable condition 2019.pdf](https://www.nature.scot/sites/default/files/2019-05/Official%20Statistics%20-%20Protected%20sites%20-%20proportion%20in%20favourable%20condition%202019.pdf)

¹¹⁴ Otter trend analysis replaces the previous indicator from 2004 but utilises all of the original survey data and in addition includes data from 2007 and 2015 surveys.

¹¹⁵ <https://www.nature.scot/scotlands-indicators-birds>

¹¹⁶ http://datazone.birdlife.org/userfiles/file/sowb/flyways/4_East_Atlantic_Factsheet.pdf

with good supporting evidence for knot and dunlin populations being mobile in response to changes in food availability.

6.4 Breeding seabirds

Scotland's breeding seabirds¹¹⁷ are of international importance. They respond to a range of factors such as changes in food availability, weather, predation and pollution, and to changes to habitats outside Scotland. Being relatively long-lived the numbers of breeding seabirds usually changes slowly over time. Breeding success (the number of chicks produced) provides an indication of food availability (generally fish and other marine species) and other factors such as predation during the breeding season. Breeding success typically varies far more from year to year than breeding numbers (abundance).

Since 1986 when the UK Seabird Monitoring Programme was established there has been a decline in both seabird abundance and productivity with signs of stabilisation for some species in recent years. The latest update to the Scottish Biodiversity indicator on the numbers and breeding success of seabirds in Scotland was in 2017. This shows that breeding seabird numbers had decreased by 32% from the 1986 level. These declines partly reflect that the mid-1980s is recognised as a peak in seabird abundance and productivity in Scotland. Some species now appear to be stabilising at a new level that differs from the 1986 baseline. This may be in response to changing fishing practices (e.g. relating to discarding) as well as to climate change.

Arctic skuas have experienced the largest declines (78%) from the indicator baseline. The Northern Isles are their breeding stronghold; there have been declines in the availability of sandeels, which they obtain from other seabirds, such as kittiwake, by chasing to make them release their food (kleptoparasitism). Similar patterns of declines have occurred for the species they kleptoparasitise, notably kittiwakes and terns. Increased predation from great skuas has also been linked to the decline of these seabirds. Common terns increased in 2016 and remained high in 2017; like many colonial nesting terns they can respond to favourable breeding conditions rapidly, resulting in higher numbers at breeding colonies in some years.

6.5 Vascular Plants

The diversity of plant species across different habitats has declined by 10% between 1998 and 2007, as shown by The Countryside Survey data. This overall decline was reflected in butterfly numbers over the same period as they rely on many plant species such as wild thyme as a food source. Competitive species such as nettle increased significantly. The National Plant Monitoring Scheme¹¹⁸ will inform the vascular plant indicator as data from the first five years between 2015 and 2019 is analysed. The first analysis is due to be completed in 2020.

The principal drivers of plant diversity loss have been land use change, and to a lesser extent, atmospheric pollution. The potential impact of plant diseases, such as sudden oak death, *Phytophthora ramorum*, on our native flora is of increasing concern. Plants are important for terrestrial biodiversity because they form the base

¹¹⁷<https://www.nature.scot/sites/default/files/2020-02/Scottish%20Biodiversity%20Indicator%20-%20S005%20-%20Abundance%20of%20Breeding%20Seabirds%201986-2017.pdf>

¹¹⁸ <http://www.npms.org.uk/>

of the food chain and provide the diversity of habitats that different species need to survive.

6.6 Terrestrial insects - butterflies

Butterfly populations¹¹⁹ can show large natural fluctuations. These are mainly due to environmental features, especially weather conditions. Long-term changes in abundance and distribution have been linked to a range of factors including habitat loss and fragmentation, land use changes, and climate change. Overall, butterflies in Scotland show no overall change, with the benefits for established or expanding species brought about by the warming summer climate and positive habitat management, being balanced out by the negative effects of warmer and wetter winters, and negative land management practices in some habitats. Scotland's Pollinator Strategy¹²⁰ is helping through a large number of projects and raising awareness to boost populations of pollinators such as butterflies.

Overall Scotland's specialist butterflies remained stable between 1979 and the most recent survey in 2018. One specialist butterfly species, grayling, declined significantly, while the small pearl-bordered fritillary and pearl-bordered fritillary increased significantly. Habitat loss, climate change, urban development and increased nitrogen deposition, are all linked to declines. There is evidence that increased nitrogen deposition and warmer temperatures increases spring plant growth resulting in shading and cooler temperatures at soil level. Paradoxically, this means species that overwinter as eggs or larvae do not benefit from the increased temperatures. The effects of climate change were likely to be negative for butterflies with a northerly distribution, with predicted long-term range contractions at the southern edge and/or at lower elevations.

6.7 Terrestrial insects - moths

Moth abundance has almost halved (46% decline) over the last 25 years, with more 'significantly decreasing' than 'significantly increasing' species (58 versus 5). However, a moth occupancy indicator from National Moth Recording Scheme distribution data, suggests that moth occupancy has increased over the last 25 years by about 16%, with similar numbers of 'significantly decreasing' and 'significantly increasing' species (51 versus 60)¹²¹. Summer warming is an important factor driving northward range expansions and corresponding increases in occupancy, whilst this is being countered for some species by negative impacts from land management practices and habitat changes, together with warmer and wetter winters, leading to population declines.

Substantial range changes are taking place for some moth species, for example the Chamomile Shark has recently been found 120km north-east of its previous Scottish record, and there have been many new colonists to Scotland in recent years, such as Blair's Shoulder-knot Beautiful Snout, and the micro moths Thistle Ermine and Gold Triangle. Moth species associated with woodland habitats have shown the most rapid increase, most significantly between 1990 and 2014.

