Scotland's Biodiversity
Progress to 2020 Aichi Targets

Interim Report 2016

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

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Acknowledgements

The preparation of this report was led by Sue Marrs and Debbie Bassett with considerable input from Simon Foster, Claire McSorley and Kamila Fraser.

It was made possible by input from a wide range of contributors, shown in Annex 4. Ed Mackey and Des Thompson assisted in assembling the finished report.

Introduction

This interim report presents Scotland's progress towards meeting the Global Aichi Targets. The Convention on Biological Diversity (CBD) set 20 global targets to be met by 2020. The *Scottish Biodiversity Strategy; 2020 Challenge for Scotland's Biodiversity* sets the strategic priorities for Scotland and the Route Map to 2020 identifies the large-scale collaborative projects that are needed to contribute to these targets.

We detail progress and the development of Aichi Target reporting in Scotland and how reporting might develop. We have adopted globally recognised guidance and design standards.

While the evidence base is incomplete at this stage we would hope that this initial assessment will attract interest and engagement towards developing a fuller account by 2020.

Background

In October 2010 the UN Convention on Biological Diversity (CBD) agreed a Strategic Plan for Biodiversity 2011-2020 and set twenty international targets known as 'Aichi Targets'.

In 2010 we undertook an assessment of biodiversity achievements in Scotland[1] and concluded that:

- Progress for Scotland's biodiversity has been made by many people and organisations that care about Scotland's biodiversity. Biodiversity loss had been slowed where targeted action had been applied.

- However, Scotland's biodiversity indicators, the condition of notified habitats and species on protected areas, and progress towards meeting Scotland's biodiversity targets demonstrated that biodiversity loss had not yet been halted and would require renewed and sustained effort over a longer period.

The UK is a signatory to the CBD Treaty and will submit a full report in December 2018, which will include progress on each Aichi Target. In Scotland we will also undertake a full assessment at the end of 2020.

Summary

The Aichi Targets are wide ranging and diverse in nature and present challenges both in terms of delivery and reporting. This is the first time we have attempted to report on these targets in Scotland. The collation of data and information across such a wide range of areas from financial resource allocation to knowledge transfer and conserved genetic resources has presented considerable challenges. We have enlisted the collaboration, advice and support from many organisations including government, agencies, academics and research institutes.

Individual accounts have been developed for thirteen of the twenty global Aichi targets and the accounts for the remaining seven Aichi targets will be developed during 2017. These accounts provide an interim assessment of progress in Scotland towards the 2020 Aichi targets and although the accounts are not yet fully developed they provide a useful check on progress to date. The evidence base for these accounts is still being developed and we would welcome contributions to improve these assessments. We will use these assessments to help inform where focused effort is required and work with others to identify appropriate actions to ensure Scotland meets its' 2020 targets.

We have adopted the five-point scoring system produced by the United Nation Convention on Biological Diversity as shown in figure 1 below.

Figure 1. Five point scale of progress, adapted from Global Outlook 4.[2]

On track to exceed target (we expect to achieve this before its deadline)	On track to achieve target (if we continue on our current trajectory we expect to achieve the target by 2020)	Progress towards target but insufficient (unless we increase our efforts the target will not be met by its deadline)	No significant overall progress (overall, we are neither moving towards the target nor moving away from it)	Moving away from target (things are getting worse rather than better)

Following collation of information and data for each Aichi account an assessment of status using the UN scale of progress was assigned to each Aichi target. This was undertaken by relevant experts and a quality assurance process was developed and applied to ensure consistency and highlight any issues with data quality.

As indicated in table 1 progress towards seven Aichi targets are on track, a further six are showing progress, but requiring additional action if we are to meet these targets by 2020. Aichi accounts to be developed during 2017 are also identified in table 1.1.

It is not suggested that this first interim assessment is definitive. The results are presented for consideration and we are hoping to build capacity and wider engagement in the process of developing them further.

Table 1.1 Summary assessments of the 20 Aichi Targets

#	Aichi Target Name	Target assessment
	A1 Awareness increased	Assessment due in 2017
	A2 Biodiversity values integrated: Scotland is a world leader in natural capital accounting, and actively promotes biodiversity through strategies and policies. Challenges remain to embed conservation and sustainable use in practice, biodiversity values have been integrated into the mainstream planning, policy and reporting frameworks	
	A3 Incentives reformed Many incentives are in place, which encourage activity to support and promote biodiversity. There are still incentives that conflict with biodiversity and potentially lead to its deterioration and sometimes loss. Further work is required to identify these and map out solutions.	
	A4 Sustainable consumption & production Sustainability is an integral part to Scotland's economy and enshrined within the Government Economic Strategy. Scotland is committed to being a low carbon economy and has ambitious targets to achieve this. However, current indicators show we still have work to do to ensure the economy is operating within safe ecological limits.	
	B5 Habitat loss halved or reduced Through past changes in land management some of Scotland's habitats have suffered losses particularly forests and peatlands. Targeted restoration is now underway on peatland, forest and freshwater habitats to reduce degradation, but it is too early to say whether these measures are sufficient to meet the target in full. By 2019 the Habitat Map of Scotland will provide comprehensive baseline habitat data and enable us, in time, to better estimate changes in Scotland's habitats. The Ecosystem Health Indicators will improve our knowledge of habitat fragmentation.	
	B6 Sustainable management – marine	Assessment due in 2017
	B7 Sustainable agriculture, aquaculture & forestry	Assessment due in 2017
	B8 Pollution reduced Reductions in pollution have led to significant improvements to air and water quality over recent decades. However, more work is required to meet air pollution and diffuse pollution targets, control marine litter, and better quantification of the effects of pollution on Scotland's biodiversity and ecosystem function (e.g. pollinators).	

Table 1.1 cont…

#	Aichi Target Name	Target assessment
	B9 Invasive species prevented and controlled Action to control the most problematic non-native invasive species is underway and new information systems are being developed to inform rapid response. However, the spread of invasive non-native species and their impacts on biodiversity is a present and growing threat.	
	B10 Pressures on vulnerable ecosystems reduced	Assessment due in 2017
	C11 Protected areas increased and improved Species, habitats and geology of national and international importance in Scotland are safeguarded in a suite of protected areas, contributing to halting biodiversity loss. Some 23% of terrestrial and inland water areas and 16% of marine areas have been brought under site protection, with over 80% of notified features in favourable condition. We now need to develop Regional Marine Plans to ensure our seas are sustainably managed.	
	C12 Extinction prevented The UK Indicator shows some evidence of a slowdown in the rate of decline in abundance of the UK's priority species. There is a mixed picture from Scotland's species indicators: with seabirds, waders, upland birds, and specialists butterflies in decline; generalist butterflies, woodland birds, and geese are increasing. Further work is required to develop a Scotland priority species indicator, and improvement of the taxonomical breadth of our GB-Red Lists, and indicator suite.	
	C13 Genetic diversity maintained Conservation, curation and research in relation to cropped plants, domesticated mammals and wild deer are progressing. However the knowledge base in Scotland is incomplete and further work is required	
	D14 Ecosystems & services safeguarded	Assessment due in 2017
	D15 Ecosystems restored & resilience enhanced	Assessment due in 2017
	D16 Nagoya protocol in force & operational The UK signed the Nagoya Protocol in 2011. Following public consultation in 2014 the Nagoya Protocol (User Compliance) Regulations 2015 were laid in the UK Parliament on 23 March 2015. Guidance on compliance and provision of an Access and Benefit-sharing (ABS) information platform provides a key tool for facilitating the implementation of the Nagoya Protocol.	

Table 1.1 cont…

#	Aichi Target Name	Target assessment
	E17 NBS & AP adapted as policy instruments The Scottish Biodiversity Strategy: 2020 Challenge for Scotland's Biodiversity was approved by the Scottish Cabinet and First Minister in May 2013 and published in June 2013. The Route Map to 2020 sets out the large scale collaborative actions required to ensure delivery of the Scottish Biodiversity Strategy and was published in 2015, with the first annual report on progress due in September 2016.	
	E18 Traditional knowledge respected	Assessment due in 2017
	E19 Knowledge improved, shared and applied Sharing and using biodiversity knowledge is key to identifying problems and solutions, priorities for conservation, and action we need to take. The Atlas for Living Scotland, Scotland's Environment Web, and the Marine Scotland data publishing portal contribute to the sharing and application of knowledge in Scotland. More work is required to address data recording, analysis gaps and improved information on ecosystem function to help set Scotland's biodiversity priorities.	
	E20 Financial resources increased Since 2011 financial resources for biodiversity in the UK have declined, but with a long term increase in the preceding years. There is currently no Scottish indicator for this target. Total funding figures for many of the Scottish organisations that have some biodiversity remit have also declined in the last 5 years. Work is required to produce a Scotland indicator.	

[1] Scotland's wildlife: An assessment of biodiversity in 2010
[2] https://www.cbd.int/gbo/gbo4/publication/gbo4-en.pdf

Development of Aichi reporting

The Aichi Targets are wide ranging and diverse in nature, presenting challenges both in terms of action delivery and reporting. This report is a first step towards collating data and information to develop Aichi accounts in Scotland.

The accounts presented are composed of a combination of information and data, some available at Scottish level others are only collated at UK level. There are some generic issues with information and data that cut across all accounts and require some further work and coordination at UK level. This applies particularly to data derived from UK indicators, which either require updating or disaggregation for Scotland.

In order to ensure a consistent approach to account development and enable the data and subsequent analysis to contribute to UK reporting, the Convention for Biological Diversity (CBD) quick guides were used to scope the assessments, with reference to technical documentation and the Global Biodiversity Outlook 4 assessment (GBO4). Further details of the methods developed are outlined in Annex 4.

Next steps

Progress is already underway to begin development of the remaining accounts and to engage more widely with other experts to further develop the suite of accounts presented in this report.

A critical step will involve working with key specialists to clearly interpret each Aichi Target for Scotland, to ensure we have a shared understanding of the aspirations for 2020.

We now need to build capacity and engage a wider audience in the assessment process. We would welcome feedback on the direction and pace of progress to-date, and views on further development of reporting against the Aichi targets.

Work is underway on the remaining seven accounts for completion in 2017 (see table 1.2 below). Scotland will then be well prepared for reporting to CBD in 2018 and providing a full account for Scotland in 2020.

Table 1.2 Initial progress with developing Aichi accounts for the remaining seven Aichi Targets

#	Aichi Target Name	Progress to 2016 – to be published in 2017
	A1 Awareness increased	Indicators for this Target include SG funded work on public attitudes to the environment, public opinion of forestry in Scotland, the SPANS (2013/14) report. Priority Projects 1, 2, 3, 5, and 6 contribute to this project.
	B6 Sustainable management – marine	Indicators and information for this target include: Scotland's Marine Atlas, Annual Sea Fisheries Statistics, Common Fisheries Policy membership and six inshore Fisheries Groups for inshore waters. Further information from Marine Scotland will be used. Priority project 12 contributes to this project.
	B7 Sustainable agriculture, aquaculture & forestry	Indicators and information for this target include: A land use strategy for Scotland, Aquaculture Scotland information and the benefits of aquaculture to Scotland paper, HNV official statistic, Scotland's Marine Plan. Priority Projects 2,4, and 11 contribute to this project.
	B10 Pressures on vulnerable ecosystems reduced	Indicators and information for this target include: CBD ocean acidification report, Hidden impacts of ocean acidification to live and dead coral framework, Scotland's Marine Atlas.
	D14 Ecosystems & services safeguarded	Indicators and information for this target include: EUNIS habitat map, SEPA's benefits from nature ecosystem services application, NCA Index, UKNEA Chapter 3 and 19, European MAES information and Scotland is using this framework. Priority projects 1,2,3,4,5,6,7,11.
	D15 Ecosystems restored & resilience enhanced	Indicators and information for this target include: SCM Indicator, CAMERAS evidence plan on resilience, connectivity indicator analysis on woodland is in development, EcoCo LIFE project producing a protocol for habitat management, creation and restoration in central Scotland, The State of Scotland's Soil. Priority project 1, 2, 3, 10, 11.
	E18 Traditional knowledge respected	Indicators and information for this target include: Fishers' North Sea Stock Survey is an annual survey of Fishers' perceptions of the state of fish stocks in the North Sea. http://www.nsss.eu/ *More work is needed on agreeing a definition of what is Traditional in a Scottish perspective.*

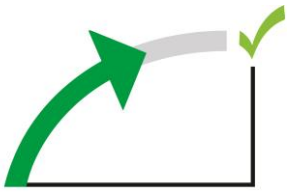
Aichi Accounts

The thirteen accounts available so far are documented in the following section.

AICHI TARGET 2 – BIODIVERSITY VALUES INTEGRATED

By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Scotland is a world leader in natural capital accounting, and actively promotes biodiversity through strategies and policies. Challenges remain to embed conservation and sustainable use in practice, biodiversity values have been integrated into the mainstream planning, policy and reporting frameworks.



