

Ecosystems and wildlife

Past drivers

Changes in biodiversity associated with land management and atmospheric pollution.
Climate change has impacted habitats.
Key role for agriculture & forestry in shaping landscapes and ecosystems.
Changes in species associated with invasive species and land use patterns.
Legislation and River Basin Management Plans have improved water quality.

Future drivers

Effects of climate change and how we adapt.
New agriculture and environment support measures post-Brexit.
Agriculture will be influenced by future global food consumption.
Land-use planning will be a vehicle for driving change.
Changes in public attitudes and behaviour (e.g. use of plastics).

Where are we now?

- Condition of Scotland's ecosystems is varied, with the water environment in a good or moderate state and has been either stable or improving in recent years.
- Land components tend to be in poorer condition, with some in decline and concern around farmland biodiversity. Overall, Scotland's Natural Capital Asset Index has remained broadly static since 2000.
- By March 2018, 79.7% of natural features on protected nature sites were assessed as being in favourable condition, up 8.3 pp from 2005.
- Abundance of terrestrial breeding birds, a proxy for biodiversity, experienced a long-term increase between 1994 to 2008, but has since fallen back and is now 17% lower than the 2008 peak and 3% lower than the 2006 baseline.

Key evidence gaps

There is a lack of data on the current state or trend on estuaries.
Little is known of the condition of the wider environment (beyond designated sites) and about striking the balance between supporting designated sites and the wider environment to enhance biodiversity.
Limited evidence on the cost effectiveness of agri-env options due to weak baseline data and the impact of spatial targeting.
The key priority sites for conservation and ecosystem health enhancement.
Understanding the loss of abundance of certain species (e.g. insects) and how connectivity influences biodiversity of different habitats.
How climate change will impact nature in the future.

Where do we want to be?

- Our biodiversity is protected and enhanced, supporting healthy ecosystems.¹
- Protect and restore biodiversity on land and in our seas, and to support healthier ecosystems.²

Current initiatives and their impact

Agri-environment: strong scientific underpinning of the options but scope to increase efficacy of options through better targeting and habitat connectivity.
CAP Greening: all Ecological Focus Area (EFA) measures have potential to result in positive outcomes, particularly if maintained in same location over time. However, EFA measures deliver less benefit than through more specific and targeted measures.
Central Scotland Green Network: no evaluation on the impact on biodiversity & habitats.
Protected Nature Sites: general agreement they have played an important role in nature conservation.
Forestry Grant Scheme: strong scientific underpinning .
Peatlands: a major on-going programme of peatland restoration with initial evaluations showing positive biodiversity benefits.
River Basin Management Plans: recognised by the EC as leading the way in our approach.

¹ Draft outcome, Developing an Environment Strategy for Scotland: Discussion Paper

² 2020 Challenge for Scotland's Biodiversity

Draft Knowledge Account – Ecosystems and wildlife

A Introduction

1. The resilience of ecosystems depends on a range of interactions and responses to environmental pressures, such as climate change, damage to soils or pollution. The nature of many of these responses to pressure may be complex, as in the case of tipping points where pressure on an ecosystem may lead to gradual change up to a threshold beyond which there is a sudden, perhaps irreversible, change.
2. Whilst ecosystems and biodiversity are important in their own right, all the food we eat and the resources we use ultimately come from nature and so ecosystem health is relevant to all of us. Due to the sensitivity of certain species and habitats, some indicators change quite quickly such as condition of freshwater, whereas others such as soil carbon are much slower to change.
3. Measuring the change in ecosystems is difficult and while the overall picture of a particular indicator at the Scotland level may be positive, this does not necessarily mean there are not specific areas which require attention. Work is underway to develop a set of ecosystem health indicators for Scotland which will provide a comprehensive assessment. While this knowledge account focuses on the terrestrial environment, there are clear linkages with the health of our marine environment.