¹¹⁹ [https://www.nature.scot/sites/default/files/2019-10/Scottish Biodiversity Indicator - Terrestrial Insect Abundance - Butterflies - Oct 2019.pdf](https://www.nature.scot/sites/default/files/2019-10/Scottish%20Biodiversity%20Indicator%20-%20Terrestrial%20Insect%20Abundance%20-%20Butterflies%20-%20Oct%202019.pdf)

¹²⁰ <https://www.nature.scot/pollinator-strategy-2017-2027>

¹²¹ <https://www.nature.scot/trend-notes-scottish-moths>

Moth abundance has almost halved (46% decline) over the last 25 years, with more 'significantly decreasing' than 'significantly increasing' species (58 versus 5). However, a moth occupancy indicator from NMRS distribution data, suggests that moth occupancy has increased over the last 25 years by about 16%, with similar numbers of 'significantly decreasing' and 'significantly increasing' species (51 versus 60).

In 2019 the 20 species in most rapid decline were associated with specific habitats; notably 13 species with semi-natural habitats, seven with a broader range of habitats including intensive farmland and plantation woodland and urban areas, whilst one is a common migrant. Eight of the 20 species are associated with moorland, suggesting moths may be declining disproportionately in this habitat.

In 2019 the 20 species increasing most rapidly were those associated (for 11 of the 20 species) with trees and woodland, whilst 18 of the 20 species were common or widespread species at a UK scale.

6.8 The condition of protected places

Protected areas represent the very best of Scotland's habitats and of the underlying geology. Their protection and management helps to ensure they remain in good condition for everyone to enjoy, both now and future generations. In Scotland there is a suite of 1,866 protected areas covering almost two million hectares.

Site Condition Monitoring is SNH's programme for monitoring the condition of nature conservation features of special interest on protected areas in Scotland. These features of special interest are known as 'natural features' and may be habitats (e.g. woodlands, reefs and freshwater lochs), species populations (e.g. otter, dotterel, marsh fritillary butterfly) or geological formations (e.g. caves, fossil beds, volcanic exposures).

The purpose of Site Condition Monitoring is to determine the condition of the designated natural feature within a site and the pressures which are influencing condition. This is to establish whether the natural feature is likely to maintain itself in the medium to longer term under the current management regime and wider environmental or other influences. There are in excess of 5,000 individual natural features of special interest on designated sites which are monitored on a rolling programme through Site Condition Monitoring. In March 2019 the proportion of natural features in favourable or 'favourable recovering' condition was 78.9% compared to 80.4% in 2016. The details of notified species and notified habitats in favourable condition are described below.

6.9 Notified species in favourable condition

In 2016, the condition of more than 200 of Scotland's most important species and groups of species protected within our suite of 1,866 protected areas (Sites of Special Scientific Interest, Ramsar sites, Special Protection Areas and Special Areas of Conservation) was measured.

In 2019, in total 70% of all species features were in favourable condition; 2% were unfavourable recovering; 2% were unfavourable with corrective measures agreed/in place; and 26% were in an unfavourable condition (values do not add up to exactly 100% due to rounding). Table 5 provides further detailed information across species groups.

Table 5. The percentage of species features that were in favourable and unfavourable recovering condition

Species group	2017	2018	2019
Amphibians and reptiles*	75%	75%	83%
Birds	72%	70%	68%
Butterflies	87%	87%	87%
Dragonflies*	100%	100%	100%
Fish	85%	85%	85%
Invertebrates	86%	85%	85%
Marine mammals	57%	57%	57%
Non-vascular plants	80%	81%	79%
Terrestrial mammals	88%	88%	88%
Vascular plants	92%	93%	93%

* Figures based on a small numbers of qualifying features

From 2017 to 2019 there has been a decrease from 76.1% to 73.2% of protected species (qualifying features) in favourable and unfavourable recovering condition. The low percentages of marine mammal features in favourable or unfavourable recovering condition is largely due to declines in harbour seal populations seen across the Northern Isles and along the east coast of Scotland. The causes of these declines continue to be investigated through the Marine Mammal Scientific Support Research Programme.

6.10 Notified habitats in favourable condition

In 2019, 63% of all habitat features on protected areas were in favourable condition, 9% were in unfavourable recovering condition, 10% of features were unfavourable with corrective measures agreed and 17% were in unfavourable condition (values do not add up to exactly 100% due to rounding).

The percentage of habitat features in favourable and unfavourable recovering condition as of May 2017, May 2018 and May 2019, are shown in Table 6 below:

Table 6. Percentage of habitat features in favourable and unfavourable recovering condition

Habitat type	2017	2018	2019
Marine	98%	98%	98%
Coastal	89%	88%	88%
Geological features	98%	98%	98%
Freshwater	74%	75%	75%
Wetlands	86%	87%	85%
Upland	84%	82%	83%
Woodland	68%	67%	65%
Heath	76%	78%	78%
Grassland	73%	76%	76%

From 2017 to 2019 there has been a slight decrease from 83.3% to 82.9% of protected habitats (qualifying features) in favourable and unfavourable recovering condition.

7. Outcome 5: Land and freshwater

Nature is faring well, and ecosystems are resilient as a result of sustainable land and water management.

