

Climate Action Evidence Review

The Lake District was designated a national park in 1951. A number of its Special Qualities are relevant to this evidence paper including:

- Rich archaeology and historic landscape
- Unique farming heritage and concentration of common land
- Wealth of habitats and wildlife
- Mosaic of lakes, tarns, rivers and coast
- Extensive seminatural woodlands
- Distinctive buildings and settlement character

In 2017 the English Lake District was also designated a World Heritage Site cultural landscape.

Relevant outcomes from the Partnership Plan 2020 – 2025

1. We will support Cumbria's 2037 net zero carbon ambition
2. We will lead a coordinated step change in climate action and net zero throughout the lifetime of this Plan
3. We will implement measures over the next ten years that will help the Lake District adapt and demonstrate resilience to the effects of climate change

Facts, figures, trends

1. Introduction

- 1.1. Human-caused emissions of greenhouse gases have contributed to an increase in global surface temperatures (from the 1850 to 1900 baseline) above 1.1°C between 2011 and 2020¹; and more recently, 2024 was the first whole year to exceed 1.5°C above pre-industrial levels.²
- 1.2. An example of climate warming can be shown for Lake Windermere as Climate Stripes, indicating the increase and frequency of warming years in the lake surface temperatures³

¹ IPCC [AR6 Synthesis Report](#)

² Copernicus Climate Change Service [Global Climate Highlights 2024](#)
[Copernicus: 2024 is the first year to exceed 1.5°C above pre-industrial level](#)

³ Surface water temperature data from the UKCEH [Cumbrian Lakes Monitoring Platform](#). This research is currently supported by NERC, through the UKCEH National Capability for UK Challenges Programme NE/Y006208/1

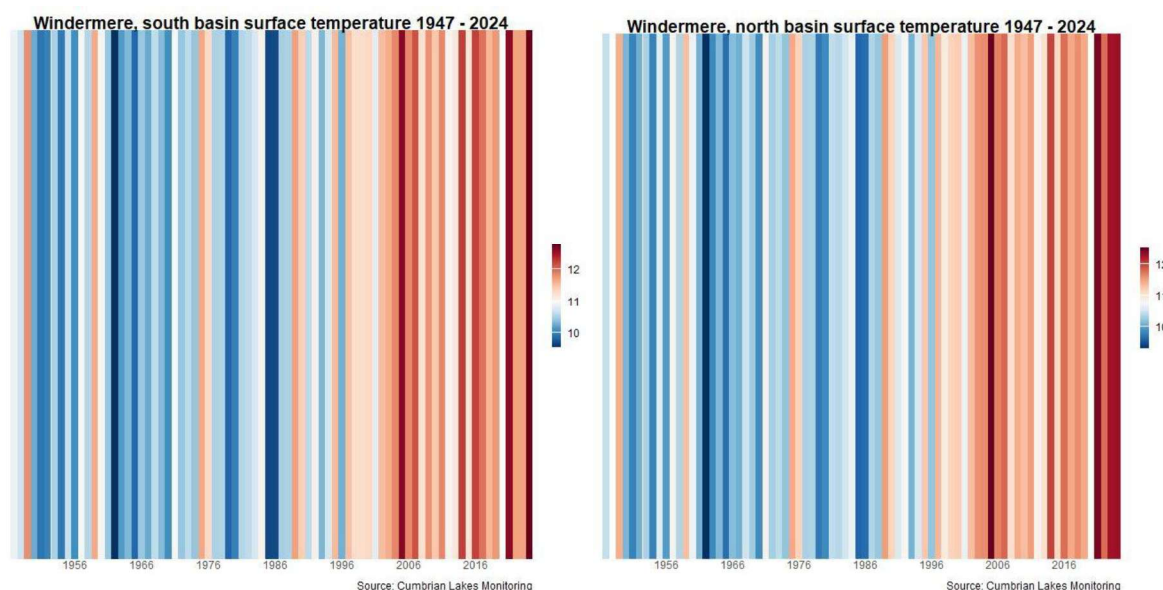


Figure1. Climate Stripes for the north and south basins of Lake Windermere

- 1.3. Using UKCP18, a future climate change prediction tool from the Met Office, our 2021 Climate Change Adaptation Risk Assessment⁴ for the Lake District National Park presented a scenario of increasingly hotter drier summers, warmer wetter winters, as well as extremely variable weather patterns such as intense rainfall, creating landscape change, variability in water supply, increased frequency and extent of flooding, sea level rise and extended growing seasons as well as creating risks and opportunities for species population survival and movement.
- 1.4. Updated Climate Data Projections for the Lake District from the 2025 Cumbria Climate Change Adaptation Report, were not available for inclusion, but when published will provide a predicted future climate scenario.