We are on-track to achieve the target.

Ecosystem services

Ecosystem services have been partly assessed by relative value,[1] such as forestry,[2] water[3] and coasts.[4] While there is inevitable uncertainty, these have informed weightings in the Natural Capital Asset Index, summarised in Table 2.1. In 2011 Scotland became the first country in the world to publish a detailed attempt to measure annual changes in its natural capital[56], based on an evaluation of ecosystem service potential. Further work is underway to map and categorise ecosystem service provision in Scotland[7].

Table 2.1 Ecosystem services weightings for Natural Capital Asset Index

Service	Rank
Mediation of mass, liquid, gas flows	10.8
Food	10.2
Recreation, aesthetics and entertainment	10.0
Science, education and symbolism	10.0
Mediation of waste, toxins etc.	8.3
Pollination, seed dispersal, habitat maintenance	8.3
Global, regional and micro climate regulation	8.3
Materials from animals, plants etc.	6.3
Water	6.0
Soil formation and composition	5.8
Pest and disease control	5.0
Existence and bequest	5.0
Maintenance of water's chemical condition	3.3
Energy	2.5

National policies & Strategies

All public bodies in Scotland have a biodiversity duty[8] and are required to publish their compliance with it.[9]

The Scottish Economic Strategy recognises the need for investment in natural resources. Scottish Planning Policy and the National Planning Framework (NPF3)[10] support four key outcomes: *A successful sustainable place; a resilient place*; *a low carbon place*; and a *more connected place*. These policies and frameworks operate at national and sub-national scales.

The Scottish Biodiversity Strategy sets out how biodiversity will be conserved for the health, enjoyment and wellbeing of the people of Scotland.[11] The Scottish Land Use Strategy has objectives relating to the economy, environment and communities; and the Principles for Sustainable Land Use to guide policy and decision making by Government and across the public sector.[12]

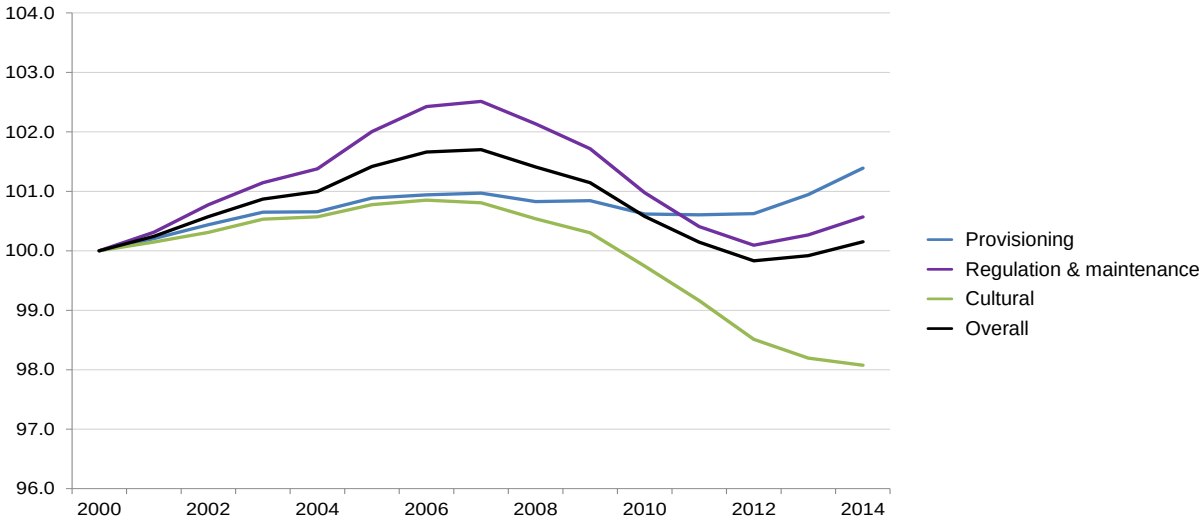
Aichi Target 2 – Biodiversity values integrated

Green Infrastructure

Green infrastructure (GI) is a strategically planned network of high quality natural and semi-natural areas with other environmental features, which is designed and managed to deliver a wide range of ecosystem services and protect biodiversity in urban settings.[13] European funding[14] is in place in Scotland to develop and improve green corridors, green recreation and health, and greening cities.

Measures that can help support biodiversity include European LIFE funding, Heritage Lottery Funds, Scotland's Rural Development Programme and Land Use Strategy.

Figure 2.2 Scotland's Natural Capital Asset Index 2015



The latest assessment[15] shows a stabilisation of Scotland's natural capital following decades of decline until the 1990s (figure 2.2). Habitats that continue to deteriorate include heaths and bogs but recovery of inland surface waters, that deliver a range of ecosystem services, contributes to the positive trend. The decline in cultural ecosystem services requires further analysis. McVittie *et al*. (2016)[16] state that "challenges remain in developing natural capital accounts. We need biophysical data that reflect changes in condition over time, and that can be linked to both management actions and benefits that can be valued".

Scottish Biodiversity Strategy

Work identified in the *Scottish Biodiversity Strategy – a Route Map to 2020* which will contribute to the delivery of this Aichi target in Scotland is identified in the box below.

Priority Project	Action	Status
PP4 - Investment in natural	Developing the Natural Capital Asset Index and associated economic metrics as a means of assessing Scotland's natural capital and maintaining the sustainability of the Scottish economy	Updated November 2016

References

1 Brooker, R., Hester, A. & Pakeman, R. eds. 2016. Ecosystem Services. The James Hutton Institute. 28pp.

2 Edwards, D., Elliot, A., Martin, S. *et al*. 2009. A valuation of the economic and social contribution of forestry for people in Scotland. Forestry Commission Research Report. Forestry Commission Scotland, Edinburgh.

3 Martin-Ortega, J., Holstead, K.L. & Kenyon, W. 2013. The Value of Scotland's Water Resources. CREW.

4 http://www.hutton.ac.uk/sites/default/files/files/publications/hutton_coast_booklet_web.pdf

5 http://www.snh.org.uk/pdfs/publications/commissioned_reports/750.pdf

6 http://www.snh.org.uk/pdfs/publications/commissioned_reports/751.pdf

7 http://www.gov.scot/Topics/Research/About/EBAR/StrategicResearch/future-research-strategy/Themes/Theme1

8 The Nature Conservation (Scotland) Act 2004 – http://www.legislation.gov.uk/asp/2004/6/contents

9 Wildlife and Natural Environment (Scotland) Act 2011 – http://www.legislation.gov.uk/asp/2011/6/contents/enacted

Scottish Planning Policy and the National Planning Framework (NPF3) – http://www.gov.scot/Topics/Built-Environment/planning/National-Planning-Framework

11 http://www.gov.scot/Topics/Environment/Wildlife-Habitats/biodiversity/BiodiversityStrategy

12 http://www.gov.scot/Topics/Environment/Countryside/Landusestrategy

13 European Commission. 2013. *Building a Green Infrastructure for Europe*. Publications Office of the European Union, Luxembourg.

14 Green Infrastructure – http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

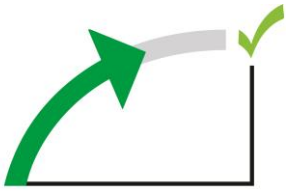
15 Scottish Natural Heritage, 2015. Scotland's Natural Capital Asset Index - 2015. Scottish Natural Heritage, Inverness. http://www.snh.gov.uk/docs/B814140.pdf

16 McVittie, A., Novo, P., Nijinik, M. 2016. Valuation and natural capital accounting. In *Ecosystem Services.* eds. Booker, R., Hester, A. & Pakeman, R. The James Hutton Institute.

AICHI TARGET 3 – INCENTIVES REFORMED

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.

Many incentives are in place, which encourage activity to support and promote biodiversity. There are still incentives that conflict with biodiversity and potentially lead to its deterioration and sometimes loss. Further work is required to identify these and map out solutions.



We are on-track to achieve the target.

Incentives in Scotland

Subsidies and tax incentives are also available for industries such as oil and gas exploration and extraction, renewable energy, estate management, house-building and capital allowance. A key planning outcome in National Planning Framework (NPF)[1] is a natural resilient place – helping to protect and enhance our natural cultural assets and facilitating their sustainable use.

Supporting farming

Some £434 million (2014-2020) is available to support farmers and land managers in Scotland to deliver benefits for biodiversity through The Scottish Rural Development Programme – Agri Environment Climate Change scheme. Under the Common Agricultural Policy (CAP), there are two sets of mandatory standards that apply to all land managers in receipt of rural payments;

- Statutory Mandatory Requirements[2] relating to public health, animal and plant health, environmental protection and animal welfare
- Good Agricultural and Environmental Condition (GAEC)[3] ensuring safeguarding soils, avoiding the deterioration of habitats and protection and management of water.[4]

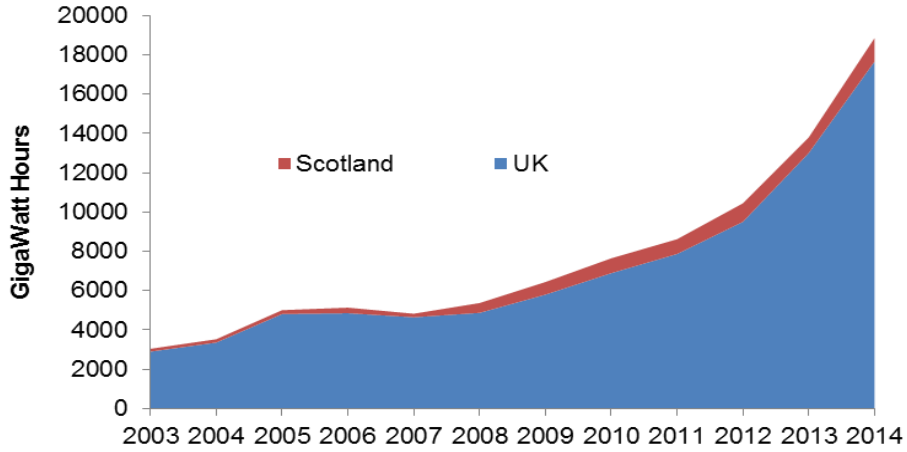
There are however a number of exclusions include marsh, rocks and scree, gorse and bracken[5] which may lead to loss of biodiversity.

Bioenergy

The Renewable Energy Directive has defined a set of sustainability criteria[6] to ensure that the use of biofuels (used in transport) and bioliquids (used for electricity and heating) is done in a way that guarantees carbon savings and protects biodiversity. Only biofuels and bioliquids that comply with the criteria can receive government support or count towards national renewable energy targets.[7] The sustainability criteria include guidance to ensure that land-take for biofuels is not

detrimentally to biodiversity. Biofuel electricity generation (Figure 3.1) has increased through subsidies, such as reducing reliance on fossil fuels.

Figure 3.1 Biofuel Electricity Generation in Scotland and the UK. Source: Department of Energy & Climate Change



Scottish Biodiversity Strategy

Work identified in the *Scottish Biodiversity Strategy – a Route Map to 2020* which will contribute to the delivery of this Aichi target in Scotland is identified in the box below.

Priority Projects	Action	Status
PP4 – Investment in natural capital	• Developing the Natural Capital Asset Index	Updated November 2016
PP11 – Sustainable land management	• Targeted support for sustainable land management • Demonstration farms	Ongoing

References

[1] Scottish Planning Policy and the National Planning Framework (NPF3)

[2] https://www.ruralpayments.org/publicsite/futures/topics/inspections/all-inspections/cross-compliance/detailed-guidance/statutory-management-requirements/

[3] https://www.ruralpayments.org/publicsite/futures/topics/inspections/all-inspections/cross-compliance/detailed-guidance/good-agricultural-and-environmental-conditions/

[4] https://www.ruralpayments.org/publicsite/futures/topics/inspections/all-inspections/cross-compliance/detailed-guidance/good-agricultural-and-environmental-conditions/

[5] https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/basic-payment-scheme/basic-payment-scheme-full-guidance/assessing-eligible-land---bps/

[6] https://ec.europa.eu/energy/node/73

[7] https://ec.europa.eu/energy/node/73

AICHI TARGET 4 – SUSTAINABLE CONSUMPTION AND PRODUCTION

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.

Sustainability is an integral part to Scotland's economy and enshrined within the Government Economic Strategy. Scotland is committed to being a low carbon economy and has ambitious targets to achieve this. However, not all indicators show confidently that we have achieved safe ecological limits.

We are progressing towards the target but at an insufficient rate.