B Recent trends

4. Overall, the state of Scotland's ecosystems is varied, with the water environment in a good or moderate state and has been either stable or improving in recent years. However, land components tend to be in poorer condition with some in decline and particular concern around farmland biodiversity and uplands.
5. 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. Although Scotland's Natural Capital Asset Index is currently static overall, the natural capital in woodland, freshwater, coast, and urban greenspace broad habitats increased between 2000 and 2010, and declined in moorland, grassland, and cropland.ⁱ
6. Around 18% of our land and 20% of our seas are covered by Protected Nature sites. By March 2018, 79.7% of natural features on protected sites were assessed as being in favourable condition, an increase of 8.3 percentage points from 71.4% in 2005.ⁱⁱ
7. Abundance of terrestrial breeding birds, a proxy for biodiversity, has experienced a long-term increase between 1994 to 2008, but has since fallen back and is now 17% lower than the 2008 peak and 3% lower than the 2006 baseline.ⁱⁱⁱ

C Past drivers of change

8. Changes in biodiversity are often associated with land management and atmospheric pollution, although the effects of climate change are also becoming evident (e.g. shifts in butterfly populations and some arctic-alpine species).^{iv} 'Scotland's Biodiversity – A Route Map to 2020'^{iv}

identifies seven key pressures on biodiversity in Scotland: pollution; land use intensification and modification; spread of invasive species and wildlife disease; lack of recognition of the value of nature; disconnection with nature; climate change; and marine exploitation.

9. The role of agriculture and forestry in shaping landscapes and terrestrial ecosystems is important as they affect a large proportion of Scotland's land area (c.70% and c.18% respectively^v). In particular, agriculture has had a major influence on Scotland's ecosystems over the past 70 years which, in part, has been influenced by changes in global food consumption, the post-World War II drive for increased food production and innovations in farm technology.
10. Red deer densities in Scotland have increased by 60% since 1961, with evidence that grazing by deer and other herbivores is a major cause of unfavourable condition of natural features in protected areas.^{vi}
11. Pollinators, which are a vital part of our biodiversity and wider environment, have declined in their abundance or distribution.^{vii}
12. Changes in species in Scotland are often associated with invasive non-native species and land use patterns. The abundance of birds may be affected by many factors such as the weather, changes to habitats and changes in the abundance of food sources. Raptor persecution is the most high profile type of wildlife crime in Scotland and it can have serious impacts on the populations of some bird of prey species at local, regional or national level.
13. The latest assessment of the condition of Scotland's protected sites identified negative pressures on natural features on protected sites from invasive species, over-grazing, water management and recreation/disturbance.^{viii}
14. Diffuse pollution from agriculture is recognised as a key pressure on water quality, with 252 rivers and lochs in Scotland affected by diffuse pollution pressures. Wetlands on lower ground, although small, are important biodiversity components of the farmed landscape and are at risk from diffuse pollution.
15. For forestry, the UK Government's tax support for forest planting (in place until 1989) provided incentives which encouraged planting on land that was marginal for forestry, resulting in environmental damage and conflict.
16. The size of fish stocks are affected by several factors, including commercial fishing and other factors such as climate change and success of recruitment (the number of young fish entering the adult population each year).

D Future drivers

17. Biodiversity is threatened by a wide range of factors: development, climate change, habitat destruction, pollution, changing land management, over-grazing, and invasive species (both native and non-native) and novel pests and diseases.

18. In terms of climate change, a key future driver will be how we adapt to a changing climate as this will have an impact on ecosystems and wildlife.
19. Changes in public attitudes and behaviour could be a major driver, such as a shift away from the use of plastics. Furthermore, land-use planning will continue to be a vehicle for driving change.

