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Scottish Genetic Scorecard

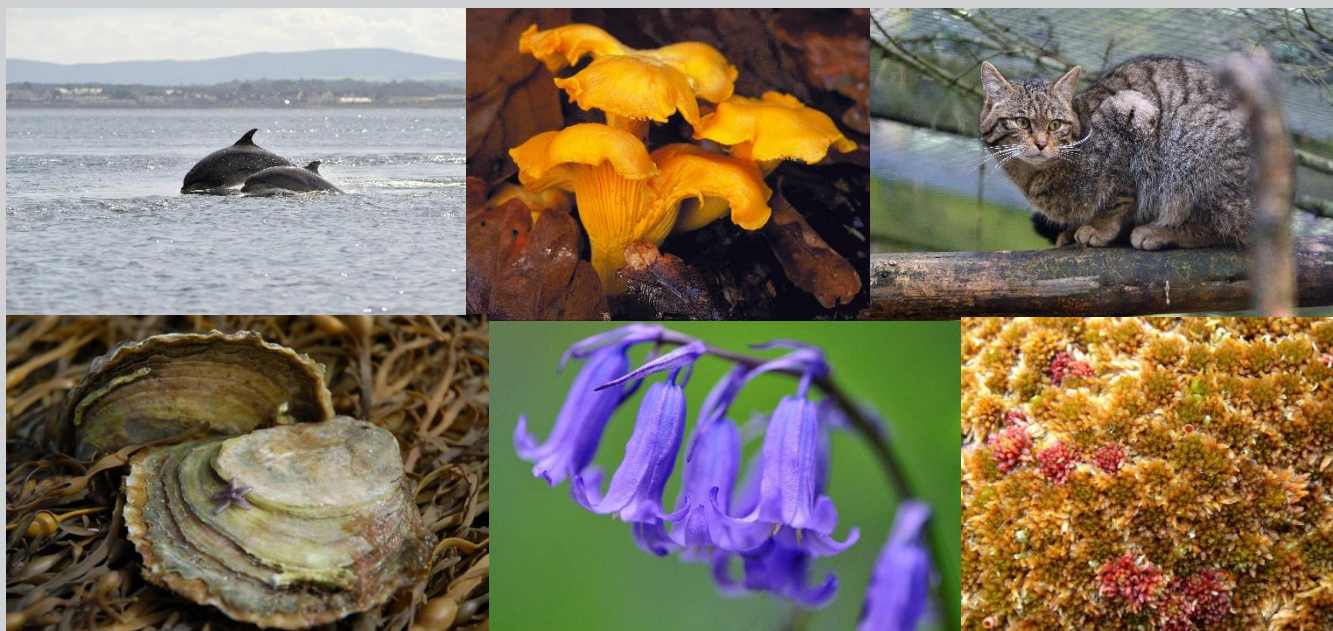


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Executive Summary

Genetic diversity is of fundamental importance for species to survive and thrive and represents a source of useful genes and gene products which can provide direct benefits to society. However, developing internationally applicable, cost-effective, and robust methods for monitoring and conserving genetic diversity has proved challenging. In this project we build on our past work to produce an internationally applicable Genetic Scorecard as a tool for monitoring and conserving genetic diversity.

The importance of genetic diversity

- Loss of genetic diversity can reduce fitness and elevate extinction risks of varieties, populations and species
- Genetic diversity loss also reduces the genetic resources available to enhance species traits for human utilization
- Genetic diversity loss can impede future adaptive responses to environmental change (e.g. to climate change or new pests and pathogens)
- Loss of genetic diversity in key individual species can have impacts on diversity in other species and ecosystem processes

The Genetic Scorecard Method

- Researchers across Scotland and the wider UK have collaborated to produce an efficient method of combining available data and expert opinion to produce a standardized monitoring and reporting tool for genetic diversity
- The methodology includes assessment of risks to genetic diversity, the levels of uncertainty associated with these risks, and the extent to which conservation measures are effective at mitigating the risks

Application of the Genetic Scorecard

- We then harnessed this method to support national reporting for the Genetic Diversity Target of the Global Biodiversity Framework
- A team of 40 experts in genetic diversity, species biology, and biodiversity reporting have collaborated to produce completed genetic scorecards for 69 species
- The resulting indicator data have been incorporated into the UK national biodiversity reporting, and the Genetic Scorecard method is currently included in the draft Targets for the Scottish Biodiversity Strategy



Monitoring genetic diversity

AIM: To produce an updated Scottish Genetic Diversity Scorecard for monitoring genetic diversity within terrestrial species and expand its application to the marine environment

Background

Genetic diversity is one of the three strands of biodiversity identified in the Convention on Biological Diversity (CBD) along with species and ecosystems. It is, however, the least well reported globally, despite its underpinning species' ability to survive and adapt, which in turn supports ecosystems and the services they provide for humanity.