National indicators measuring environmental impact

The Government Economic Strategy is aimed at all production sectors, including agriculture, forestry, fisheries, oil and gas, renewables as well as other forms of production such as electronics, retail and marketing, construction and tourism.[1]

National Indicators measuring environmental impact
The Scottish Government National Performance Framework includes four key measures of sustainable production and consumption:[2]

- Reduce Scotland's carbon footprint
- Increase the proportion of journeys to work made by public or active transport
- Reduce waste generated
- Increase renewable electricity production

There has been reduction in Scotland's carbon footprint since a peak in 2007 (figure 4.1) when it was 94.3 million tonnes carbon dioxide equivalent ($MtCO_2e$). The latest figure of 76.8 $MtCO_2e$ for 2012 represents a slight rise over the previous year.

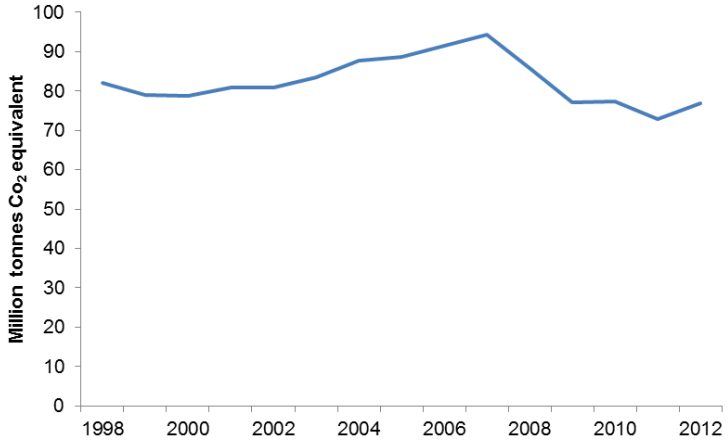


Figure 4.1 Scotland's Carbon Footprint, 1998-2012. (Source: Scottish Government)

Aichi Target 4 – Sustainable consumption and production

An estimate of the ecological footprint was undertaken in 2006[3]. This was stable but above the target value, suggesting that further work is required.

Plans for sustainable consumption and production

A number of policies exist that help guide action towards ensuring sustainability goals are being met. These include the Climate Change (Scotland) Act (2009),[4] the Zero Waste Plan (2010),[5] Low Carbon Scotland (2013)[6] and Safeguarding Scotland's Resources (2013).[7]

Although the use of natural resources is mentioned within the economic strategy, it is unclear specifically what measures are being taken to ensure that impacts are being kept within safe ecological limits.

Scottish Biodiversity Strategy

Work identified in the *Scottish Biodiversity Strategy – a Route Map to 2020* which will contribute to the delivery of this Aichi target in Scotland is identified in the box below.

Priority Project	Relevance	Status
PP4 – Investment in natural capital	Developing the Natural Capital Asset Index	Ongoing (revised NCAI expected Nov 2015)
PP11 – Sustainable land management	Targeted support for sustainable land management practices under SRDP	Ongoing

References

1 http://www.gov.scot/Topics/Statistics/Browse/Business/SABS/KeyFacts
2 http://www.gov.scot/About/Performance/scotPerforms/outcome/envImpact
3 http://www.gov.scot/About/Performance/scotPerforms/indicators/ecologicalFootprint
4 http://www.gov.scot/Topics/Environment/climatechange/scotlands-action/climatechangeact
5 http://www.gov.scot/Topics/Environment/waste-and-pollution/Waste-1/wastestrategy
6 A Low Carbon Economic Strategy for Scotland http://www.gov.scot/Publications/2010/11/15085756/0
7 http://www.gov.scot/Resource/0043/00435308.pdf

AICHI TARGET 5 – HABITAT LOSS HALVED OR REDUCED

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.

Through past changes in land management some of Scotland's habitats have suffered losses particularly forests and peatlands. Targeted restoration is now underway on peatland, forest and freshwater habitats to reduce degradation, but it is too early to say whether these measures are sufficient to meet the target in full. By 2019 the Habitat Map of Scotland will provide comprehensive baseline habitat data and enable us, in time, to better estimate changes in Scotland's habitats. The Ecosystem Health Indicators will improve our knowledge of habitat fragmentation.

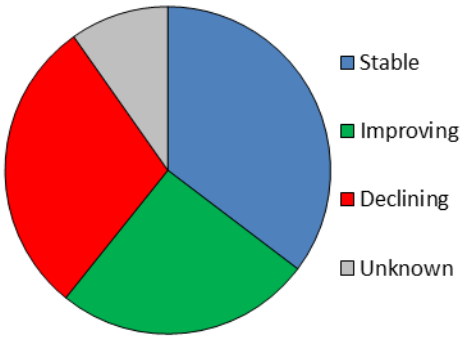
Progressing towards the target but at an insufficient rate.

Past loss or reduction of Scotland's native habitats has been caused by: land use intensification and modification; overexploitation; overgrazing;[1] invasive non-native species[2] and wildlife diseases, such as rhododendron and ash dieback respectively; climate change (particularly montane, wetland, and coastal habitats) and pollution; and habitat fragmentation.[3,4] Habitats for which Scotland is of European importance include: woodland; peatland; mountain landscapes; machair; coastal cliffs and seas.[5]

Habitat changes

The condition of notified habitats on protected sites in Scotland is stable.[6] Land and sea under positive management increased between 2010-2012).[7] However, the status of UK habitats of European importance declined from 2007 to 2013.[8]

Figure 5. 2013 EU Habitats Directive Article 17 Scottish reporting – Scottish assessment of Overall trends in Conservation Status qualifier for 51 terrestrial and coastal habitats



The 2013 EU Habitats Directive Article 17 assessment of terrestrial and coastal habitats[9] showed 42% bad, 36% inadequate,[10] and 22% favourable. Scottish trends in conservation status were 30% in decline, 24% improving, 36% stable and 10% unknown (Figure 5.). Table 5.1 shows how five of the habitat groups had declining conservation status with the groups with the greatest proportion of declines being "Coastal sand dunes and continental dunes", "Marine, coastal and halophytic" and "Forests". Six groups showed improvements with "Natural and semi-natural grassland formations" and "Freshwater habitats" having the greatest number of improvements. The remainder of marine habitats in Scotland were reported on a UK scale.[9]

Aichi Target 5 – Habitat loss halved or reduced

Table 5.1 2013 EU Habitats Directive Article 17 Scottish reporting - Scottish assessment of Overall trends in Conservation Status qualifier for 51 terrestrial and coastal habitat grouped by category (using JNCC categories)[11]

Habitat Group	Total	Declining	Improving	Stable	Unknown
Coastal sand dunes and continental dunes	9	5	2	0	2
Forests	5	5	0	0	0
Freshwater habitats	6	0	3	2	1
Marine, coastal and halophytic	5	2	0	2	1
Natural and semi-natural grassland formations	8	2	4	2	0
Raised bogs and mires and fens	8	1	2	4	1
Rocky habitats and caves	5	0	0	5	0
Sclerophyllous scrub (matorral)	1	0	1	0	0
Temperate heath and scrub	4	0	1	3	0

Work is underway to quantify habitat fragmentation.[12] In the past land cover changes were assessed using aerial photographs; between 1947 and 1988 long established and semi-natural features reduced by 17%.[13] Currently, Scotland uses a variety of data sources; we now have a Level 1 EUNIS land cover map[14] (work is continuing to produce higher level maps),[15] and there is a UK marine EUNIS map.[16] These provide current and up-to-date maps of the distribution of Scotland's terrestrial and marine habitats, against which change may be measured. Work is being carried out by JNCC on "Making Earth Observation work for UK biodiversity conservation".[17]

Scotland's habitats and biodiversity

Completion of the Habitat Map of Scotland in 2019 will enable us to better assess the extent and rate of change of habitats across Scotland. More information on habitat data can be found in Aichi Target 19 account.

More than 10% of Scotland's sea area is covered by the newly designated (2014) Nature Conservation Marine Protected Areas.[18] The most recent assessment of Scotland's offshore marine and coastal protected sites are mainly in favourable condition at 98% and 82% respectively.[6] However, estuaries and inshore habitats are in a poor state with many concerns for the majority of shallow and shelf subtidal sediments across Scotland.[19] Several restoration projects,[3] the Scottish Costal Forum,[20] and the EU Marine Strategy Framework Directive will contribute to better management of these areas. Many of our freshwater habitats are in relatively good condition,[4] however, there are some declines in our freshwater vascular plant diversity,[21] and invasive non-native species continue to impact these habitats.

Aichi Target 5 – Habitat loss halved or reduced

Scotland's woodlands declined by 4.5% by the beginning of the 20th century. However, by the middle of the 20th century, Scotland's woodland had increased rapidly mainly by fast growing conifer species, and by the 1990's more diverse woodland types were being planted.[4] By 2013 the total area covered by woodlands or forests in Scotland was 1.4Mha (18% of the land area);[4] most of this area is dominated by introduced species. The Native Woodland Survey of Scotland (NWSS) assessed that just over one fifth (0.311Mha, March 2011) of our woodland is native.[22] The NWSS showed that 50% of native woods on the National Forest Estate were in good condition, but the remaining 50% were in unfavourable condition with the largest factor being from grazing effect of herbivore such as deer and sheep.[1] The Habitats Directive Annex I forest habitat types all have an overall conservation status of inadequate declining (Table 5.1). Woodland birds show a long term increase in abundance in Scotland.[23] Although Scotland's State of the Environment Report, 2014 assesses the condition of our forests and woodlands for wildlife as "moderately good", and that this condition is likely to continue with sustainable management,[4] woodland habitats on protected sites have the second worst condition of all habitats with only 53% of protected woodland features being in favourable condition.[6] The 2006 Scottish Forestry Strategy[24] will enable us to monitor change.

Mountains and uplands cover most of Scotland's landmass.[4] Upland breeding birds have shown a gradual long term decline in Scotland,[23] but remedial action on protected sites is improving condition of upland habitats.[4] Peatlands cover more than 20% of Scotland's area; in Scotland 70% of blanket bog and 90% of raised bog have been damaged.[25] Scotland's National Peatland Plan (2015), with support from SRDP, is working towards improving their protection and condition, with over 10,000ha restored. Biodiversity hotspot analysis in the uplands has shown the importance of biodiversity habitat mapping to spatial targeting of management options).[26] Grasslands have suffered declines in recent years: there have been significant declines in vascular plant diversity in grasslands;**Error! Bookmark not defined.** and, 50% of grassland protected features are in unfavourable condition, the worst condition of all habitat features on protected sites.[6]

Ecosystem Services and Health & Wellbeing

When in a healthy condition Scottish habitats can provide ecosystem services such as water, food, fuel and energy, storm protection, carbon storage, minerals, and flood control.[4] Although Scotland's Natural Capital index is currently static, the natural capital in woodland, freshwater, coast, and urban greenspace broad habitats increased between 2000-10, and declined in moorland, grassland, and cropland.[27] Scotland's Land Use Strategy will enable us to think more strategically about land use, and provide a framework for decision making to ensure that our land delivers multiple benefits, results in partnerships with nature, and links people with the land.[28] A project in central Scotland is looking at the natural environment, climate change resilience and how these impact on our health and wellbeing, particularly in our more populated areas.[29]

Aichi Target 5 – Habitat loss halved or reduced

Scottish Biodiversity Strategy

Work identified in the *Scottish Biodiversity Strategy – a Route Map to 2020* which will contribute to the delivery of this Aichi target in Scotland is identified in the box below.

Project	Action	Status
PP1,2,&3 – Restoration of Peatlands, Native Woodlands, and Freshwaters	Restore 5,100ha peatlands and Flow Country Peatland restoration. Restore approximately 10,000ha of native woodlands, and conservation management of National Forest Estate. River Basic Management Plans (2015-21) and Pearls in Peril LIFE project.	Ongoing
PP11 – Sustainable land management	Sustainable land management through SRDP, Support for biodiversity on arable farms, Wildlife Estates Scotland Initiative, and Demonstration Farms.	Ongoing

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5 http://www.gov.scot/Resource/0048/00480289.pdf
6 http://www.snh.gov.uk/docs/B424913.pdf
7 http://www.snh.gov.uk/docs/B551631.pdf
8 http://jncc.defra.gov.uk/page-4239
9 http://jncc.defra.gov.uk/page-6563
10 https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp
11 https://jncc.defra.gov.uk/page-6563
12 http://www.snh.gov.uk/docs/A1308427.pdf
13 http://www.snh.gov.uk/docs/B1009930.pdf
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27 http://www.snh.gov.uk/docs/B814140.pdf
28 http://www.gov.scot/Topics/Environment/Countryside/Landusestrategy
29 http://www.centralscotlandgreennetwork.org/delivering/priorities-for-delivery

AICHI TARGET 8 – POLLUTION REDUCED

By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Very notable improvements to air and water quality over recent decades, brought about by reduced pollution, has led to marked improvements in the status of fresh and coastal waters. Much work remains to be done, with more challenging measures required to control diffuse pollution but pollution from point sources is very much less detrimental to ecosystem function and biodiversity than in the past.