Key steps

- Promote an ecosystem approach to land management that fosters sustainable use of natural resources and puts biodiversity at the heart of land-use planning and decision-making
- Ensure that measures taken forward under CAP encourage land managers to develop and retain the diversity of wildlife habitats and landscape features
- Support “High Nature Value” farming and forestry
- Put in place the management necessary to bring Scotland’s protected areas into favourable condition and improve the ecological status of water bodies
- Ensure that biodiversity and ecosystem objectives are fully integrated into flood risk management plans and restore wetland habitats and woodlands to provide sustainable flood management
- Restore and extend natural habitats as a means of building reserves of carbon and to help mitigate climate change
- Provide clear advice to land and water managers on best practice

The Land Use Strategy 2016 – 2021 (LUS)¹²² was published in March 2016 and builds on the successful Regional Land Use Pilots led by local authorities in the Scottish Borders and Aberdeenshire. The adoption of an “ecosystem approach” is one of the cornerstones of the LUS. The Scottish Rural Development programme 2014 - 2020¹²³ was formally approved by the European Commission on 26 May 2015. The programme is now in its final year. There have been 5 Agricultural Environment Climate Scheme (AECS) application rounds (2015 – 2019). The scheme is not open for new application in 2020 but eligible expiring AECS contracts will be extended instead.

7.1 Agri-environment programme - AECS

A total of £198 million has been committed since 2015 to over 2,900 AECS contracts for a range of activities that help to maintain and enhance biodiversity, climate, water, organic and protected site national priorities. However, the 2019 application round was a smaller application round, which presents a risk of reduced uptake of

¹²² <https://www2.gov.scot/landusestrategy>

¹²³ <https://www.gov.scot/policies/agriculture-payments/scottish-rural-development-programme-srdp/>

agri-environment activity on farms and therefore potentially reduced progress towards Scotland's environmental targets.

Around 250 applications have been approved committing £3M covering peatland restoration under AECS. Capital works involve specific items under Lowland Bog Management, Moorland Management and Management of Buffer Areas for Fens and Lowland Bogs (this does not cover some additional capital spend and management). The number of applications with targeted restoration activity has remained steady through the 2015 – 2018 period. In addition, there are many more applications that support management of peatland both upland and lowland bogs through other AECS measures connected with these habitats. For example £2.5M has been committed to lowland bog and wetland management. In addition to funding through AECs, the Peatland Action Fund is a restoration fund managed by Scottish Natural Heritage focusing on capital works that support peatland restoration.

Provision of advisory services covering SRDP and targeted for land managers and farmers has been in place through an £18.2 million package for 'one to one' advice and a 'one to many' service. The one to one advisory service has trained circa 100 advisors (they have now received multiple elements of training) and 2,400 individual pieces of advice have been provided or are underway through Integrated Land Management Plans, Specialist advice, Carbon Audits and Mentoring, some of which will contain elements of biodiversity advice. The 'one to many' advisory service has delivered to over 24,117 beneficiaries so far through various events including workshops and seminars, focus and discussion groups, and site visits and demonstrations, some of which were aimed specifically at environmental outcomes.

7.2 Agri-environment programme – Ecological focus areas

Ecological Focus Areas are areas of land upon which carrying out particular agricultural practices can be beneficial for the climate and the environment; these have been successfully implemented and include increased protection for hedgerows and watercourses under cross compliance. Approval was also secured from the European Commission to implement a "nutrient efficiency reporting measure" on grasslands farms. Some monitoring of AECS and Greening measures has been carried out for SNH in 2019/2020, although analysis of the results has yet to be completed.

7.3 Research and demonstration of best practice

A programme of research and demonstration activities has been undertaken at the existing research farms of James Hutton Institute (JHI) and Scotland's Rural College (SRUC). Work is ongoing examining ecosystem services at the SRUC farms at Kirkton and Auchtertyre, and biodiversity monitoring activities are being undertaken at JHI farms co-ordinated by the Centre for Sustainable Cropping. A successful LEAF (Linking Environment and Farming) demonstration event was held at Balruddery Research Farm in June 2016 jointly organised by JHI and SRUC.

7.4 Freshwater and diffuse pollution

In the water environment¹²⁴, the regulatory framework is facilitating environmental improvements for a number of sectors, although certain toxic substances from

¹²⁴ <https://www.sepa.org.uk/environment/water/river-basin-management-planning/>

diffuse sources need to be addressed. Diffuse pollution and the physical condition of water bodies remain as key management challenges and this is reflected in the second cycle of river basin management plans. Partnership working at a catchment-scale to address these pressures will be a key factor in meeting these targets and also realising the potential benefits for biodiversity.

SEPA’s most recent (2018) condition assessment for rivers and lochs¹²⁵ shows that there is variation in the condition of freshwaters across Scotland. For Scotland as a whole, 65.7% of our surface and groundwater water bodies are at good or better status (as defined in the Water Framework Directive). This is a slight increase from 2017 (64.9%) while 57.1% of water bodies (rivers, canals and lochs) meet the required EU standard of being of ‘Good’ or ‘High’ status. In some regions, such as the Western and Northern Isles, Argyll and North Highland water bodies are in much better condition than the national average.

7.5 Assessing progress towards this outcome

A number of indicators relevant to this outcome have been previously described in sections 2 to 4, and these are not repeated here.

The Breeding Farmland Birds trend note¹²⁶, published in 2013 provides some further information on species that are found predominantly on farmed land. It revealed that, seed-eating birds showed stable or increasing long-term trends but four out of five wader species showed significant declines. Species such as the corn bunting have benefited from targeted management under SRDP. The decline in farmland waders, such as lapwing and curlew, is an ongoing concern. Several studies have looked at ways to improve breeding success for waders. So far, the practices required to improve wader breeding success (e.g. grazing management, habitat improvement) have not been tested at a sufficiently large scale to affect national trends. There is however significant ongoing activity supported under SRDP such as local wader initiatives and the RSPB led Working for Waders Project. These and other work will require more time and sustaining effort to see measurable effects.

