

Scotland's Nature on Red Alert Report Parliamentary Briefing

Summary

- **Scottish Environment LINK and WWF Scotland's recently published report '[Scotland's Nature on Red Alert: Climate change impacts on biodiversity](#)' highlights climate change pressures and the impact those pressures are having on Scotland's biodiversity.**
- **The report, authored by ecologist Tamsin Morris, is a comprehensive literature review of approximately 150 studies and brings together existing evidence with a view to also inform Scottish Parliament deliberations on the Climate Change (Emissions Reductions Targets) (Scotland) Bill, (the Climate Bill).**
- **On the basis of existing evidence, it concludes that:**
 1. **Scotland's climate trends indicate that annual average temperatures have already increased by an average of 1°C.**
 2. **Scotland's biodiversity is already experiencing a changed climate, affecting species abundance, distribution, their food sources, breeding and ability to adapt.**
 3. **As detailed in the report, species that could be affected through climate pressures are some of Scotland's most well-known and iconic wildlife, including Atlantic salmon, the capercaillie, the freshwater pearl mussel and the kittiwake.**
- **A two-pronged approach should be employed to tackle climate change: (a) increasing emission reduction and (b) ensuring that ecosystems are healthy, so they can continue to absorb greenhouse gases and withstand the impacts of climate change.**
- **To avoid irrecoverable loss to our biodiversity and ecosystem breakdown, Scottish Environment LINK members have called for more ambitious climate change targets and support the following amendments to the Climate Bill¹:**
 - **Legislating a 77% reduction of climate emissions by 2030 and achieving net zero emissions by 2050.**
 - **Establish measures to protect and enhance blue carbon habitats and recognise scale and importance of blue carbon stores.**
 - **Establish a duty for Ministers to create a National Ecological Network in line with commitments made in Scotland's biodiversity route map.**
 - **Reinforce the Land Use Strategy through legislation.**
 - **Establish a duty for Ministers to produce a Nitrogen Balance Sheet for Scotland by 2020.**
 - **Establish a target for increasing the area of agroforestry in Scotland by 2020.**
 - **Establish a duty for a 'sunset clause' for peat extraction in Scotland.**

¹For Scottish Environment LINK's evidence on Stage 1 deliberations of the Climate Bill: <http://www.scotlink.org/wp/files/documents/Scottish-Environment-LINK-ECCLR-Stage-1-Evidence-Climate-Bill-Aug2018.pdf>

INTRODUCTION

Scottish Environment LINK is the forum for Scotland's voluntary environment community, with over 35-member bodies representing a broad spectrum of environmental interests with the common goal of contributing to a more environmentally sustainable society.

In January 2018, Scottish Environment LINK and WWF Scotland published a joint report 'Scotland's Nature on Red Alert: climate change impacts on biodiversity', authored by Tamsin Morris. The report brought together existing evidence about the damage that climate change is already inflicting and will continue to inflict on Scotland's species and habitats.

Following section summarises the evidence set out in the report.

CLIMATE CHANGE IMPACTS ON SCOTLAND'S BIODIVERSITY

It is now well documented that climate change will impact biodiversity globally as well as locally. According to the IPCC² suggests that even a 1.5°C average temperature rise may put 20-30% of species at risk of extinction, and if the warming goes beyond 2°C nearly all ecosystems will struggle. In order to align to the 1.5°C ambition IPCC recommends Changing climate is also one of the main threats to Scotland's biodiversity, where the impact of those threats is likely to magnify with more climate driven changes³.

According to the 'Scotland's Nature on Red Alert' report the following are some key ways in which climate change is affecting Scotland's nature:

a) Water temperature rise:

There has been a **warming of about 1°C in Scotland** over the past few decades⁴. Projections based on past trends indicate that **rise in air temperature could raise water temperature between 0.4 to 0.7°C for every 1°C rise during summer months**, warming up our rivers.

Increased water temperatures can be lethal for cold water adapted species such as **Atlantic salmon and Arctic charr** or severely affect their growth and egg survival rate. There have been declines in the populations of both species, while studies indicate that the threat to Arctic charr is more significant under temperature rise of 2°C as opposed to 1.5°C.