Progressing towards the target but at an insufficient rate.

Freshwater and marine, air, and soil are affected by pollutants including sulphurous oxides, nitrogen (oxides and ammonia), carbon oxides, phosphate, ozone, metals, halogens, volatile organic compounds, radioactive compounds, persistent organic pollutants, litter, organic matter, noise, and light. Excess nutrients cause acidification and eutrophication of soils and waters resulting in the loss of biodiversity and effects on ecosystem functioning (such as primary production and decomposition); [1,2,3] they can cause excessive growth of aquatic algal mats that smother other organisms and remove oxygen from the water.[4] Pollutants may be toxic to organisms and can accumulate in their bodies affecting normal functioning, or can cause harm to wildlife by entanglement or ingestion. Pollutants can come from fertilisers, pesticides, industry, urban development, animal and human waste, and transport.

In the air, freshwater and marine environments, Scotland collects and collates information underpinning reporting for EU Directives including information from the Air Quality Strategy, River Basin Management Plans, and the Marine Atlas. Although the Scottish Soil Monitoring Action Plan[5] and Scottish Soil Framework[6] describe pressures and measures to safeguard ecosystem health from e.g. acid critical load exceedance[2] there is currently no EU Directive for soils.

Scotland is making gradual progress in decreasing pollution in Scotland, with better integration of pollution control measures in incentives such as the Scottish Rural Development Programme (SRDP) Agri-Environment Climate Scheme[7] and Greening guidance under the CAP Basic Payment Scheme[8]. More could be done on quantifying the effect of pollution on biodiversity and ecosystem function (e.g. pollinators) and also control of pollutants with particular regard to air pollution, diffuse pollution, and marine litter.

Trends in Pollution and Biodiversity

In the last 20-25 years air pollutant emissions have declined,[9] bathing water quality has shown evidence of a long-term improvement but with weather driven fluctuations[10]. River water quality has improved and freshwater macroinvertebrate diversity in Scottish rivers has increased.[11] Ozone at ground level has fluctuated but frequently exceeds the Air Quality Strategy threshold.[12] The seas around Scotland are generally clean with mainly stable trends for e.g. eutrophication and algal

toxins.[13] Across the UK hazardous substances input to the marine environment has declined.[14] Habitats particularly sensitive to acidification cover 60% of Scotland. Between 1995-1997 and 2010-2012 the area of land subject to critical loads of acidification fell from 68% to 33%. Habitats sensitive to eutrophication cover 55% of Scotland. Over the same time period this too fell from 59% to 45%.[12]

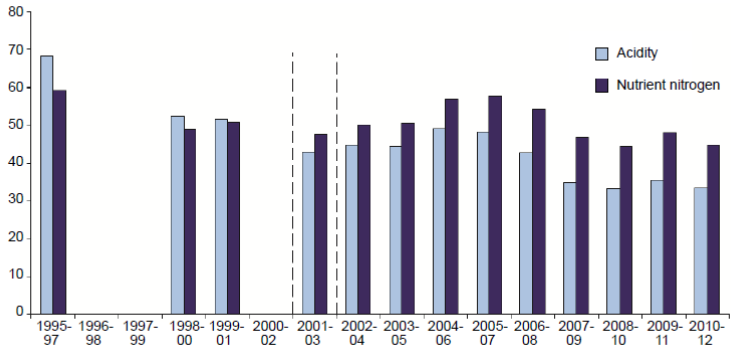

Figure 8.1 Sensitive Habitats Exceeding Critical Loads for Acidification and Eutrophication: 1995-1997 to 2010-2012 (Source: Scottish Government).[12]

Nitrate Vulnerable Zones[15] cover 14% of Scotland's land mass, where nitrate water pollution from agricultural sources is reduced through mandatory rules on farming practices.[16] The percentage of riverine sites with mean nitrate concentrations of < 0.3 mg N/l has increased from 25% in 2000 to 33% in 2013.

Pollution control

Pollution control measures include sludge, waste management, water environment management, pollution prevention and control regulations.[17] EU Directives[18] including Water Framework Directive, Air Quality Directive, and Marine Strategy Framework Directive[19] require the assessment of pollution control measures and set thresholds for biodiversity. Scottish Environmental Protection Agency (SEPA) has guidance on their pollution control mechanisms and regulations by industry *via* the Pollution Prevention and Control Regulations,[20] and also water regulations and licencing for controlled activities in our waters.[21] Diffuse pollution can be controlled and regulated using Sustainable Urban Drainage Systems (SUDS) in the urban environment, and General Binding Rules in the rural environment.[22]

Work has been carried out on some nature conservation sites impacted by pollution e.g. many lochs require focus effort to reduce chronic increases in nutrient input, and nutrient and slurry management.[23] The Pearls in Peril LIFE project focuses on reducing the impacts of diffuse pollution;[24] for this critically endangered mollusc. Developing and implementation of two river basin management plans;[25] and, plans to carry out work on measures for priority catchments for diffuse pollution will also deliver biodiversity benefits.[26] The ENTRUST Landfill Community Fund in Scotland closed in 2015[27] and EU funding such as LIFE supports projects investigating biodiversity and pollution.[21]

The Scottish Soil Monitoring Action Plan[28] and Scottish Soil Framework[29] describe pressures and measures to safeguard ecosystem health from e.g. acid critical load exceedance.[2]

Scottish Biodiversity Strategy

Work identified in the *Scottish Biodiversity Strategy – a Route Map to 2020* which will contribute to the delivery of this Aichi target in Scotland is identified in the box below.

Priority Projects	Relevance	Status
PP3 – Restoration of freshwaters	Diffuse pollution effects on freshwater, and River basin management plans (2015-21). Pearls in Peril Life project	Ongoing
PP11 – Sustainable land management	Links with agriculture, seeking EC approval for new nutrient efficiency measures on grassland.[30]	Ongoing

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AICHI TARGET 9 – INVASIVE ALIEN SPECIES PREVENTED AND CONTROLLED

By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Action to control the most problematic non-native invasive species is underway and new information systems are being developed to inform rapid response. However, the spread of invasive non-native species and their impacts on biodiversity is a present and growing threat.

We are progressing towards the target but at an insufficient rate.

The commonest pressure (greater than 50%) on protected nature sites is the presence or changing extent of invasive species[1]. More than 3,017 non-native species are recorded in Great Britain; of which 237 established species have a negative impact on biodiversity.[2] Among the 1,161 non-native species established in Scotland, 183 (16%) have negative ecological impacts. The majority of invasive non-native species (INNS) are higher plants (Table 9.1).

Information on INNS is collated by the GB Non-Native Species Secretariat through a partnership process involving many national experts.[3] Data on the recorded occurrence of species are available *via* the National Biodiversity Network (NBN) Gateway.[4] A prioritised list of the top 50 INNS established in Scotland was drawn up by a group of 25 species experts at a workshop in 2015.[5] All of these species were assessed as having moderate to high impacts and are prioritised for action. The spread of species taxonomic group by habitat is also summarised in Table 9.1

Table 9.1 Non-native species and INNS established in Scotland[6]

Broad taxonomic group	All Non-Native Species		Top 50 INNS			
	Non-Native	Invasive	Freshwater	Marine	Land	Total
Lower plants	9	6	0	5	0	5
Higher plants	928	121	4	1	15	20
Insects	109	5	0	0	3	3
Other invertebrates	81	19	2	3	1	6
Vertebrate	34	32	7	0	9	16
Total	**1161**	**183**	**13**	**9**	**28**	**50**

Distribution of INNS

The greatest number of INNS species occurs in woodland and urban habitats (Table 9.2). The UK National Ecosystem Assessment[7] shows continuing impact in semi-natural grasslands and moorlands, mountain and heaths. Elsewhere, in other habitats, the impact is increasing.

Aichi Target 9 – Invasive alien species prevented and controlled

The Native Woodland Survey of Scotland cites INSS as a serious potential threat to the biodiversity of native and ancient woods. Nineteen percent of all native woodland polygons in the survey contained INNS; lowland mixed deciduous and upland oak woodlands showed the highest recorded frequency both with 30% of all polygons affected. Rhododendron was recorded in 12% of the total woodland area.

Of course the impact of INNS varies as does the cost of control or eradication. Remedial action is undertaken on the basis of risk, as assessed by the Non-Native Risk Analysis Panel (NNRAP)[8] through an expert assessment and peer review. The socio-economic impacts of INNS are greatest in urban areas and intensively managed agricultural habitats. Weeds and damage to crops and stored food by pests have greatest economic impacts. The rabbit is ranked as the most costly INNS, with an estimated annual cost of £96 million per annum in Scotland.[9] Japanese knotweed costs around £4.4 million per annum, mainly in urban areas. The total annual cost of INNS to Scotland's economy in 2010 was estimated to be £125 million.

Table 9.2 Distribution of established INNS by EUNIS habitat[1]

EUNIS Habitat	No species
Marine	12
Coastal habitats	25
Grasslands etc	23
Heathland, hedgerow & scrub	13
Inland surface water	24
Mires, bogs and fens	11
Woodland and forest	30
Inland unveg. sparsely veg.	17
Urban habitats	30
Total	**183**

In order to managing INNS prevention and early detection are critical and understanding distribution routes plays a key part. The GB Non-native species secretariat currently has five species on high alert[10] as part of a rapid response protocol. A spatial application to track the change of occurrence in the number of known INNS is currently under development (Figure 9.3).

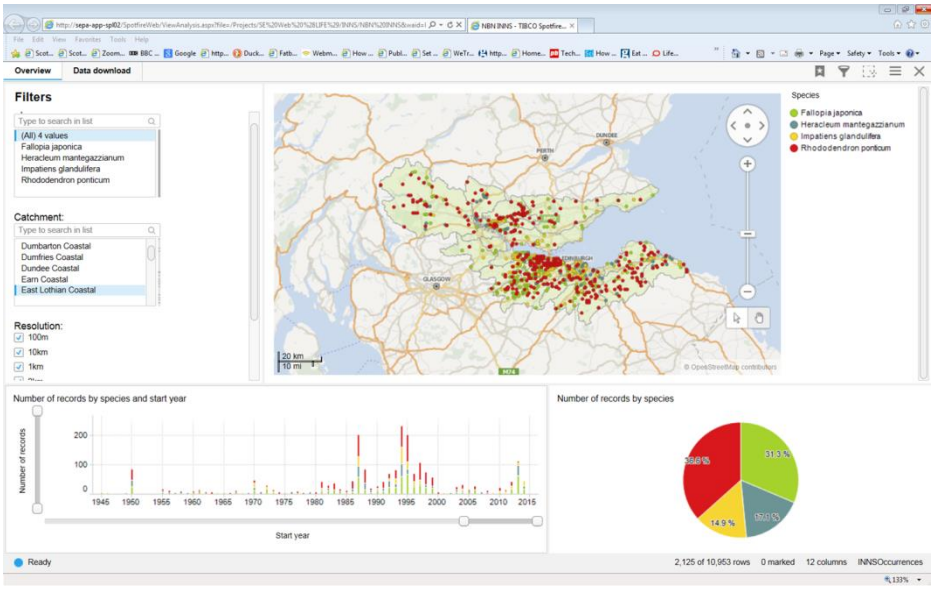

Figure 9.3 Spotfire INNS tool showing individual records, date record and number of records by species

Aichi Target 9 – Invasive alien species prevented and controlled

Scottish Biodiversity Strategy

Work identified in the *Scottish Biodiversity Strategy – a Route Map to 2020* which will contribute to the delivery of this Aichi target in Scotland is identified in the box below.

Priority Projects	Action	Status
PP9 – Conservation of priority species	Removal and/ or control of invasive species	Ongoing
Supporting work	Invasive prevention and development of response capability.	Ongoing

References

1 SNH Protected Nature Sites Application – http://www.environment.scotland.gov.uk/get-interactive/data/protected-nature-sites/

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AICHI TARGET 11 – PROTECTED AREAS INCREASED AND IMPROVED

By 2020, at least 17 per cent of terrestrial and inland water areas and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascape.

Species, habitats and geology of national and international importance in Scotland are safeguarded in a suite of protected areas, contributing to halting biodiversity loss. Some 23% of terrestrial and inland water areas and 16% of marine areas have been brought under site protection, Over 80% of notified features or freshwater are in favourable condition. We now need to develop Regional Marine Plans to ensure our seas are sustainably managed.

We are on track to the target.