Additional indicators that help to describe the farmed environment and the changes that have occurred are presented in Table 7, though only one has been updated during this reporting period.

Table 7. Indicators relevant to monitoring progress in Outcome 5 – Land and Freshwater

No.	Indicator	Start	Updated	Trend
	River water quality indicator ¹²⁷	1992	2018	
N7	Land & sea of natural heritage importance ¹²⁸	2008	2013	Archived

¹²⁵<https://www.sepa.org.uk/media/484107/state-of-scotlands-water-environment-2018-summary-report.pdf>

¹²⁶<https://www.nature.scot/sites/default/files/A1075307%20-%20Trend%20note%20-%20biodiversity%20-%20Farmland%20Birds%20in%20Scotland%20-%202013.pdf>

¹²⁷ <https://www.sepa.org.uk/environment/water/aquatic-classification/river-water-quality-indicator/>

¹²⁸ <https://www.nature.scot/scotlands-indicators-sustainable-use>

7.6 River quality

The proportion of river length classed as unpolluted rose from 83.3% in 2013 to 84% in 2015 and has been maintained at this level in 2018. It should be noted that the standards for measuring water quality were modified in 2013 and the impacts of this are described in the river water quality indicator¹²⁹.

7.7 Land and sea of natural heritage importance

By 2012, the total area of land under some form of positive management¹³⁰ was 5,180,600ha (66% of the total land used for agriculture). The increase in the area of land under agri-environmental management agreements was predominantly due to a larger area of Scotland being managed under the SRDP rather than the growth in the area of protected sites (including Sites of Special Scientific Interest, Natura sites and NNRs). In the marine environment 22% of Scotland's seas are within the MPA network, within which there is a responsibility for public authorities through their decision making to ensure they are not placed at significant risk. The National Marine Plan also gives policy protection to Priority Marine Features across Scotland's seas, to ensure there is not a significant impact to their national status. There are 27 MPAs that have specific fisheries measures in place and further measures are currently being developed for others and outside the MPA network.

¹²⁹ <https://www.sepa.org.uk/environment/water/aquatic-classification/river-water-quality-indicator/>

¹³⁰ Positive management is defined as land, water or sea which is owned or designated for nature, subject to management agreements or specific planning policies

8. Outcome 6: Marine and coastal

Scotland's marine and coastal environments are clean, healthy, safe, productive and biologically diverse, meeting the long term needs of people and nature.

Key steps

- Adopt a National Marine Plan and develop regional marine plans to aid balanced decision-making in the marine environment
- Establish a coherent network of marine protected areas, promoting sustainable use and conservation
- Collate information on the location and sensitivity of priority marine features and make this information available to support their protection
- Achieve good environmental status for Scottish Seas
- Bring CFP fish stocks to levels consistent with the maximum sustainable yield wherever possible, and take account of biodiversity in managing inshore fisheries
- Implement a rapid response framework to prevent colonisation of new invasive species in Scotland's seas and islands
- Improve the monitoring of the marine environment to identify changes and guide progress towards the above outcomes
- Improve understanding of how coastal ecosystems are likely to adapt to climate change and develop appropriate strategies for coastal zone management

The Marine (Scotland) Act 2010¹³¹ provides the legislative framework for the effective delivery of this Scottish Biodiversity Strategy outcome. Its main measures include:

- Marine planning: a new statutory marine planning system to sustainably manage the increasing, and often conflicting, demands on our seas;
- Marine licensing: a simpler licensing system, minimising the number of licences required for development in the marine environment to cut bureaucracy and encourage economic investment;
- Marine conservation: improved marine nature and historic conservation with new powers to protect and manage areas of importance for marine wildlife, habitats and historic monuments;

¹³¹ <http://www.scotland.gov.uk/Topics/marine/seamanagement/marineact>

- Seal conservation: improved protection for seals and a new comprehensive licence system to ensure appropriate management when necessary;
- Enforcement: a range of enhanced powers for marine conservation and licensing.

The Marine (Scotland) Act 2010 also introduced a specific duty to protect and enhance the marine environment and included measures to help boost economic investment and growth in sectors such as marine renewables.

8.1 The National Marine Plan and Regional Marine Plans

Recent progress in implementing the legislation has been significant, including the 2015 publication of the National Marine Plan¹³², which promotes an ecosystem approach, putting the marine environment at the heart of the planning process to promote ecosystem health, resilience to human-induced change and the capacity of the marine environment to support sustainable development and use. Draft Regional Marine Plans (RMPs) for Shetland and the Clyde are now being revised, following public consultation during 2019, and work is underway on a regional assessment to prepare for an Orkney Islands RMP.

8.2 Marine Protected Areas

Considerable progress has been made with consultation and designation of Marine Protected Areas. Approximately 22% of Scotland's marine area (including inshore & offshore waters) now has protective status for nature. This includes SSSI, Ramsar & Natura sites plus a suite of 31 Nature Conservation Marine Protected Areas (NCMPAs). These sites form a network of MPAs, safeguarding much of Scotland's marine biodiversity. Additional Natura sites (Special Protection Areas) and NCMPAs are also being considered that will broaden the range of marine life protected and move towards completion of the Scottish MPA network. Work to improve protection of the most sensitive Priority Marine Features outside the MPA network is also underway.