Invertebrate species are impacted in several ways, for example spring macroinvertebrates could decline by 21% for every 1°C temperature rise. With temperature rise of 3°C or more local extinction of some species could be expected. There would be a significant impact from the loss of invertebrate species, due to their position in the food chain.

b) Decrease in snow cover:

Scotland is already experiencing a reduction in **snow cover, where studies suggest over the last 43 years snow cover has declined by 32.1%**⁴. While projections differ for different parts of Scotland, the Highlands snow cover days are projected to reduce by 30% by the 2050s. By the 2080s mountain areas in the UK would also experience a drop of 65 to 80% in mean winter snowfall.

² IPCC, 2018, Global Warming of 1.5C <http://ipcc.ch/report/sr15/>

³ Biodiversity Climate Change Impacts: Report Card 2015- <https://nerc.ukri.org/research/partnerships/ride/lwec/report-cards/biodiversity/>

⁴ The report uses data from a Scotland and Northern Ireland Forum for International Research (SNIFFER, 2014), study which looks at climate trends between 1961 and 2004.

As average temperatures increase it is likely that there will be a decline in climatically suitable habitat for montane and Arctic-alpine species. Estimates suggest that even where projections are based on assumptions of high reductions of GHG emissions, **78% of the habitat for Arctic / montane species, such as dwarf willow, moss campion and stiff sedge, will be climatically unsuitable**. In the same study when projections consider high levels of GHG emissions being produced with low reduction this number goes up to 93%. Species such as dwarf willow are protected under the EU Habitats Directive as Annex 1 habitats, their loss or change in their conditions is noteworthy.

Bird species at the edge of their southern range in the UK would have reduced range of climatically suitable habitat. For montane birds such as snow bunting and ptarmigan, the difference (in terms of climate impact on species abundance and distribution) between projections that consider ambitious emission reduction and unambitious emission reduction is considerable. Climate models on locations with similar climatic conditions to Scottish habitats of **snow bunting and ptarmigan** suggest that projections considering unambitious emissions reductions would experience a higher rise in temperatures, where the decline in distribution for these species would be nearly 90% and 98% respectively.

c) Changes in precipitation:

Climate change is leading to changed patterns of precipitation. The impacts are not uniform and as such the impacts vary for different species.

Summer precipitation levels are projected to decrease in parts of Scotland, leading to significantly hotter and drier summers and an increased risk of drought

This would lead to lower river levels and in extreme cases could lead to sections of rivers drying up. With lower river levels, species within these freshwater habitats would be affected. Trends suggest that **birds dependent on freshwater habitats such as common scoter, which breed in lochs in North and West of Scotland are already declining** and are at a high risk of extinction in the UK.

The wildlife that makes up our **moorlands** is also under threat from climate pressures of increased temperatures and decreasing summer precipitation. Studies indicate that the abundance of **craneflies**, an important food source for birds such as dunlin, grouse, golden plover and snow bunting, is affected after a hot, dry summer. With rising temperatures their abundance is reduced which in return reduces food availability at key lifecycle stages for these birds.

At the same time, **climate trends suggest that overall there has been an increase in annual precipitation levels in Scotland of 21.1%**. While the expected increase in frequency and intensity of rainfall, under different projections varies across Scotland, overall the expected increase could lead to increased frequency of floods, increased severity of flooding and spate events.

This again will create significant challenges for many species. For example, one of the most critically endangered molluscs in the world, the **freshwater pearl mussel**, has multiple vulnerabilities to climate change. Specifically, significant spate events cause the mussels to be washed out of the river gravels, often dropping them in unsuitable river habitat, or sometimes even onto dry land. What is more this species is also vulnerable because of its dependency on other species such as Atlantic salmon and brown trout as part of its lifecycle process.

Higher precipitation in early summer could also have a negative impact on species such as **capercaillie**. Research confirms that wet weather during the summer months reduces the chick's ability to source food, diminishing its chances of survival. Climate models for the capercaillie indicate that a rise of 1.9°C by the 2050s could wipe out 99% of the capercaillie's potential climate space, whereas a rise of .7°C may still give it a chance of survival, at 59% of its climate space being lost.