Almost two thirds of Scotland's land, and parts of the sea, are recognised (through designation / tenure / stewardship or local planning policy) to be of natural heritage importance.[1] The extent will increase with the inclusion of Marine Protected Areas.[2]

Scotland's protected areas contribute to safeguarding Scotland's biodiversity and are a key component of Scotland Biodiversity Strategy.[3] By August 2015 the extent of protected areas [4] in Scotland's total area was: Terrestrial and Inland waters = 22.7%; Marine = 16.0%. In March 2016, 80.4% of natural habitat and geological features, and species features were in favourable condition,[5] meeting the national target.[6]

This is an improvement since 2007 (Figure 11.1).

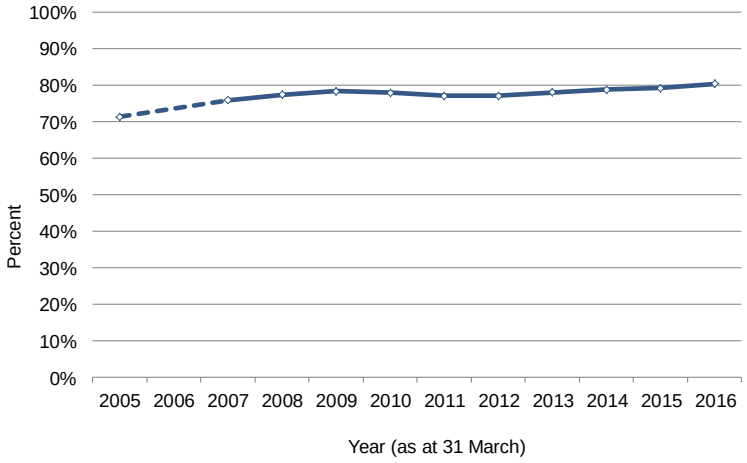

Figure 11.1 Percentage of natural features on protected nature sites found to be in favourable condition, as at 31 March, 2005, 2007-2016[5]

Grassland and woodland habitats,[7] amphibians and reptiles, and marine mammals[8] have the greatest proportion of features in unfavourable condition.

Aichi Target 11 – Protected areas increased and improved

Marine and geological features, dragonflies and terrestrial mammals, and have the greatest proportion of features in favourable condition. Birds on Special Protection Areas are performing well across the European Union.[9]

Representativeness, connectedness, and management

Scotland's Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPAs) and Special Areas for Conservation (SAC) are representative of their qualifying species and habitats, with consideration of important biodiversity areas, including Important Bird Areas, and Important Plant Areas.[10] A Scottish Protected Areas for Nature Review (PANR) aims to "address how the role and purpose of protected areas might be developed to better secure public benefits, within the context of wider thinking on land use and ecosystem services". [11]

Land use intensification has led to the isolation of some protected sites[11] making them less resilient to change or effective in protecting biodiversity.[3] A more ecologically coherent network[3] can improve connectivity.[12] The impacts from two pressures on biodiversity namely; over-grazing and invasive species impact the most protected sites. Work is underway to identify remedial management on some sites.

Ecosystem Services and Community Involvement

Guidance is available on how to apply an ecosystems approach to plans policies and management of land.[13] By improving the condition of habitat features we may also improve regulating ecosystem services (such as carbon sequestration by peatbogs)[14] within and beyond protected areas.[15] There is some evidence that protected sites may deliver more in terms of regulating and cultural services than non-designated sites.[15] Scotland's Land Use Strategy objectives include: "Urban and rural communities better connected to the land, with more people enjoying the land and positively influencing land use",[16] with the NAPR "suggesting exploring all opportunities to involve people in decisions about the establishment and management of protected areas".[11]

Biodiversity remains under threat[17] and 17% coverage of terrestrial protected areas may not be enough to safeguard biodiversity and ecosystem services.[18] We need to complement the protected areas approach with other measures that tackle pressures on biodiversity across the whole countryside.

Scottish Biodiversity Strategy

Work identified in the *Scottish Biodiversity Strategy – a Route Map to 2020* which will contribute to the delivery of this Aichi target in Scotland is identified in the box below.

Priority Projects	Action	Status
PP8 – Protected areas in good condition	Condition status	Ongoing
PP12 – Increase environmental status of our seas	Complete the suite of MPAs and Natura sites	Ongoing

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AICHI TARGET 12 – EXTINCTION PREVENTED

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.

The UK Indicator shows some evidence of a slowdown in the rate of decline in abundance of the UK's priority species. There is a mixed picture from our species indicators: with seabirds, waders, upland birds, and specialists butterflies in decline; generalist butterflies, woodland birds, and geese are increasing. Further work is required to develop a Scotland priority species indicator, and improvement of the taxonomical breadth of our GB-Red Lists, and indicator suite.

We are progressing towards the target but at an insufficient rate.

GB Red Listed Threatened Species found in Scotland

The Alliance for Zero Extinction (which uses the 2004 Red List for species information) "aims to prevent extinctions by identifying and safeguarding key sites, each one of which is the last remaining refuge of one or more Endangered or Critically Endangered species", and lists no key sites in Scotland where a species extinction is imminent globally.[1] However, Scotland's species are under threat of climate change;[2] land use change; recreational, agricultural and forestry practices; non-native species, pollution and disease; and over exploitation.[3]. The Scottish Biodiversity List (SBL),[4] a statutory list that contains 2105 terrestrial and marine species deemed "important" by Scottish Ministers, includes:

- 441 (21%) classed as threatened, and 222 (11%) as near threatened in GB[5] (for those species with a GB Red List assessment);
- 70 of these threatened species are classed in the SBL as being in decline; and
- 70 endemic terrestrial species, sub species or races on the SBL with 34 endemic species being threatened; 24 of these endemic, threatened species are rare in Scotland making them of particular risk of extinction.

Indicators and Conservation

Currently, there is no Scotland indicator for threatened species. However, two UK indicators of priority species, based on country lists such as the SBL, show that since 1970 there were significant long term (1970-2012) declines in the abundance (birds; butterflies; mammals; and moths)[6] and frequency (insects)[7] of priority species, at 67% and 40% respectively. Many of these species were prioritised because they were already in decline.[8] The bar chart in Figure 12.1 shows that in the long term, there are 75% of species in decline, but 53% in the short term, giving us some indication that we may be halting the decline of priority species. In the short term the abundance (Figure 12.1) indicator is still declining but at a rate lower than previously, and has no significant short term trend (2007-2012). A stable or significantly

increasing index would provide a good indication that on average priority species are no longer in decline and therefore the UK are moving towards this Aichi target.[8]

More years of data are required to determine whether this stable short term trend will continue. Analysis of Scotland data underpinning both the abundance and the frequency indicators could provide a Scottish indicator of priority species. However, it should be noted that the priority indicators and bar charts include a broader list of species than are "threatened" and are not taxonomically representative.[8]

The Scottish Biodiversity Strategy indicators show that the trends in some of Scotland's species have been mixed: there is a long term stable trend for breeding birds, with evidence of a decline in upland birds and an increase in woodland birds.[9] Our wintering waders and breeding seabirds show long term declines, however our wintering geese have benefitted from large, long term increases.[10,11] Generalist butterflies show a long term increase, but specialist butterflies show a long term decrease, which has stabilised in the short term.[12] These changes may be due to factors including climate change, habitat loss, and those affecting migratory species outside of Scotland. Only a limited range of species have appropriate data for trends analyses; even for well-studied taxa such as birds, data may be insufficient.

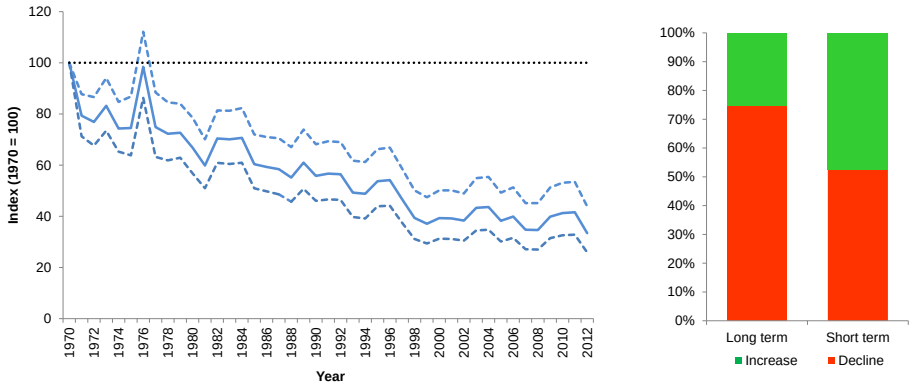

Figure 12. Changes in the relative abundance of priority species in the UK, 1970 to 2012[6]

Notes:
1. Based on 213 species. Dotted lines show the 95 per cent confidence intervals relative to the 1970 reference year.
2. Bar chart shows the percentage of species increasing or declining over the long-term (1970 to 2012) and the short-term (2007 to 2012).
3. All species in the indicator are present on one or more of the country priority species lists (Natural Environmental and Rural Communities Act 2006 - Section 41 (England) and Section 42 (Wales), Northern Ireland Priority Species List, Scottish Biodiversity List).

The proportion of species with a favourable conservation status on protected sites is 80.4%.[13] For the remaining protected sites a number of pressures have been identified which are contributing to unfavourable status, including (in decreasing order); recreation/disturbance, water management, invasive species, over-grazing, and "other" (including pressures such as climate change, air pollution, and wildlife

crime). From the 2013 UK Habitats Directive reporting[14], 57.5% of terrestrial Habitats Directive species in Scotland were assessed as having good Conservation Status, up from 47.5% in the previous reporting period (2001-2006[15]).

In 2013 those terrestrial Habitats Directive species (n=40) assessed with a conservation status as inadequate or bad had decreased 52.5% in 2006 to 42.5% in 2013. The Conservation Status assessment takes into account species range, population, habitat, and future prospects[16]. In 2013 there are 10% of Habitat Directive species for which the conservation status is unknown[17], down from 17.5% in 2006.

There are opportunities in preventing species extinction including funding of biodiversity conservation *via* Scottish Rural Development Programme (2014-2021), targeted projects,[18] and protected sites management. SRDP is now targeted to those areas where greatest biodiversity benefit may be achieved,[19] we are continuing to carry out projects on priority species,[20,21] and effectively managing protected sites particularly through the Delivering Favourable Condition programme of work. SNH have collated a list of more than 40 possible funders for natural heritage projects[22].

The benefits that species deliver may be quantified in part through their contribution to healthy habitats as measured in the Natural Capital Asset Index (NCAI)[23]. There has been an historical deterioration of habitats from 1950s-1990s, followed by a stabilisation and then slight improvement since 1990.[24]

Constraints to prevent extinction would include: continued pressures such as disturbance, climate and land use change, invasive non-natives species, pollution, land management etc; volunteer recruitment and data availability[25] (to address the data deficiency for rare, difficult to identify or cryptic species we may have to employ novel technologies e.g. eDNA); and financial resources.

Issues, case studies, and knowledge gaps

Some SBL species are too rare and data deficient to assess their GB threat status e.g. *Euphrasia campbelliae* (an eyebright). There are large groups for which no assessments have yet been incorporated into the GB Red Data lists.[26] The Scottish wildcat is one of Scotland's most endangered species and is currently in decline primarily through hybridisation with domestic cats. By 2019 SNH and Scottish Wildcat Action aim to have; secured five stable, wild populations; a better understanding of wildcat distribution, overall numbers, genetics and degree of hybridisation; and, raised local awareness of the threats to wildcats.[27] Recent surveys show that otter populations have largely recovered from historic lows.[28] Scotland is famous for its non-vascular plant species[18] and new species are still being discovered, such as the only global finding of Northern prongwort (*Herbertus borealis*) in 2012 on Beinn Eighe National Nature Reserve, following the identification using DNA analysis.[29] The bryophyte *Grimmia anodon*, an SBL species listed as being extinct in Scotland (based on GB-IUCN 2001 Red-list assessment), was refound in 2005.[30] The new national plant monitoring scheme may help to improve our knowledge of trends, and thus the status of plants;[31]

however, vascular plant diversity has declined in recent years.[32] Many reintroductions to Scotland of locally extinct species have been successful, including vendace, and white-tailed sea eagle, however reintroduced capercaillie have suffered a 50% decrease.**Error! Bookmark not defined.** On-going work is being undertaken to conserve the great yellow bumblebee,[33] freshwater pearl mussel, and red squirrels.[19] An action plan for hen harriers (Red listed) is currently on-going.[34]

Halting the decline in biodiversity and threat of extinction is a challenge to all countries across the globe. The global extinction of the great auk in the 1850s though overexploitation is a cautionary tale for highlighting human driven extinctions.[22] As the Indicators above show, there are some critical challenges to preventing extinction of Scotland's wildlife. Many of our most important groups of species are in decline such as seabirds, for which we hold internationally important numbers of some species; changes in sandeel availability are considered to be the most likely cause of declines in black legged kittiwakes, which may be affected by a combination of climate and fishing impacts.[11] It is only through concerted and coordinated action that we can halt declines in groups of species such as seabirds, waders, upland birds and specialist butterflies, and to tackle some of these cross border pressures such as global climate change, pollution and overexploitation.