A Scottish MPA Monitoring Strategy has been published, with principles to help prioritise future monitoring and to provide a framework for gathering evidence to support future assessment and reporting. The Strategy covers monitoring within and outwith MPAs. Two examples of projects undertaken during this reporting period to improve the evidence are: the European Maritime and Fisheries Fund (EMFF) Project 'Engaging the Fishing Industry in Marine Environmental Survey and Monitoring'¹³³; and the development and publication of the Community-led Marine Biodiversity Monitoring Handbook¹³⁴. Data relating to the protected features of MPAs and to Priority Marine Features are collated in an SNH database called GeMS (the Geodatabase of Marine features in Scotland). This information is then made available online through Marine Scotland's National Marine Plan interactive¹³⁵.

¹³² <http://www.gov.scot/Publications/2015/03/6517>

¹³³ <https://www2.gov.scot/Resource/0054/00542176.pdf>

¹³⁴ <https://www.nature.scot/community-led-marine-biodiversity-monitoring-scotland>

¹³⁵ <https://marinescotland.atkinsgeospatial.com/nmpi/>

8.3 Assessing the state of the seas

In 2019, Defra published a revised assessment of progress for Part 1 of the UK Marine Strategy¹³⁶. This provides an updated assessment of the state of seas across the UK, and sets objectives, targets and indicators for achieving Good Environmental Status. Work is underway in Scotland to complete a second Marine Atlas, known as the Scottish Marine Assessment 2020. This is intended to be an assessment of the state of Scotland's seas and will be used to support review of the National Marine Plan in 2021.

8.4 Sustainable fisheries

The Inshore Fisheries Strategy¹³⁷ and the 2019 Future of Fisheries Management in Scotland - national discussion paper have considered the steps for improving the governance and the knowledge base to support effective management and decision-making. This reflects the principle of setting fishing limits in line with the best available scientific advice, using the precautionary principle, and aligned with the delivery of Maximum Sustainable Yield within an ecosystem context. For example, in the inshore fisheries there is greater engagement of stakeholders in the management process through the Regional Inshore Fisheries Groups framework and research has been undertaken to develop methods and technology to provide the necessary information. This involves the implementation of electronic monitoring across the inshore fleet to provide an understanding of fishing activity that has previously been unavailable.

8.5 Marine non-native species

With an ongoing and increasing trend in introductions of non-native species into the marine environment, the challenge is to slow or halt this trend while dealing effectively with the consequences of those INNS species that present a high risk to nature and/or marine industries. To that end, the development of a Scottish Marine Non-native Species Strategy, including a framework for rapid response, is in being undertaken to underpin a strategic approach to this issue. In the meantime, ongoing actions include the development of biosecurity plans (Loch Creran, Loch Fyne) and a Biosecurity for LIFE project focused on implementing biosecurity/eradication and raising awareness of non-native mammal predators (mustelids/rodents) on seabird islands.

8.6 Coastal ecosystems

Current climate change projections predict that rising sea level, coastal erosion and coastal flooding will increasingly affect Scotland's soft coastlines and impact on coastal communities and assets. We aim to improve our understanding of how marine and coastal ecosystems are likely to respond to climate change and to develop appropriate strategies to support adaptation and safeguard in particular those habitats that can trap and store carbon.

The Dynamic Coast project¹³⁸ is establishing an evidence base of national coastal change. Current work is investigating the resilience of Scotland's natural coastal

¹³⁶<https://www.gov.uk/government/publications/marine-strategy-part-one-uk-updated-assessment-and-good-environmental-status>

¹³⁷ <http://www.gov.scot/Topics/marine/Sea-Fisheries/InshoreFisheries/InshoreFisheriesStrategy>

¹³⁸ <http://www.dynamiccoast.com/index.html>

defences, estimating how future climate change may exacerbate erosion, and developing adaptation plans at sites around Scotland.

8.7 Climate change and the marine environment

There is a growing focus on the role that marine and coastal habitats can play in climate change mitigation. Research underway through the Scottish Blue Carbon Forum¹³⁹ focuses on measuring the ability of various marine and intertidal habitats to trap and store carbon, alongside understanding the effects that human activities may have on these habitats, and the Marine Climate Change Impacts: Report Card 2020¹⁴⁰ summarises the latest evidence from 26 topics regarding the physical, ecological, and social and economic impacts of climate change on UK coasts and seas.

8.8 Assessing progress towards this outcome

There is only one Scottish Biodiversity Indicator, S5 – breeding seabirds that has been updated during this reporting period. Commentary is provided in section 6.4. New marine indicators have been developed, for example to report on progress towards achieving Good Ecological Status (GES) under the UK Marine Strategy, under the OSPAR Convention and for Scotland’s Marine Assessment 2020. These cover aspects like seal abundance and distribution, zooplankton biomass and rate of introduction of non-native species. Scotland’s National Performance Indicators also include an indicator on the sustainability of fish stocks¹⁴¹, reflecting the percentage of stocks for which exploitation is at or below the level which would be expected to lead to maximum sustainable yield. In future, it should be possible to adapt and use some of these other indicators for SBS monitoring purposes.

Table 8. Biodiversity indicators summaries relevant to Outcome 6

No.	Indicator	Start	Updated	Trend
S5	Breeding seabirds ¹⁴²	1986	2020	 stabilisation for some species in recent years

¹³⁹ <https://www.bluecarbon.scot/about>

¹⁴⁰ <http://www.mccip.org.uk/impacts-report-cards/full-report-cards/2020/>

¹⁴¹ <https://nationalperformance.gov.scot/sustainability-fish-stocks>

¹⁴² <https://www.nature.scot/scotlands-indicators-birds>

9. Outcome 7: Measuring progress

A framework of indicators that we can use to track progress.