To address this important shortfall, a SEFARI-funded 'Think Tank' consortium developed the Scottish Genetic Diversity Scorecard which was published in 2020. It has been highly influential within Scotland and internationally. The Scorecard was recognised as a Complementary Indicator under the Global Biodiversity Framework. Within Scotland, the approach has also informed on-the-ground conservation, for example by providing an evidence base for the roll-out of Genetic Conservation Units for forest trees. The original Scorecard was awarded the Nature of Scotland 'Innovation Award' in 2020.

Outstanding challenges

1. Updating the Genetic Scorecard methodology

Since the design of the original Genetic Scorecard, additional genetic indicators have been incorporated into the Global Biodiversity Framework, and there is thus a need to (a) develop guidance for reporting on these new indicators in Scotland, and (b) update the Genetic Scorecard to accommodate these changes.

2. Application to a wider suite of species

The original Genetic Scorecard was applied to 26 predominantly terrestrial species. There is a need to test and apply the methodology on a larger group of species, and in particular, to achieve greater representation of the marine environment.

Refining the methodology

Funding from the SEFARI Gateway enabled the establishment of a Specialist Advisory Group on the Scottish Genetic Diversity Scorecard, with the Secretariat based at the Royal Botanic Garden Edinburgh (RBGE), and the group co-chaired by RBGE, NatureScot and the University of Edinburgh.

Initial workshops focused on the integration of two new Indicator metrics into the Scorecard. One of these indicators is focused on the amounts of genetic diversity *within* populations (the 'Ne500' indicator which is based on the number of individuals within populations as a proxy for levels of genetic diversity). The second indicator focuses on the proportion of populations maintained ('PIV') as a proxy for the conservation of genetic diversity *between* populations. Although conceptually simple, there are many practical issues to address prior to the successful implementation of these indicators.

A second series of workshops trialled the updated scorecard, firstly on terrestrial species, and then on marine species, making iterative adjustments to refine the method.

Populating the Scorecard

Once the methodological developments were completed, a series of Scorecard 'hackathons' were held, bringing a wide team of experts together to work on Scorecard production and subsequent peer-review.

The team

40 individuals from 22 organisations worked together on the Genetic Scorecard and its associated Indicators.



Project outputs

A revised Scottish Genetic Scorecard methodology was developed, and accounts were completed for 69 different species. The accounts include amphibians, reptiles, birds, fishes, mammals, invertebrates, plants and fungi, and taxa ranging from the common frog, basking shark, golden eagle, Scottish wildcat, woolly willow, juniper, chanterelle, and the knotted wrack seaweed.

Uptake in Scotland and beyond

- The Scottish Genetic Scorecard is now included in the UK's most recent National Report to the Convention on Biological Diversity <https://uk.chm-cbd.net/sites/gb/files/2026-03/cbd-7nr-uk.pdf> and the work of the team was covered in a report by JNCC: <https://jncc.gov.uk/our-work/ukbi-genetic-diversity-of-wild-species/#toc>
- A Biodiversity Index based on the Scottish Genetic Scorecard is on the shortlist to be one of the statutory targets for the Natural Environment (Scotland) Act 2026, and this was presented in the State of Nature thematic session "Bending the curve amid complexity and uncertainty: toward robust and measurable biodiversity targets" at the British Ecological Society annual meeting 2025
- The collaborative process for developing the indicators and the Genetic Scorecard was reported in a JNCC blog: <https://jncc.gov.uk/news/the-art-of-collaborative-indicator-development/>
- The Genetic Scorecard is being incorporated into mammal and reptile conservation plans in South Africa (species include the black rhino) and is in the process of being "gazetted" which will give it statutory status.
- A presentation on the Genetic Scorecard to the *Genetic Nature Observation and Action (GENOA)* EU COST Action annual meeting led to the setting up of a working group with members from across Europe





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Read the species accounts here:

<https://www.nature.scot/information-hub/indicators-trends/genetic-scorecard-indicator>



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