In order to identify those species most in decline, we require better information on a Scotland scale on the rate of change and location of our highest priority species (to create a map of areas of most importance to our threatened species), including information on the threat status of these species. Much of our data are collected by volunteer recorders, so we have to ensure recording organisations are adequately funded and we continue to engage with citizen science initiatives.[35]

Scottish Biodiversity Strategy

Work identified in the *Scottish Biodiversity Strategy – a Route Map to 2020* which will contribute to the delivery of this Aichi target in Scotland is identified in the box below.

Priority Projects	Relevance	Status
PP1,2,3 – Restoration of habitats PP11 – Sustainable land management PP12 – Increase environmental status of our seas	Restoration and protection of the habitats upon which our threatened species rely	Ongoing
PP8 – Protected areas in good condition PP9 – Conservation of priority species	Conservation of our protected areas and priority species e.g. freshwater pearl mussel	Ongoing

Aichi Target 12 – Extinction prevented

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AICHI TARGET 13 – GENETIC DIVERSITY MAINTAINED

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.

Conservation, curation and research in relation to cropped plants, domesticated mammals and wild deer are progressing. However the knowledge base in Scotland is incomplete and further work is required.

We are progressing to target but at an insufficient rate.

Crop Plants

The botanical element of this target overlaps with Target 9 of the Global Strategy for Plant Conservation,[1] reporting for which is coordinated by Plant Link (PLINK). Most reporting to date has been undertaken at a UK level. The UK Biodiversity indicator for plant genetic resources[2] reports on the genetic diversity of cultivated plants held in UK germplasm collections. The trend shows an increase in the numbers of accessions and is a measure of *ex situ* conservation of cultivated plants using methodology developed by the United Nations Food and Agriculture Organisation. The Millennium Seed Bank Project made the largest contribution to accessions since 2000 and, in 2014, accounted for just over 10% of the world's seed-bearing species. The Project aims to collect and store 25% of the world's flora by 2020, including all of those from the UK. Crop varieties bred for and used in agriculture in Scotland are held by Science and Advice for Scottish Agriculture including all varieties added to the UK National list. The collection includes historically important crop varieties that are no longer commercially maintained.

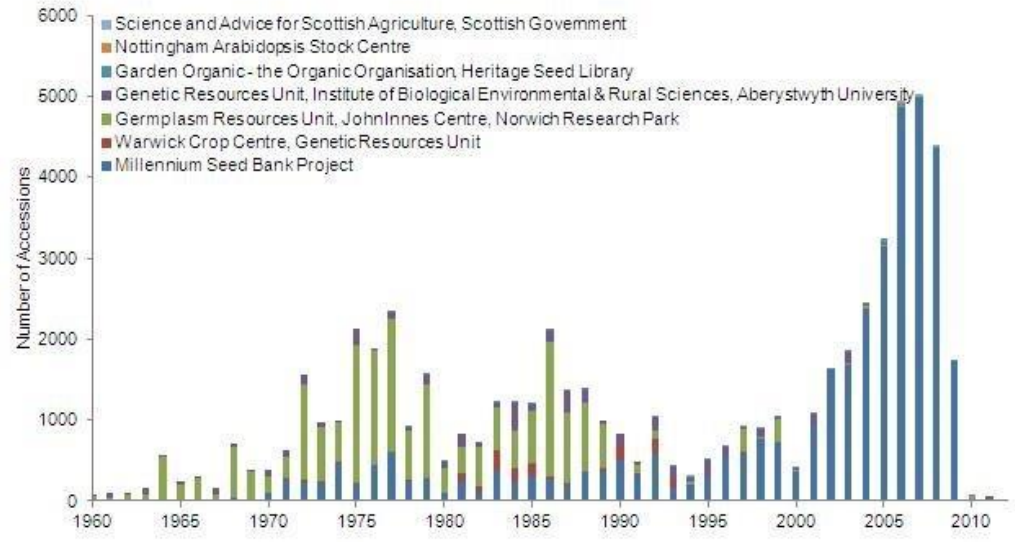

Figure 13.1 Number of flowering plant accessions added per year at UK holding institutes. (Source: EURISCO via JNCC UK biodiversity indicator C9b)

Aichi Target 13 – Genetic diversity maintained

Fielder *et al.* (in press)[3] produced an inventory of 120 crop wild relatives in Scotland and have identified sites for their *in situ* conservation. Their paper provides a valuable assessment of the status of Crop Wild Relatives (CWR) in Scotland. The (draft) Scottish national inventory of priority CWR contains 102 species and 18 subspecies, approximately 10% of the 1259 CWR taxa present in Scotland. *Ex situ* accessions for only 11 of the priority CWR are available. Of the 40 accessions for Scottish priority CWR stored in gene banks, 23 are stored at the Genetic Resources Unit, IBERS at Aberystwyth University and the remaining 17 are stored at the Millennium Seed Bank, Kew.

The Scottish study found that approximately one third of priority CWR occurrence records are located within nature conservation sites. It was noted that although the Millennium Seed Bank, Kew aims to collect and store accessions for all native plants in the UK, the collection does not necessarily address populations across the UK. As a result accessions might be available for a species occurring in Scotland, but collected from another part of the UK. The report concludes that "conservation of priority CWR in Scotland is incomplete" and that accessions should be collected from all (120) priority CWR from Scotland.

Landraces are crops that have been traditionally grown without formal improvement and can have genetic, heritage and socioeconomic value. Science and Advice for Scottish Agriculture (SASA) holds collections of seven Scottish landraces,[4] most of which are from the North and Western Islands. The Scottish Landrace Protection Scheme has been set up to help identify and protect additional landraces as part of Scottish Government's commitment to conserve plant genetic resources.

Domesticated Mammals

The Rare Breeds Survival Trust compiles an annual watch list of native breeds, based on the numbers of breeding females in the UK. Data are derived from over 130 breed societies[5] as shown in table 13.2

Table 13.2 Status of native domesticated mammals considered to be at risk 2015 – total numbers in each category for the UK and named breeds from Scotland

Category	Equine		Cattle		Sheep		Goats		Pigs	
	Scotland	UK	Scotland	UK	Scotland	UK	Scotland	UK	Scotland	UK
Critical	Eriskay	5	-	4	-	0	-	0	-	0
Endangered	-	2	Native Aberdeen Angus	2	-	1	-	1	-	0
Vulnerable	Clydesdale	1	-	2	Castlemilk moorit North Ronaldsay	7	-	0	-	6
At risk	Highland	3	Shetland	3	Soay	10	-	0	-	4
Minority	-	1	-	3	-	7	-	1	-	1

Aichi Target 13 – Genetic diversity maintained

Other Scottish breeds are not of concern. SRDP has an option to encourage the farming of traditional or native cattle breeds on small units.[6] The UK Indicator[7] tracks numbers of critically endangered species from 2000.

Wild Deer

Two native species of deer occur in Scotland – red and roe – and two non-native wild species – sika and fallow.[8] Along with muntjac deer, another non-native species present in the UK, their distribution is mapped as one of the *Wild Deer a National Approach* indicators.[9] Past management practices of introducing non-native deer to improve shooting 'trophy' size has called into question the genetic make-up of Scotland's deer; however studies have shown this has had a limited impact especially in the Highlands.[10] Hybridization studies between the non-native sika and red deer have shown this not to be common.[11]

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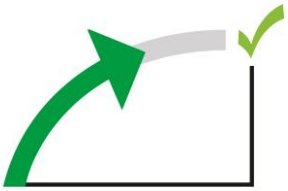
AICHI TARGET 16 – NAGOYA PROTOCOL IN FORCE & OPERATIONAL



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.

The UK signed the Nagoya Protocol in 2011. Following public consultation in 2014 the Nagoya Protocol (User Compliance) Regulations 2015 were laid in the UK Parliament on 23 March 2015. Guidance on compliance and provision of an Access and Benefit-sharing (ABS) information platform provides a key tool for facilitating the implementation of the Nagoya Protocol.

We are on track to achieve this target

The Nagoya Protocol

The Nagoya protocol aims to promote the conservation and sustainable use of biodiversity by ensuring that any benefits derived from genetic research are fairly shared with the owners of those genetic resources.

The UK signed the protocol in June 2011 and it is now part of UK law under The Nagoya Protocol (Compliance) Regulations 2015[1]. This legislation applies, in the main, to a number of sectors including; food and beverage, pharmaceutical, cosmetic and personal care, animal breeding, plant breeding, biotechnology, bio-control and academia.

In order to support businesses and others working in these sectors the UK government undertook a consultation[2] on implementation of the Nagoya Protocol and has now developed guidance for stakeholders.[3]

Sharing best practice

There are a number of platforms that support best practice, provide guidance[4] and provide legal clarity[5] for users including Access and Benefit-sharing Clearing-house (ABSCH) developed by the Convention on Biological Diversity.

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[1] http://www.legislation.gov.uk/uksi/2015/821/pdfs/uksi_20150821_en.pdf?

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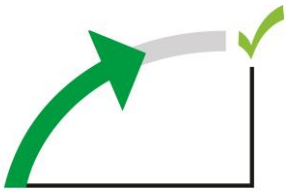
AICHI TARGET 17 – NATIONAL BIODIVERSITY STRATEGY & ACTION PLAN

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



The *Scottish Biodiversity Strategy; 2020 Challenge for Scotland's Biodiversity* was approved by the Scottish Cabinet and published in 2013. This document sets the strategic direction for biodiversity action in Scotland. The Route Map to 2020, published in 2015, provides a clear focus for activity which will significantly contribute to the Scottish Biodiversity Strategy. Both documents represent the policy instruments for biodiversity in Scotland.

We are on track to achieve the target

Scottish Biodiversity Strategy

Following the publication by the Convention on Biological Diversity of the Strategic Plan for Biodiversity 2011-2020[6] the Scottish Biodiversity Strategy It's in Your Hands[7] (2004) was revised. In 2013 the Scottish Biodiversity Strategy; 2020 Challenge for Scotland's Biodiversity[8] was approved by the Scottish Cabinet and work began on developing a Route Map to 2020 which set out the large scale collaborative action required to significantly contribute to the strategy. This was published in 2015, with the first report on progress produced in 2016[9].

The Nature Conservation (Scotland) Act[10] 2004 requires the government to report on progress[11] with the biodiversity strategy every three years. Progress report are laid before Parliament, the next is due in January 2017.

UK biodiversity framework

In the UK the devolved administrations produce country level biodiversity strategies each linked to the CBD Aichi targets. To ensure reporting at UK level and identify the activities needed to galvanise and complement country strategies, in pursuit of the Aichi targets, a UK Biodiversity Framework[12] is in place. This provides a common purpose and there are also many activities, including reporting to CBD and indicator development which benefit from a joined-up UK approach.

[6] https://www.cbd.int/sp/
[7] http://www.gov.scot/Resource/Doc/25954/0014583.pdf
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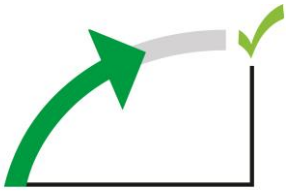
[12] http://jncc.defra.gov.uk/pdf/UK_Post2010_Bio-Fwork.pdf

AICHI TARGET 19 – KNOWLEDGE, IMPROVED SHARED AND APPLIED

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.



Sharing and using biodiversity knowledge is a key aspect to identifying problems and solutions, priorities for conservation, and action we need to take.[1] The Atlas for Living Scotland, Scotland's Environment Web, and the Marine Scotland data publishing portal contribute to the sharing and application of knowledge in Scotland. More work is required to address data recording, analysis gaps and improved information on ecosystem function to help set Scotland's biodiversity priorities.

We are on track to achieve this target.

Sharing and application of Scotland's biodiversity knowledge

Much of Scotland's biodiversity information can be accessed and shared through: the UK's National Biodiversity Network Gateway (which holds many species but only some habitat records);[2] the Marine Scotland data publishing portal[3] and the National Marine Plan interactive (NMPi) portal;[4] and Scotland's Environment Web[5] (SEWeb), and biodiversity portal Atlas of Living Scotland[6]. SEWeb is the gateway to Scotland's environment information and data, including Scotland's EUNIS habitat map.[7] Scottish Government established a Co-ordinated Agenda for Marine, Environment and Rural Affairs Science (CAMERAS 2011-2016); its scope includes "monitoring and surveillance, knowledge exchange and the more effective use of existing data and information".[8] In 2009 the 2007 EU INSPIRE Directive was transposed into Scottish law by the formation of the INSPIRE (Scotland) Regulations, to ensure that spatial data are shared to the benefit of society and environmental policy.[9]

Species and habitat data are collected by: our national schemes and societies (NSS), charities, and local records centres;[10] statutory agencies such as SNH and SEPA; Scotland's National Parks and local authorities; industry and developers; academic/research[11] institutions (with general knowledge exchange – not specifically biodiversity – from university research showing a long term increase);[12] and, by the general public through citizen science initiatives,[13] such as OPAL, Wildlife Counts, iSpot and iRecord.