Key steps

- Put in place a programme of work to measure progress towards the 2020 outcome, so that we can track progress and deal with problems
- Work more closely with the growing number of volunteers to develop our understanding of the changing state of nature
- Develop and support the Scottish Biodiversity Information Forum to bolster the collection and wider use of the biodiversity data in Scotland
- Publish a terrestrial habitat map for Scotland

9.1 Biological data

Much of the information required for measuring progress is held by the National Biodiversity Network Gateway (NBN)¹⁴³ which in Scotland is displayed through the NBN Atlas Scotland¹⁴⁴. The individual records are mainly supplied by volunteer citizen scientists, including through structured surveys, through the work of environmental NGOs, through specialist groups, or through engaging locally through Local Records Centres. The number of records transferred from the NBN Gateway to the Atlas platform is approaching 4 million for Scotland. Citizen science is also a key source of data for the State of Nature report referred to above. SNH and our partners are looking at ways to develop the State of Nature evidence base further.

The Scottish Biodiversity Information Review¹⁴⁵ has investigated how to “establish integrated local and national structures for collecting, analysing and sharing biological data to inform decision making processes to benefit biodiversity”. Sixteen government and non-government bodies oversaw a comprehensive audit of the biological recording infrastructure and made recommendations across data, information services, governance, finance, and implementation. An Outline Business Case is currently under consideration.

9.2 Indicators

A suite of biodiversity and people engagement indicators were developed in 2006 to report progress on delivery of outcomes for the Scottish Biodiversity Strategy; It's in Your Hands (2004) and were adopted for reporting against the updated 2020 Challenge for Scotland's Biodiversity (2013). In addition the 2020 Challenge document identified the need for spatial indicators of ecosystem health at a national and regional level. A suite of ecosystem health indicators¹⁴⁶ has been developed for

¹⁴³ <https://data.nbn.org.uk/>

¹⁴⁴ <https://scotland.nbnatlas.org/>

¹⁴⁵ <https://nbn.org.uk/wp-content/uploads/2018/11/SBIF-Review-Final-Report-and-Recommendations.pdf>

¹⁴⁶ <http://www.snh.gov.uk/docs/A1308427.pdf>

this purpose by the Scottish Biodiversity Strategy Science and Technical Group. These indicators, including protected nature sites are available on Scotland's Environment Web¹⁴⁷ where live data can be analysed spatially helping us to understand how species on protected nature sites are doing across Scotland.

9.3 Spatial habitat mapping

The Habitat Map of Scotland was first published in 2015 and is continually being updated. It uses EUNIS the European Nature Information System to classify the best available habitat and land use data. It is a generalised map of habitats such as woodland or mires, bogs and fens for all of Scotland. Higher resolution data from site based surveys or national habitat surveys collected by SNH and a wide range of contributors in the public, private and voluntary sectors have been re-classified to EUNIS. These data are discoverable and available to view and download on Scotland's Environment Web¹⁴⁸ and the SNH data downloads site. We have mapped the distribution of some habitats including soft coasts for the first time and are working with partners to use innovative technologies including satellite data and Artificial Intelligence that will allow us to produce a repeatable habitat and land use map of Scotland. We have also developed a mapping technique that uses infrared images from aerial photography to map upland sites.

9.4 State of Nature

In 2019 the third State of Nature covering the UK was published alongside a separate State of Nature for Scotland¹⁴⁹. Leading professionals from more than 70 wildlife organisations have for the first time joined with Government agencies to present the clearest picture to date of the status of species across the land and sea.

In Scotland data sets from across a wide range of species were brought together to provide a synopsis of how they are faring. The report shows from 1994 to 2016, 49% of Scottish species have decreased and 28% have increased in abundance.

¹⁴⁷ <http://www.environment.scotland.gov.uk/get-interactive/data/protected-nature-sites/>

¹⁴⁸ <https://www.environment.gov.scot/our-environment/habitats-and-species/habitat-map-of-scotland/>

¹⁴⁹ <https://www.nature.scot/state-nature-scotland-report-2019>

10. Next Steps – The 2020 Challenge for Scotland’s Biodiversity

10.1 Completing the 2020 challenge

In response to the outbreak of Covid-19, the Scottish Government has placed restrictions on work and activities across many sectors, including the environment, to ensure the safety of the Scottish population. Without the ability to undertake field work, stakeholder engagement and other conservation activities, it is currently impossible to assess how many additional Route Map actions and other work required to deliver the outcomes of the 2020 Challenge for Scotland’s Biodiversity will be undertaken.

The benefits of previous conservation work and activity will be having a continued positive impact on biodiversity across Scotland, even though there are restrictions in what further work will be undertaken to the end of 2020.

Reporting from the Route Map to 2020 and the progress against the international biodiversity targets (Aichi targets¹⁵⁰) has identified actions required going forward (as listed below). These will inform and help prioritise work throughout the coming year and beyond, during which a new Global Biodiversity Framework will be under development. The Scottish Government will then need to reflect and respond to the new international biodiversity targets which are due to be agreed in 2021.

In the [Route Map Progress Report 2017-19](#)¹⁵¹, a number of areas are identified where focused sustained effort is required:

- Increase the amount of native woodland in good condition (upwards of 46% as identified in the Native Woodland Survey of Scotland).
- Restore approximately 10,000 ha of native woodland into satisfactory condition in partnership with private woodland owners through deer management plans.
- Development of nature networks which support and link our most important nature sites.