E Current initiatives and their impact

20. Agri-environment Climate Scheme: as part of the EU Common Agricultural Policy (CAP) Pillar 2, this scheme promotes land management practices which protect and enhance Scotland's natural heritage, improve water quality, manage flood risk and mitigate and adapt to climate change. Overall, there is strong scientific underpinning of the agri-environment options but scope to increase efficacy of options through better targeting and habitat connectivity. However, weak baseline data makes it difficult to assess the overall impact of the scheme.
21. CAP Greening: This is a mandatory component of the EU CAP Pillar 1 Direct Payments Scheme which supports agricultural practices which are beneficial for the climate and the environment. A review found that all Ecological Focus Area (EFA) measures within Greening have the potential to result in positive outcomes, particularly if maintained in the same location over time. However, EFA measures deliver less benefit than through more specific and targeted measures.^{ix} Evaluations by the EC^x and the European Court of Auditors^{xi} concluded that the scheme has only had a limited and variable impact on farm management practices and unlikely to significantly enhance the CAP's environmental and climate performance.
22. Central Scotland Green Network (CSGN): is one of Europe's biggest greenspace projects, covering over 19 local authority areas and 3.5 million people. It supports the restoration of ecosystems through upland and lowland habitat management and woodland creation and management. An evaluation indicated a minimum return on investment of £2.14 for every pound spent on the CSGN, however it did not examine the impact on biodiversity and habitats.^{xii}
23. Protected Areas for nature: there are 1,866 protected areas in Scotland, covering around 18% of our land and 20% of our seas. There is agreement they have played an important role in nature conservation but are not in themselves a sufficient response to the widening and increasing pressures bearing on the natural environment. They have also tended to focus more on rarity and maintaining the status quo than responding to a changing environment and the dynamic character of natural systems.^{xiii}
24. Forestry Grant Scheme: this supports the creation of new woodlands, contributing towards the Scottish Government's target of 10,000 hectares of new woodlands per year and the sustainable management of existing woodlands. There is a strong scientific underpinning of the forestry options.
25. Peatland Action Fund: aims to restore Scottish peatlands whilst also supporting demonstration sites and events to raise standards and encourage innovation for effective peatland restoration. Initial evaluations show positive biodiversity benefits.

26. River Basin Management Plans: The Water Framework Directive (2000) requires Member States to establish a framework for the management of our water resources through the introduction of River Basin Management Plans, a cyclical, detailed planning mechanism for setting environmental objectives for each water body within a river basin district. Scotland's approach to tackling controlled activities and diffuse pollution has been recognised by the European Commission as leading the way in Europe.

ⁱ <https://www.nature.scot/professional-advice/planning-and-development/valuing-our-environment/natural-capital-asset-index>

ⁱⁱ https://www.nature.scot/sites/default/files/2018-05/2018%20Official%20Statistics%20-%20Protected%20sites%20-%20proportion%20in%20favourable%20condition%231_0.pdf

ⁱⁱⁱ <https://www.nature.scot/sites/default/files/2018-02/Official%20Statistics%20-%20Terrestrial%20Breeding%20Birds%20-%20Index%20of%20abundance%201994-2016.pdf>

^{iv} <http://www.gov.scot/Publications/2015/06/8630>

^v Results from the June 2017 Scottish Agricultural Census, Scottish Government,

<http://www.gov.scot/Publications/2017/10/9554/0>

Forestry statistics 2017, Forestry Commission,

[https://www.forestry.gov.uk/pdf/Ch1_Woodland_FS2017.pdf/\\$FILE/Ch1_Woodland_FS2017.pdf](https://www.forestry.gov.uk/pdf/Ch1_Woodland_FS2017.pdf/$FILE/Ch1_Woodland_FS2017.pdf)

^{vi} Deer Management in Scotland, SNH (2016)

<http://www.snh.org.uk/pdfs/publications/corporate/DeerManReview2016.pdf>

^{vii} Pollinator Strategy, Scottish Government, <https://news.gov.scot/resources/pollinator-strategy>

^{viii} https://www.nature.scot/sites/default/files/2018-05/2018%20Official%20Statistics%20-%20Protected%20sites%20-%20proportion%20in%20favourable%20condition%231_0.pdf

^{ix} CAP Greening Review, Scottish Government,

<http://www.gov.scot/Topics/farmingrural/Agriculture/CAP/CAP2015/Greening/CAP-Greening-Review>

^x Evaluation study of the payment for agricultural practices beneficial for the climate and environment, European Commission, 2017, https://ec.europa.eu/agriculture/sites/agriculture/files/fullrep_en.pdf

^{xi} Greening: a more complex income support scheme, not yet environmentally effective, European Court of Auditors, 2017, https://www.eca.europa.eu/Lists/ECADocuments/SR17_21/SR_GREENING_EN.pdf

^{xii} A valuation estimate of six major potential benefits of the CSGN,

<http://www.centralscotlandgreennetwork.org/delivering/costing-valuing-and-resourcing-the-csgn>

^{xiii} "Protected areas for nature – review: Report to Scottish Natural Heritage", 2014

<https://www.nature.scot/sites/default/files/2017-07/A1509577%20-%20Protected%20Areas%20for%20Nature%20Review%20-%20The%20Panel's%20report%20to%20SNH%20-%20July%202014.pdf>