Baseline information, trends and indicators are generated where data allow; work is carried out on a Scotland scale, for example, Scotland's National Performance Indicators,[14] Scotland's Marine Atlas,[15] and Scottish Natural Heritage's Trends and Indicators[16]. On a UK scale, for example, the UK Biodiversity Indicators[17] and the Biological Records Centre work programme including development of data analytical

tools and new technologies.[18] Data, knowledge, and trends are used to inform policy and underpin advice; such as that used for protecting, restoring and securing freshwater pearl mussel populations on SACs[19] and the use of biodiversity data in spatial targeting of SRDP measures.[20] Ongoing or repeat surveys and research by our National schemes and societies including the UK's National Plant Monitoring Scheme,[21] are required to ensure we can determine habitats' and species' status and trends, and also improve our understanding of vital ecosystem functioning, and values.[22] The value we place on biodiversity forms part of our Natural Capital Asset Index; data on the area and quality of broad habitats are used to help assess the sustainability of Scotland's economic growth.[23]

Habitats Information

Habitat surveys (conducted by observers or remotely) usually provide these data in a range of classification systems including; NVC, Phase 1, Eunis/Annex 1/Priority Marine Feature, Marine Nature Conservation Review Biotopes. There are several large databases containing habitat data including: Standing water database, Native Woodland Survey of Scotland, Land cover map of Scotland, National Marine Plan interactive portal. Scotland currently has a level 1 EUNIS land cover map[24] (more work is being undertaken to produce higher level maps[25]), and there is a UK marine EUNIS map.[26] We have good habitat data on protected sites and features but more needs to be collected in the wider countryside and marine environment; the gaps include lowland, grassland, lowland wetland, large areas of upland, and in deep sea and offshore areas. Information on habitat trends and the rate of habitat loss is currently limited, but required for our statutory EU Habitats Directives reporting and for Aichi Target 5 reporting.

Species information

To date (September 2015) the NBN holds 12.3M records from Scotland, with 9.7M of these being publically available (Figure 19.). This increasing trend is set to continue and is mirrored in the UK indicator (2004-2014),[27] and also in a Scotland indicator (2000 – 2007).[28] There are geographic and taxonomic gaps[29] in species records; remote and also offshore areas are often under-recorded. Although there is a coordinated plan of survey activity through the Scottish MPA Project Partners, there is not a coordinated approach to improving coverage in the terrestrial environment. More work is required to enable organisations to mobilise their data; for example, INSPIRE compliance and mobilisation has been applied in the UK through MEDIN[30] with data being collated by accredited Data Archive Centres, however more work is required to ensure better

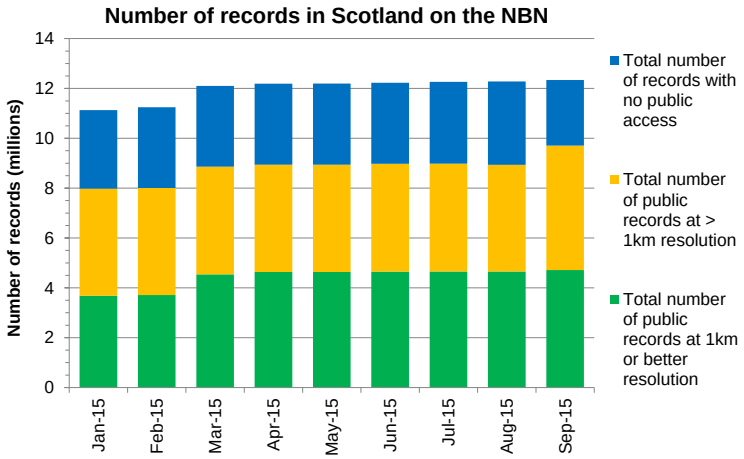


Figure 19. The number of Scottish records on the NBN (Source NBN Trust September 2015)

flow of data from all marine sectors. Work by NBN to secure data from the private sector[31] is ongoing.

Collecting data

There are many programmes to generate biodiversity information, for example: citizen science projects[16, 32] including National Schemes and Societies and local recording organisations training; statutory monitoring programmes and projects, e.g. site condition monitoring[33] and the Marine Protected Areas Project;[34] fisheries management; and national partnership projects such as the Habitat Map of Scotland.[24] The increase in citizen science, combined with the recent increase of novel technologies (including eDNA, smartphone apps, earth observation, and camera traps), better data management and relevant analyses has all contributed to improved biodiversity knowledge access and exchange.. [35, 36] However, engagement with, and support of, our volunteers and communities, better communication and coordination between different commissioners and users of information, and adequate funding for organisations involved in the collection, collation, management and analyses of biological records, are key to ensuring we continue to produce high quality biodiversity information.

Scottish Biodiversity Strategy

Work identified in the *Scottish Biodiversity Strategy – a Route Map to 2020* which will contribute to the delivery of this Aichi target in Scotland is identified in the box below.

Priority Project	Relevance	Status
PP1 – Restoration of peatlands	Providing habitat information in uplands	Ongoing
PP9 – Conservation of priority species	Providing priority species information	Ongoing
PP11 – Sustainable land management	Providing information for targeted action	Ongoing

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AICHI TARGET 20 – FINANCIAL RESOURCES FROM ALL SOURCES INCREASED

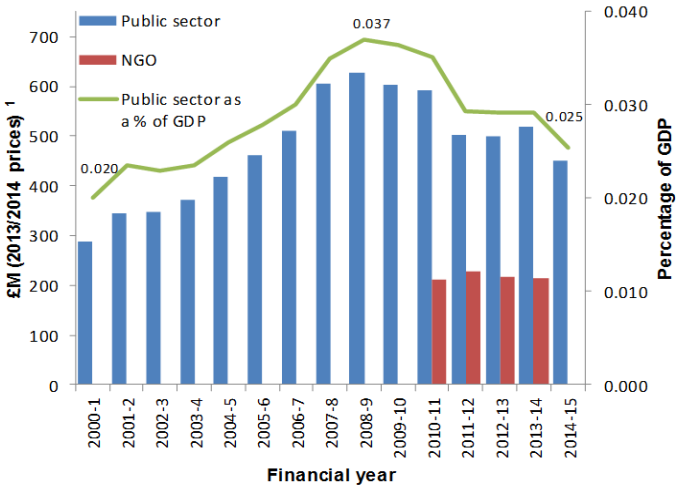
By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

The UK indicator shows a long term increase in financial resources for biodiversity, but a recent decline. This decline is mirrored in total funding figures from Scottish organisations that have some biodiversity remit. We have progressed to target but fallen back in recent years. Work is required to produce a Scotland indicator.

We are progressing towards target but at an insufficient rate.

The UK indicator[1] (Figure 20.1) shows £452M of UK public sector funding being spent on UK biodiversity in 2014/15 with a long term increase of 57% in real terms (2000/01–2014/15). However, between 2009/10 and 2014/15 there was a short term decline in spending of 26%. Public sector spending as a percentage of GDP has fluctuated with the actual expenditure but remained relatively stable at approximately 0.03% for the last four years, although there is some evidence of a recent slight dip. In the most recent year of the time series (2013/14), NGOs spent £215M on biodiversity or nature focus work. Due to insufficient data it is not possible to report on these; more data should enable assessment in the future.

Figure 20.1 Expenditure on biodiversity in the UK, 2000-01 to 2014-15 (Source Defra, Her Majesty's Treasury[1])



Notes:
1. Deflated using UK Gross Domestic Product Deflator. 2. Non-governmental spend is net of government funding. 3. Small revisions to past data series as a result of improved estimation methodology can mean the indicator does not show exactly the same pattern between years.
Source: Defra, Her Majesty's Treasury.

An EU Indicator (1995-2006),[2] which reports only on LIFE projects provides some indication that although LIFE expenditure as a proportion of total EU expenditure has fluctuated in the past, it is stabilising and was set to increase. Between 2000-06 the UK received the highest average contribution of LIFE Nature funding across all EU countries, at £2.2M across 18 projects. Figure 20.1 includes spending provided solely for the protection and promotion of biodiversity,

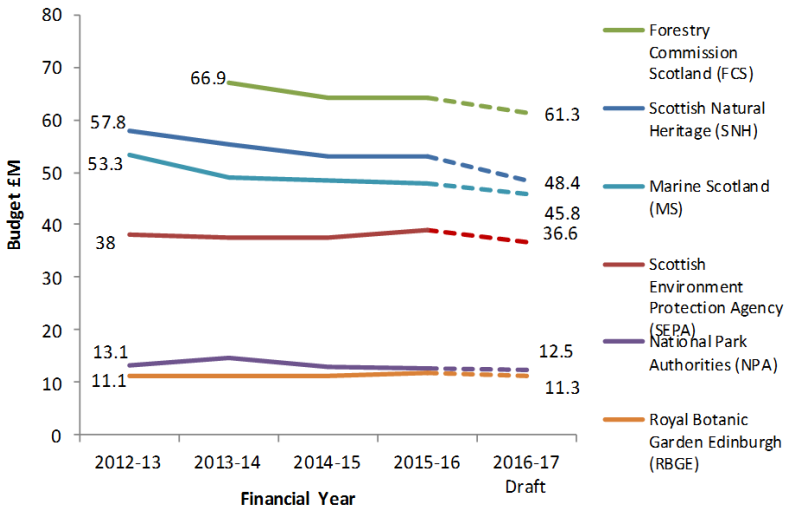
generally excluding operational costs. Further work is required on: standardization of biodiversity expenditure definitions; and, comprehensive collation and separation of public and non-public body information.

Mobilisation of financial resources in Scotland

The Scottish Rural Development Programme[3] (SRDP) focuses biodiversity activity through Pillar 2 of the EU Common Agricultural Policy (CAP). It is one of the main sources of biodiversity funding in Scotland. To April 2014 *c*. £434m has been committed: on the principal regional priorities that address biodiversity (regional priorities 8,9,10,11)[4] (*c.* £216M); and for forestry (all biodiversity woodland and forestry) options (*c*. £218M).[5] Between 1992 and 2013 the area of Scotland under higher-level agri-environment schemes (Environment Sensitive Areas, Countryside Premium, Rural Stewardship, Rural Priorities) has increased from 0.12 to 1.16 million hectares reflecting an increase in spend over this time.[6] From 2010 to 2012 there was evidence of an increasing trend in the area of land under positive management in Scotland (including tenure, management agreements, nature conservation and planning policies), with 5,181Mha (66%) of Scotland under positive management by 2012. In the same period, the area at sea remained static; with the recent inclusion of the marine protected areas, this Scottish trend is due to increase.

Figure 20.2 has information on Scottish Government (SG) budgets for six organisations that have some biodiversity element to their work. However, not all of the functions of these organisations are related to biodiversity. Figure 20.2 shows that over the last five years (2012-13 to 2016-17) SG funding (including this year's draft funding) for SNH[7] (SG's nature conservation agency) and Marine Scotland[8] (SG's body responsible for the integrated management of Scotland's seas) will have declined by 16% and 14% respectively. For RBGE[9] (funding for "maintaining its National Collections and its contributions to environmental and biodiversity change, sustainable agro-forestry, and improving rural

Figure 20.2 Scottish Government actual (solid line) and draft funding (dashed line) for the last five years for organisations with a biodiversity remit.



Notes:
1. From Chapter sections on "Research Analysis and Other Services", "Marine and Fisheries", "Environmental and Rural Services", and "Forestry Commission ". 2. Not all of the functions of these organisations are related to biodiversity.
Source: Extracted from Scottish Government's Scottish Draft Budgets 2013-14, 2014-15, 2015-16[1] and 2016-17**Error! Bookmark not defined.**).

livelihoods in very poor areas of the world"), SEPA[10] (SG's principal environment regulator), and NPA[11] funding will have remained quite stable, with no 5-year change that will exceed 5%. For FCS, only data for 2013-14 is available, with a decline of 8% from 2013-14 to 2016/17.

The Scottish Government's RACCE Committee noted concerns about the trend of budget cuts to SNH and the NPs, and also that research institutions have to raise non-Government funding to "sustain their standards of excellence".[12] Since 2004 all public sector bodies in Scotland have a duty to further the conservation of biodiversity, and since 2012 are required to report on their compliance with this duty; so, in time, could potentially contribute to biodiversity projects and thus to a Scotland indicator through their reporting.