These are all highly relevant to the nature-based solutions required as part of the response to the Climate Emergency and biodiversity crisis; carbon sequestration, ecosystem restoration and connectivity.

A further significant challenge for all involved in delivering the Scottish Biodiversity Strategy is the need to better mainstream biodiversity action across all sections of public and private sectors, and to secure alternative funding to replace that lost from the UK exit from the EU. Unlocking private sector funding based on a nature-rich future for a just and net zero economy, as a part of the post COVID-19 recovery, has considerable potential.

10.2 Post 2020 for biodiversity in Scotland

The Global Assessment of Biodiversity and Ecosystem Services (IPBES Report 2019)¹⁵² provides clear evidence that transformative change is required if the

¹⁵⁰ <https://www.nature.scot/aichi-targets-interim-reports-2016-2017-2018>

¹⁵¹ <https://www.nature.scot/biodiversity-route-map-2020-3rd-year-report-2017-2019>

¹⁵² <https://ipbes.net/global-assessment>

biodiversity crisis is to be addressed and the UN Sustainable Development Goals are to be achieved. There are a number of clear attributes to this work:

- Focusing on the key drivers of biodiversity loss – both direct and indirect.
- Applying an ecosystem approach – working in more integrated ways towards shared goals.
- Mainstreaming biodiversity delivery – involving more sectors, organisations and individuals in developing a nature-rich Scotland.
- Developing nature-based solutions for a net-zero economy.

10.3 Scottish Biodiversity Programme

A Scottish Biodiversity Programme co-led by the Scottish Government and Scottish Natural Heritage (SNH) has been established to oversee all of our activity on biodiversity. The programme brings together all the elements required to complete the current strategy, to raise our international profile with a view to influencing and shaping new international targets, and to prepare the way for the successful development and delivery of a future strategic framework for biodiversity. It will provide an overarching, common governance structure to our approach across all relevant work. This will ensure that resources are being directed effectively and that there is a common understanding of priorities and an agreed approach to delivering them. The Programme Board has established an Advisory Group and a Stakeholder Engagement Group which will bring together a wide range of interests.

Annex 1 - Links between Aichi Targets and the Scottish Biodiversity Strategy 2020 Challenge Outcomes

CBD Goal	Strategic	Aichi Target (summary)	SBS Outcome/ key step
A. Addressing the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society			
1		People are aware of the values of biodiversity what they can do.	Ch. 1 Key step 2 & 3 Ch. 3 Key steps 1,4 & 5 Ch. 4 Key step 5 Ch. 5 Key step 7 Ch. 7 Key step 2 & 3
2		Biodiversity values have been integrated into national and local development and planning processes and are being incorporated into national accounting.	Ch. 2 Outcome Ch. 2. Key step - 1
3		By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio-economic conditions.	Ch. 1 Key step 1, 3 & 4 Ch. 2 Key step 2 & 3 Ch. 5 Key step 2 & 3 Ch. 6 Key step 1 & 5
4		By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	Ch. 1 Outcome Ch. 2 Outcome Ch. 2 Key step 1 Ch. 3 Key step 5 Ch. 5 Outcome Ch. 5 Key step 1
5		By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	Ch. 1 Outcome Ch. 1 Key step 2 Ch. 2 – Key step 3 Ch. 7 Key step 4
6		By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and apply ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	Ch. 6 Outcome Ch. 6 Key step 5

B. Reduce the direct pressures on biodiversity and promote sustainable use	
7 By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	Ch. 5 Outcome Ch. 5 Key step 1, 2 & 3
8 By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	Ch. 1 Outcome Ch. 1 Key step 1, 3 & 4 Ch. 5 Outcome Ch. 5 key step 3 Ch. 6 Key step 8
9 By 2020, invasive non-native species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	Ch. 5 Outcome Ch. 6 Key step 6
10 By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	Ch. 2 Key step 3 Ch. 4 Key step 2 Ch. 5 Key step 6 Ch. 6 Key step 2,3,4 & 8
C. To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity	
11 By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and there are effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	Ch. 1 Outcome Ch. 2 Outcome Ch. 4 Outcome Ch. 4 Key step 3 Ch. 6 Key step 7
12 By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	Ch. 4 Outcome Ch. 4 Key step 3 Ch. 6 Outcome Ch. 6 Key step 7
13 By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	Ch. 4 Key step 4 Ch. 5 Key step 2 & 3

D. Enhance the benefits to all from biodiversity and ecosystems	
14 By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	Ch. 1 Key step 4 Ch. 4 Key step 1 Ch. 5 Key step 5
15 By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	Ch. 1 Outcome Ch. 2 Key step 3 Ch. 4 Outcome Ch. 5 Outcome Ch. 6 Outcome
16 By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	Ch. 1 Key step 1, 3 & 4
E. Enhance implementation through planning, knowledge management and capacity building	
17 By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	2020 Challenge for Scotland's Biodiversity
18 By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels	Ch. 1 Key step 4 Ch. 3 Key step 4 Ch. 4 Key step 4 Ch. 5 Outcome
19 By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	Ch. 1 key step 3 & 4 Ch. 7 Key step 1 & 4
20 By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	Ch. 5 Key step 2 Ch. 6 Key step 5

Annex 2 - Natural Heritage, Biodiversity, People Engagement and Ecosystem Health Indicators

Indicator Performance Rating Key

	Performance Improving
	Performance Maintaining
	Performance Worsening
	Performance to be confirmed
	Indicator in development

Table 9. Summary of Indicators.