2. Decarbonisation

- 2.1. In December 2020, the UK Government set a new plan which aims for at least 68% reduction in greenhouse gas emissions by the end of the decade, compared to 1990 levels. In April 2021, the UK Government substantially increased its commitment by setting a new target of 78% carbon emission reduction by 2035. The UK's Seventh CCC Budget⁵ then updated the ambition to reduce emissions by 87% (compared to 1990 levels) by 2040, setting out decisions and actions that are needed to achieve this including: low carbon energy production; building efficiency, as well as peat restoration and woodland creation. This was followed up

⁴ Lake District National Park Partnership Plan [Climate Change Adaptation Report](#)

⁵ Climate Change Committee [UK Seventh Carbon Budget](#)

by the Prime Minister announcing the UK's Nationally Determined Contribution target to reduce its greenhouse gas emissions by at least 81% by 2035, compared to 1990 levels.

- 2.2. The 2022 Lake District National Park's Green House Gas (GHG) Assessment presented a carbon budget baseline (for 2019) of 2,048,661 tonnes CO₂e⁶ of emissions, attributable to within the national park boundary as:

Emission contribution	tonnes CO ₂ equivalent per year (t CO ₂ e)
Energy-only GHG (Incl. Supply Chain): Residents + Visitors + Industry	442,181
Food & Drink: Residents + Visitors	406,024
Other Non-Food Shopping (Incl. Cars): Residents + Visitors	116,680
Visitor travel to & from the Lake District (Excl. Flights; Incl. Car Manufac.)	841,647
Agriculture (Land Use Non-CO ₂)	315,596
Land use, excluding agriculture (sequestering CO ₂)	-73,466

Table 1: Lake District National Park's Green House Gas (GHG) Assessment, 2019 baseline

- 2.3. Residents travel (included in the Energy-only GHG figure above) is estimated to be 201,289 CO₂e.
- 2.4. The Lake District National Park Landscape Tracker (used to monitor green house gas emissions) reports that in 2022 estimated emission reduction was 225,271 tonnes CO₂ equivalent from 2020– this represents only 27% of the reduction that is required during that period⁷.

3. Buildings

- 3.1. We are collaborating with Zero Carbon Cumbria and Small World Consulting to develop a Cumbria buildings energy profile (and with data cut to the national park boundary) that categorises and analyses key building types to provide insights into the age, construction type, materials, energy performance. This was not available at the time of the preparation of this evidence paper but will provide a baseline of buildings' energy performance that can be used to track change from.

⁶ Small World Consulting, Lake District National Park's Green House Gas (GHG) Assessment 2022

⁷ Small World Consulting [Lake District National Park's Landscape Carbon Tracker](#)

4. Transport

- 4.1. The main mode of travel to the Lake District is still dominated by private vehicle (approximately 91% in 2022 up from 89% in 2018). Whilst for travelling around the Lake District modes of travel change, with 68% of visitors travelling by private vehicle meaning other modes become more significant. The main other modes of travel include: walking (16%); boat/ferry (1%); cycling/ebike (9%); bus (5%) and train (1%)⁸.