Other funding sources

Biodiversity Scotland show that current substantial funding for biodiversity action and research projects was delivered through the Scottish Government's Rural Affairs, Food and the Environment (RAFE) Strategic Research, the Heritage Lottery Fund, Scottish Rural Development Programme, EU's LIFE Nature and Biodiversity, SNH Grants, and the Central Scotland Green Network Development Fund. SNH have also collated a list of more than forty possible funders for Natural Heritage Projects[13]. Substantial additional funding for biodiversity through NGOs contributes both to action delivery and research. There is scope for greater contributions from business.

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Annex 1

Big steps for nature	Route Map Target	Priority projects – on-going	Aichi targets
Ecosystem Restoration	T1 Ambitious peatland restoration programme underway, contributing to the EU 15% degraded ecosystem restoration target.	Priority Project 1 - Restoration of peatlands • Peatland Action - store and sequestrate carbon through peatland management covering 5,100 ha. • Flow Country Peatland Restoration - setting an international benchmark for good practice.	1 – Awareness Increased 5 - Habitat loss halved and reduced 12 – Extinction prevented 14 – Ecosystems and services safeguarded 15 – Ecosystem restored and resilience enhanced 19 – Knowledge improved, shared and applied
	T2 Increase the amount of native woodland in good condition (upwards of 46% as identified in the *Native Woodland Survey of Scotland*). T3 3,000 – 5,000 ha of new native woodland creation per year. T4 Restore approximately 10,000 ha of native woodland into satisfactory condition in partnership with private woodland owners through	Priority Project 2 - Restoration of native woodlands • Provision of grants, information, events and training for woodland management , expansion and creation • Conservation management of the National Forest Estate • Develop deer Management plans with public interest targets to contribute to overall aim of woodland restoration.	1 – Awareness Increased 5 - Habitat loss halved and reduced 7 – Sustainable agriculture, aquaculture and forestry 12 – Extinction prevented 14 – Ecosystems and services safeguarded 15 – Ecosystem restored and resilience enhanced 19 – Knowledge

	deer management plans.		improved, shared and applied
	T5 Achieve agree ecological water quality objectives under the WFD of river and lake water bodies and to contribute to meeting conservation objectives (including Natura 2000 sites) through scoping improvements to physical modifications.	Priority Project 3 - Restoration of fresh waters • Development and Implementation of two River Basin Management Plans for the 2nd cycle (2015-2021) – delivering Water Framework Directive objectives and associated biodiversity benefits. • Physical restoration of rivers in priority catchments as part of the Pearls in Peril Life Project will deliver substantial biodiversity benefits and restore river function.	1 – Awareness Increased 5 - Habitat loss halved and reduced 8 - Pollution reduced 9 – Invasives prevented and controlled 12 – Extinction prevented 14 – Ecosystems and services safeguarded 15 – Ecosystem restored and resilience enhanced 19 – Knowledge improved, shared and applied

Big steps for nature	Route Map Target	Priority projects – on-going	Aichi targets
Investment in Natural Capital	T6 Businesses are more aware of their reliance on Scotland's natural capital and more investment is being made in building natural capital.	Priority Project 4 - Investment in natural capital • Promoting the Woodland Carbon Code to attract investment in woodland creation. • Developing the Peatland Code as a framework for investing in peatland restoration. • Developing the Natural Capital Asset Index and associated economic metrics as means of assessing Scotland's natural capital and maintaining the sustainability of the Scottish economy.	2 – Biodiversity values integrated 3 – incentives reformed 4 - Sustainable consumption and production 6 – Sustainable marine management 7 - Sustainable agriculture, aquaculture and forestry
Quality greenspace for health and education benefits	T7 Increase regular visits and active travel in greenspace through improved infrastructure, information and campaigns and the provision of activities and events.	Priority Project 5 - More people experiencing and enjoying nature • Support the better provision & quality of greenspace through developing planning and place-making. • Delivering national and local participation campaigns, events and activities and outreach work targeted at under-represented groups. • Developing opportunities for public engagement in volunteering & citizen science	1 - Awareness Increased 9 – Invasives prevented and controlled 14 - Ecosystems and services safeguarded

		through Scotland Counts and SEWeb.	
	T8 100 schools in the 20% most disadvantaged areas across Scotland have access to quality greenspace for outdoor learning.	Priority Project 6 - Taking learning outdoors • Provide outdoor learning opportunities in National, Regional and Local Parks, Nature Reserves and the national Forest Estate. • Support teachers through Teaching in Nature, Forest Schools and similar programmes to ensure they are able to deliver outdoor learning to children and young people. • Develop and improve greenspace provision and opportunities for outdoor learning close to schools in the most disadvantaged communities in Scotland.	14 - Ecosystems and services safeguarded
	T9 Improve greenspace quality and use on at least one hospital or health facility in each NHS board on mainland Scotland.	Priority project 7 - Developing Scotland's *Natural* health service • Developing and promoting a green exercise tool-kit for use by the health and environment sectors. • Delivering a NHS Greenspace Demonstration Project; providing quality greenspace for use by patients, visitors and staff for treatment, recovery, recreation and relaxation.	14 - Ecosystems and services safeguarded

Big steps for nature	Route Map Target	Priority projects – on-going	Aichi targets
Conserving wildlife in Scotland	T10 At least 80% of designated 'features' in favourable condition by 2016.	Priority Project 8 - Protected Areas' in good condition • Focusing action on those sites that are in most need of effective conservation management. • Undertake work to ensure that at least 18% of land and freshwater is under conservation designation.	9 - Invasives prevented and controlled 11 – Protected areas increased and improved 12 – Extinction prevented
	T11 Six high profile projects underway in 2015, with a further suite of species projects to be developed.	Priority Project 9 - Conservation of priority species • Freshwater Pearl Mussel management and reintroductions on 19 Special Areas for Conservation (SAC) in Scotland. • Langholm Moorland Demonstration Project – sustainable management of red grouse, habitat, hen harriers and other wildlife. • Increasing abundance of ground nesting birds through the eradication of North American mink on the Outer Hebrides. • Improve breeding seabird opportunities on Shiant islands through removing black rats and building artificial burrows. • Under PAWS[1] implement action plan	9 - Invasives prevented and controlled 12 – Extinction prevented 19 - Knowledge improved, shared and applied

		for hen harriers involving intelligence sharing, enforcement and awareness raising to combat wildlife crime. • Deliver Saving Scotland's red Squirrel Project through collaborative work with many land owners to safeguard red squirrel population in stronghold ranges.	

Big steps for nature	Route Map Target	Priority projects – on-going	Aichi targets
Sustainable management of land and freshwater	T12 Improve connectivity between habitats and ecosystems.	Priority Project 10 - Improving ecological connection • Habitat management to support connections for eight sites within the Central Scotland Green Network area through Ecological Connectivity Life Project.	9 - Invasives prevented and controlled 15 – Ecosystem restored and resilience enhanced

	T13 Promotion of measures to support biodiversity under CAP. A suite of sites demonstrating good practice aimed at supporting wildlife.	Priority Project 11 – Sustainable land management • Targeted support for sustainable land management practices under Scottish Rural Development Programme (SRDP) Agri-Environment Climate and Forestry Grant Scheme. • Support for biodiversity on arable farms through the ecological focus areas Common Agricultural policy greening requirement and increased protection for hedgerows and watercourses. • The Wildlife Estates Scotland (WES) Initiative – encouraging best practice and demonstrating how game and wildlife management can deliver multiple benefits, including conservation for society and rural communities. • Demonstration Farms - including Leaf Farms and Climate Change Focus farms, plus research and teaching farms run by SRUC and JHI.	7 – Sustainable agriculture, aquaculture and forestry 8 - Pollution reduced 12 – Extinction prevented 19 - Knowledge improved, shared and applied

Marine and Coastal ecosystems restored	14. 10% of Scotland's seas to be incorporated in nature conservation Marine Protected areas.	Priority project 12 - Increase environmental status of our seas • Developing the evidence base through setting and delivering surveillance/ monitoring strategy that will allow authoritative reporting of state and progress. • Completing the suite of MPAs (including the additional NATURA sites) and agreeing and delivering measures for their effective management. • Putting in place Regional Marine Plans that incorporate provision for decision making that promotes ecological coherence between protected areas and safeguards priority marine features.	6 – Sustainable marine management 11 – Protected areas increased and improved 12 – Extinction prevented

Annex 1 - Aichi Goals and Targets

The global vision under the United Nations Convention on Biodiversity is 'Living in Harmony with Nature'. This means that by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.'

To accomplish this we need to 'take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication. To ensure this, pressures on biodiversity are reduced, ecosystems are restored, biological resources are sustainably used and benefits arising out of utilization of genetic resources are shared in a fair and equitable manner; adequate financial resources are provided, capacities are enhanced, biodiversity issues and values mainstreamed, appropriate policies are effectively implemented, and decision-making is based on sound science and the precautionary approach.'

This is expressed through 20 Aichi Biodiversity Targets under five strategic goals. The goals and targets comprise both aspirations for achievement at the global level, and a flexible framework for the establishment of national or regional targets.[13]

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

Target 1

By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Target 2

By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Target 3

By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

Target 4

By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

[13] Convention on Biological Diversity, Aichi Biodiversity Targets https://www.cbd.int/sp/targets/

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

Target 5

By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Target 6

By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Target 7

By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Target 8

By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Target 9

By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Target 10

By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

Target 11

By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

Target 12

By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Target 13

By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-

economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services

Target 14

By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Target 15

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Target 16

By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building

Target 17

By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Target 18

By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

Target 19

By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

Target 20

By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current

levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

Annex 2 - Method

1. The Convention for Biological Diversity (CBD) quick guides[14] were used to scope the assessments, with reference to the technical documentation,[15] Scotland's National Targets,[16] and the Global Biodiversity Outlook 4 (GBO4).[17]
2. The guiding questions from the quick guides were sent to relevant specialists, mostly within SNH but with some externals included (Annex 5), for 18 of the 20 Aichi Targets. Two of the Targets (16 and 17) were not included in this as they are narrative based.
3. The proposed Aichi Target document development and other technical information required for reporting against Aichi Targets were submitted to the SNH Scientific Advisory Committee on 24th September 2015.
4. The two-page summaries were compiled for each of the targets using information from the specialists' answers to the CBD guiding questions, published studies, relevant indicators, the Scottish Biodiversity Strategy Big Steps for Nature and Priority Projects,[18] and information gleaned from external sources.
5. Eleven draft assessments were sent to Scottish Biodiversity Strategy Science Support Group (SBSSSG)[19] members for quality assurance in May 2016 (Annex 4), who were asked to provide:

- comment on the content including any major oversights
- Clarity of text
- Does the information provide understanding of the status of progress towards the target?

6. QA comments were received back by 15 June on nine of the eleven sent out.
7. Comments were incorporated for seven of these targets by 27 June.
8. A draft report was submitted to Scottish Government on 1st July for comment.
9. On 15th September the Scottish Natural Heritage Scientific Advisory Committee was asked to comment on development of Aichi accounts to date, provide specific guidance on Aichi accounts 3, 8 and 20 and comment on quality assurance process.
10. Assessment scores of progress towards the Aichi Target were set by SNH, post-QA.
11. Progress and timescales towards development of a full suite of Aichi accounts was agreed with Scottish Government and is presented in Annex 5.

[14] https://www.cbd.int/nbsap/training/quick-guides/
[15] https://www.cbd.int/sp/targets/rationale/default.shtml
[16] https://www.cbd.int/nbsap/targets/default.shtml
[17] https://www.cbd.int/gbo4/
[18] http://www.gov.scot/Publications/2015/06/8630/4
[19] http://www.biodiversityscotland.gov.uk/doing/scottish-biodiversity-governance/science-and-technical-group/

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Annex 5 Progress towards developing the full account

Target	SBSSSG QA	Publishing schedule		
	Comments received	2016	2017	2018
A1 Awareness increased			✓	✓
A2 Biodiversity values integrated	Yes	✓		✓
A3 Incentives reformed	Yes	✓		✓
A4 Sustainable consumption & production	Yes	✓		✓
B5 Habitat loss halved or reduced	Yes	✓		✓
B6 Sustainable management – marine			✓	✓
B7 Sustainable agriculture, aquaculture & forestry			✓	✓
B8 Pollution reduced	Yes	✓		✓
B9 Invasives prevented and controlled	Yes	✓		✓
B10 Pressures on vulnerable ecosystems reduced			✓	✓
C11 Protected areas increased and improved	Yes	✓		✓
C12 Extinction prevented	Yes	✓		✓
C13 Genetic diversity maintained	Yes	✓		✓
D14 Ecosystems & services safeguarded			✓	✓
D15 Ecosystems restored & resilience enhanced			✓	✓
D16 Nagoya protocol in force & operational	No	✓		✓
E17 NBS & AP adapted as policy instruments	No	✓		✓
E18 Traditional knowledge respected			✓	✓
E19 Knowledge improved, share and applied	Yes	✓		✓
E20 Financial resources increased	Yes	✓		✓