Biodiversity state indicators

No.	Indicator	Start	Updated	Trend 2017	Trend 2019
S1	Status of biodiversity action plan (BAP) priority species ¹⁵³	2008	2008	Archived	Archived
S2	Status of biodiversity action plan (BAP) priority habitats ¹⁵⁴	2008	2008	Archived	Archived
S3	Abundance of terrestrial breeding birds	1994 2017	2018 2018		 

¹⁵³ Archived following publication of 2010 UK Biodiversity framework.

¹⁵⁴ Archived following publication of 2010 UK Biodiversity framework.

S4	Wintering waterbirds	1975	2018		
S5	Breeding seabirds	1986	2018		 Stabilisation for some species in recent years
S6	Vascular Plant diversity	1998	2007	Archived	Archived
State	National Plant Monitoring Scheme	2015	2019		
S7	Woodland diversity	1995	1999	Archived	Archived
	Native woodland condition	2006 to 2013			
S8	Terrestrial insect abundance - Butterflies	1979	2019		
S9	Trend of moths in Scotland - abundance	1965	2019		
	Trend of moths in Scotland - occupancy	1965	2019		  Divergent
S10	Notified species in favourable condition	1999	2019		
S11	Notified habitats in favourable condition¹⁵⁵	1999	2019		
	Site condition monitoring	2010	2019		
	Otter	1977	2004	Archived	Archived

¹⁵⁵ Includes habitats classified as unfavourable recovering and unfavourable with corrective measures agreed.

S12	Otter trend ¹⁵⁶	1977	2015	Archived	Archived
S13	Freshwater macro-invertebrate diversity River Quality	1981	2008	Archived	Archived
		1992	2018		
S14	Marine plankton	1958	2010	Archived	Archived
S15	Estuarine fish	1977	2005	Archived	Archived
S17	Non Native species	1950s	2001	Archived	Archived

Engagement Indicators

No.	Indicator	Start	Updated	Trend 2010-2017	Trend 2010-2019
E1	Attitudes to biodiversity	2006	2019		
E2	Greenspace	2007	2015	Archived	Archived
	OS - spatial greenspace	2017			
E3	Increase people's visits to the outdoors ¹⁵⁷	2012	2018		
E4	Involvement in biodiversity conservation	2010	2015		
E5	Membership of biodiversity NGOs ¹⁵⁸	2013	2015		

Other Natural Heritage indicators

No.	Indicator	Start	Updated	Trend 2010-2017	Trend 2010-2019
N2	Built Development	2008	2012		Archived
N3	Visual influence of built development	2008	2013		Archived

¹⁵⁶ Otter trend analysis replaces the previous indicator from 2004 but utilises all of the original survey data and in addition includes data from 2007 and 2015 surveys.

¹⁵⁷ <https://www.gov.scot/publications/scotlands-people-annual-report-results-2018-scottish-household-survey/>

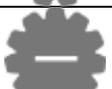
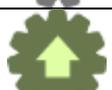
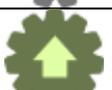
¹⁵⁸ Data used for previous reporting from 2007 and 2009 was absolute member numbers provided by NGOs. Since 2013 the Scottish Nature Omnibus survey now includes a question relating to membership of an organisation which looks after the environment and is expressed as a % of the population.

N7	Land & sea of natural heritage importance	2008	2013	Archived	Archived
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National Performance Framework Indicators

Indicator	Start	Updated	Trend 2010-2017	Trend 2010-2019
Increase Natural Capital	2000	2017		
Increase people's visits to the Outdoors	2006	2018		
Improve access to local greenspace	2013	2016		
Terrestrial breeding birds⁶⁷	1994	2018		
	2017	2018		

Ecosystems Health Indicators

Indicator	Start	Updated	Status 2017	Status 2019
EUNIS Land cover Scotland¹⁵⁹	2015			
Improve the condition of terrestrial & freshwater protected nature sites¹⁶⁰	2005	2018		
Native woodland condition	2006-2013			
High Nature Value Farming¹⁶¹	2009			
Terrestrial Breeding Bird¹⁶²	1994	2018		
	2017	2018		

¹⁵⁹ <https://www.environment.gov.scot/our-environment/state-of-the-environment/ecosystem-health-indicators/condition-indicators/indicator-1-land-cover/>

¹⁶⁰ <https://www2.gov.scot/About/Performance/scotPerforms/indicator/naturesites>

¹⁶¹ <https://www.environment.gov.scot/our-environment/state-of-the-environment/ecosystem-health-indicators/condition-indicators/indicator-4-farming-and-nature/>

¹⁶² <https://www.nature.scot/information-hub/official-statistics/official-statistics-terrestrial-breeding-birds>

Annex 3 Acronyms

CSGN	Central Scotland Green Network
FCS	Forestry Commission Scotland (now Scottish Forestry)
JHI	James Hutton Institute
MS	Marine Scotland
NCMPA	Nature Conservation Marine Protected Area
NNR	National Nature Reserve
RAMSAR	The Convention on Wetlands of International Importance
SAC	Special Areas of Conservation
SNH	Scottish Natural Heritage
SPA	Special Protection Areas
SRDP	Scottish Rural Development Programme
SRUC	Scotland's Rural College
SSSI	Site of Special Scientific Interest



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ISBN: 978-1-83960-853-7 (web only)

Published by The Scottish Government, June 2020

Produced for The Scottish Government by APS Group Scotland, 21 Tennant Street, Edinburgh EH6 5NA
PPDAS743746 (06/20)

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