In terms of winter precipitation, this is expected to continue to rise. While an increase in winter temperatures could increase the survival rates over the winter period for some woodland bird species, increased precipitation and damp conditions would have a detrimental effect on their ability to survive. Birds such as treecreepers could have reduced chance of winter survival, as wetter conditions would affect dampen the birds' plumage, reducing insulation capabilities.

d) Increase in sea temperature levels:

Sea temperatures have increased by 0.4°C in the coastal waters of south of Scotland and 0.3°C in the northern waters. Certain data suggests that sea temperature rise of 2 to 2.5°C is expected by the 2080s. While north and west of Scotland may experience only 1°C warming of the seas, the warming will be most evident in autumn. With change in sea water temperatures some cetacean (whales, dolphins and porpoises) species will shift their range to waters with more suitable temperature.

As such, species that live in colder water are likely to shift their range northwards. As the area of warming waters expand this will have additional implications, the habitat range of these species would shrink. Populations of species such as **white beaked dolphin are threatened** due to climate change induced warming of the seas. These species are already being pushed further up north in their marine habitats of northern Minch, Outer Hebrides and the northern North Sea.

Rise in sea temperatures is also having an impact on food availability for certain species, which is then affecting their abundance due to their dependency on these food sources. Seabirds such as **kittwake have been affected**, as their populations have declined by approximately 60% since 1986. Rising sea temperatures are contributing to the birds' inability to breed as this is linked to the abundance of sandeels. Sandeels, abundant in low sea temperatures, are being affected by rising sea temperatures.

e) Rise in sea levels:

Climate change is likely to induce sea level rise, around Scotland's coastal waters. Current projections⁵ estimate a rise of approximately 30cm in the Clyde to Skye coastal waters and the Moray Firth by 2095. Rises of 35cm are projected for remainder of the mainland, along with rises of 40cm for the Hebrides and Orkney and 50cm in Shetland.

Found in only northern Scotland and north-western Ireland, machair lands are in a low-lying, relatively flat landscape, which make them vulnerable to sea level rise. Machair is distinguished for its rich diversity of wild species and invertebrates that attract birds like corn bunting and corncake. A combination of **coastal flooding and increased winter rainfall levels could result in waters being stagnant in machair lands**, for

⁵ In terms of future projections different temperature pathways are dependent on different factors that will drive GHG emissions. The 'Scotland's Nature on Red Alert' report uses UK Climate 2009 projections, as the 2018 regional scale projections were unavailable at the time the report was written.

longer periods of time. Flood inundated machair lands would have implications on whether it can be maintained, thus there is a threat of flooding to the physical condition of machair lands.

RECOMMENDATIONS

In view of the above, Scottish Environment LINK members recommend the following changes made to the Climate Bill:

1. **Increase emission reduction targets to 77% by 2030 and net-zero emissions by 2050:** to avoid increased biodiversity loss and potential ecosystem breakdown, the Bill's targets need to be consistent with a 1.5°C ambition. The difference between a 2°C and 1.5°C temperature change is significant and there is increasing evidence that even under a scenario where temperatures return to a 1.5°C state following 'overshoot', the damage to biodiversity will be at that point irreversible⁶. With damage to global and local biodiversity with even half a degree rise being irreversible⁷ ambitious emission reduction targets need to be set at an earlier stage.
2. **Establish measures to protect and enhance blue carbon habitats and recognise scale and importance of blue carbon stores**
 - Through the Climate Change Plan a degree of protection and enhancement of blue carbon habitats can be accounted for. The Plan should draw from existing policies in National Marine Plan and propose policies for Regional Marine plans aiming to reduce human pressures on carbon sinks.
 - Climate change and fishing are currently the two main stressors on marine ecosystems. With concerns on the status of seabed habitats and species⁸, work being done through Scotland and UK's marine biodiversity commitments is not enough to reverse the decline in marine biodiversity⁹, more can be done within the Bill by recognising carbon stores. Several marine planning areas in the Scottish seas have habitats that sequester and store carbon¹⁰ (known as blue carbon habitats¹¹).
 - Several instances of 'blue carbon' habitats are beyond the geographic scope of marine planning area network, requiring protection and possibly restoration through other mechanisms such as marine planning. With potential negative emission implications of blue carbon habitats, for Scotland to meet its net zero emissions target it is important that these habitats are protected and enhanced.
3. **Establish a duty for Ministers to create a National Ecological Network in line with commitments made in Scotland's biodiversity route map:** a National Ecological Network would provide a strategic, practice based, long term method to invest in the resilience of natural assets such as woodlands and peatlands. Through the restoration and improvement of these habitats, carbon sequestration and storage would be enhanced, helping us meet internationally and nationally agreed mitigation targets.
4. **Reinforce the Land Use Strategy through legislation:** LINK members recommend that a land use strategy plan should be introduced and should include actions and milestones that deliver specific policies and proposals. Progress on the land use strategy should be reported annually before the Scottish Parliament. In addition to this a duty should be set on Ministers to establish Regional Land Use frameworks in all areas of Scotland.

⁶ Differential climate impacts for policy-relevant limits to global warming: the case of 1.5 °C and 2 °C <https://www.earth-syst-dynam.net/7/327/2016/>

⁷ IPCC, 2018, Global Warming of 1.5C <http://ipcc.ch/report/sr15/>

⁸ Scotland's Marine Atlas: <http://77.68.107.10/MarineAtlas-Complete.pdf>

⁹ International Commitments include: The Convention on Biological Diversity (CBD); the World Summit on Sustainable Development (WSSD); the OSPAR convention; the European Marine Strategy Framework Directive (MSFD)

¹⁰ <https://www.nature.scot/snh-commissioned-report-761-assessment-carbon-budgets-and-potential-blue-carbon-stores-scotland>

¹¹ Scottish National Heritage (2017) Assessment of Blue Carbon Resources in Scotland's Inshore Marine Protected Area Network- Blue Carbon Habitats include: seagrass meadows, kelp forests, coldwater coral reefs and maerl beds, and potential carbon stores such as horse mussel beds. Most of blue carbon is stored in relatively stable seabed sediments, accumulated over many years. However, some carbon sequestering habitats such as maerl and flame shell beds, which are recognized Priority Marine Features, are sensitive to physical disturbance, and can release carbon back into the atmosphere when damaged or destroyed.

5. **Establish a duty for Ministers to produce a Nitrogen Balance Sheet for Scotland by 2020:** a Nitrogen Balance Sheet is a recognised methodology for recording evidence on nitrogen flows and losses throughout Scotland. Emissions reductions can be planned and delivered through this methodology, by informing the Scottish Government’s policies on nitrogen use efficiency, through improved fertilizer use and the development of a fertiliser reduction target¹².
6. **Establish a target for increasing the area of agroforestry in Scotland by 2020:** with tree planting as an existing carbon sequestration and afforestation method, farmers too will need to plant more trees. Agroforestry techniques can provide food and trees on the same land and avoid tensions of farmers feeling they are losing land to forestry. Despite these reasons’ agroforestry is still behind. Government policy and targets are needed for the adoption of agroforestry techniques.
7. **Establish a duty for a ‘sunset clause’ for peat extraction in Scotland:** a duty is required to provide accountability in carbon stocks in peatlands that are under pressure from commercial extraction. The duty for a “sunset clause” will set a time for companies that hold consents to extract peat, granted through the planning process, to re-activate them or these consents will permanently expire. This will result in a clearer picture for the Government in terms of planning, whether the peatlands identified are under threat and require protection.

For more information contact:

Dilraj Watson, LINK Advocacy Officer,
E-mail: dilraj@scotlink.org | Tel: 0131 225 43 45
www.scotlink.org www.savescottishseas.org

¹² As described in the Scottish Government Climate Change Plan <https://www.gov.scot/Resource/0053/00532096.pdf>