5. Farming and other land use

- 5.1. A full farming carbon account is not available for each Lake District farm business, however West Lakes CIC Farm Carbon Audit has shown that for 20 farm systems (including grazing on Commons) the average emission per farm is 225.86 tonnes CO₂e and that 171.16 tonnes CO₂e are typically sequestered each year. This results in an average carbon balance, or net emissions of 54.70 tonnes CO₂e for each of those 20 farms.
- 5.2. Across the whole of the National Park the estimated amount of carbon stored and sequestered by habitats are for: above ground carbon storage, 6,123,738 tonnes (27 tonnes/ha); below ground carbon storage, 108,663,682 tonnes (476 tonnes/ha); total carbon storage of 114,767,877 tonnes (503 tonnes/ha), a sequestration of -455,568 tonnes (t co₂ equivalent Yr⁻¹), which is the equivalent of -2 CO₂e tonnes /ha that is sequestered by habitat above ground.
- 5.3. The England Peat Map⁹ shows a total area of peat habitat of 88,322.34 hectares, of which 52,473 hectares are deep peat¹⁰. From this a cumulative total of 9,674 hectares of upland and lowland peatland has been restored since 2013. Since 2015, this has sequestered 4,300 tonnes CO₂e.
- 5.4. In 2023 woodland canopy (including recently planted new woodland) covered 31,145 hectares (13.2%) of the Lake District¹¹. This is an increase from 30,900 hectares in 2022, representing an increase of 245ha in one year.
- 5.5. The Zero Carbon Cumbria Decarbonisation Plan for Farming and Other Land Use proposes a pipeline of actions, all of which are aligned to ongoing work of the Lake District National Park Partnership to deliver actions that contribute carbon reduction in line with the ambition to limit

⁸ Cumbria Tourism [Visitor Survey 2022](#)

⁹ Natural England [England Peat Map 2025](#)

¹⁰ Natural England 2025 Protected Landscapes Targets and Outcomes Framework Data Release – 7 March 2025 – Peaty Soils

¹¹ [National Forest Inventory GB 2023 | Forestry Commission Open Data website](#)

climate change to within 1.5°C and meet government targets to reduce carbon emissions¹².

6. Climate risks

- 6.1. The State of the Park Report 2023¹³ highlights the vulnerability of the cultural landscape and impact on habitats and wildlife from flooding, higher temperatures, wildfires, erosion and soil degradation, whilst likely exacerbated by the predicted increased frequency of extreme weather.
- 6.2. The first climate change vulnerability assessment specifically for the World Heritage Site (WHS) concludes that actions necessary to address the climate crisis, could, significantly in the short term impact attributes that contribute to its designation and Outstanding Universal Value (OUV). Features such as coastal, upland, and lowland archaeology, and vernacular landscape features/buildings and agro-pastoral farming system, which is central to the WHS's integrity are all vulnerable. However, the WHS designation includes many other components, some of which may be less affected by climate change.¹⁴
- 6.3. 14% of the Lake District is at risk from flooding from rivers, sea or surface water, including 3,902 hectares of agricultural land and 13,566 hectares which are designated sites, however, some of this land is intentionally allowed to flood as it forms part of natural flood plains.
- 6.4. The National Flood Risk Assessment climate change scenario indicates that 1 in 4 properties (1,831) are at risk from river and sea flooding by 2050 across Cumbria¹⁵, at medium flood risk (less than 3.3% but greater than 1% chance of flooding in any given year). At a high risk of flooding (greater than 3.3% chance of flooding in any given year) 3,504 properties are at risk flooding from rivers and seas.
- 6.5. The Lake District National Park (and Cumbria) are predicted to experience the greatest impact from increasing rainfall intensity and peak river flow show that the Lake District is one of the areas of the country that will see the greatest impacts¹⁶, furthermore, analysis published by the Environment Agency shows that Cumbria has the most river gauges that are already seeing statistically significant rising trends of river levels.
- 6.6. UK National Parks Climate Change Adaptation Report 2025¹⁷ summarises the often interdependent assets and the characteristics of managing

¹² Zero Carbon Cumbria [Farming and other Land Use](#)

¹³ Lake District National Park Authority [State of the Park Report 2023](#)

¹⁴ Lake District National Park Partnership [Climate Change Climate Adaptation Report 2021](#)

¹⁵ Environment Agency [National assessment of flood and coastal erosion risk in England 2024 2025](#)

¹⁶ Climate change allowances for peak river flow in England [Climate Change Allowances 2025](#)

¹⁷ National Parks England and National Landscapes Association [Protected Landscapes High Level Report for Adaptation Reporting Round 4 \(ARP4\) 2025](#)

protected landscapes such as nature recovery, cultural and historic heritage, access and recreation and development management. In a changing climate, the predicted key risks, in particular for the Lake District, include:

- Hotter, drier summers, causing drought, will lead to land use change, loss of character and integrity in historic/designed landscapes, as well as the loss of veteran or landscape trees due to heat stress or disease, impacting visual amenity. This will impact upon the special qualities of the rich archaeology and historic landscape. Soils will become prone to erosion and drought affects its ability to provide water and nutrients. As drought impacts water supplies for drinking (especially non-mains supply in very rural settings), low flows impact water quality and available habitat. Fire risk increases and drying out of peat soils can lead to increased carbon emissions as well as impact species abundance and diversity in a range of habitats. Historic environment features become vulnerable from drying out and increased fire risk. Higher summer temperatures and increased drought periods impact livestock farming, requiring more shelter or housing, increasing time/costs, affecting the Lake District's unique farming heritage and concentration of common land. Community public health and well-being impacts from heat stress and poor air quality are also likely. Areas of extensive habitat or open access land are also at increased fire risk during drought.
- Warmer, wetter winters and changing seasonal cycles can lead to changes in the visual character of the landscape over the long term such as the regeneration of semi-natural woodlands and also lead to altered agricultural practices. Increased seasonal rainfall leads to saturated ground and soils, resulting slope instability and risk of surface water flooding as well the movement of soils and sediment loads into rivers. Flooding from coastal sea level rise and increased river flows will become more frequent leading to the loss of habitats, changes to access and recreational routes as well as loss of historic environment features. As well as impacting upon the local economy from damage to key transport routes, energy and water distribution networks and infrastructure, and flooding of commercial and residential properties. These can also impact upon local community's ability to respond in times of need.

6.7. Cumbria Climate Change Adaptation Report primarily focuses on contextualising existing UK climate projection data (UKCP18) and national risk assessments to Cumbria. It does not identify climate extremes that are unique to Cumbria in terms of their physical occurrence compared to other regions but rather discusses how Cumbria is expected to experience the impacts of projected climate extremes and the increased frequency of

extreme weather events, through focused area profiles for Grasmere and Keswick (and others in the county). It highlights vulnerabilities or sensitivities to these changes, including:

- The coastline is likely to be at risk from more tidal surges and wave height due to an increase in storm strength and frequency resulting from increased wind power.
- Increased risk of flooding from streams, rivers, and sewers from more intense rain, which will become more frequent in the future.
- For high temperatures, the report explicitly warns that focusing solely on median temperatures might be misleading, as the increased extreme temperatures are the concern.
- The potential for increased frequency and impact of wildfires in Cumbria's grassland areas suggests the summer wildfire period might be changing and lasting longer.
- High Fells and uplands, are identified as potentially more sensitive to the impacts of climate warming, because of the sensitivity of upland habitats and species that are generally more sensitive to change, rather than experiencing unique temperature extremes themselves. The uplands are also vulnerable to land use change and species movement into these habitats. With 4°C of warming, a significant area of upland habitat will be lost through a combination of these risks. Consequently impacting upon the wealth of habitats and wildlife as well as the physical and biological features of the mosaic of lakes, tarns, rivers and coast. However, it does give opportunities for species adaptation and migration; and some species will be lost.
- The Keswick area profile highlights how it will experience slightly lower temperatures than Cumbria as a whole. Overall summers and winters will be warmer with an increased frequency of hot and extreme summer days; as well as fewer days of ice in winter. Compared to Cumbria it will experience more precipitation, but overall, summers will be drier, and winters wetter. Windspeeds are predicted to be lower than the rest of the county. Peak river flows and peak rainfall will be consistent with Cumbria's as a whole.
- The Grasmere area profile highlights how it will experience broadly similar temperatures to Cumbria. Summers and winters will be warmer including more hot and extreme summer days, with a decrease in the number of days of ice. It is predicted to experience more precipitation than the rest of the county, summers will be drier, and winters will be marginally wetter. Windspeeds will be marginally higher than Cumbria. It will experience similar peak river flow and peak rainfall as in all other areas of Cumbria.

What does this mean?

- 7.1. As climate change warming continues, the scale of change expected through to 2050 and beyond in the Lake District is going to be significant and greater compared to other areas of the UK, increasing the pressure on and threat to the Lake District, its environment, economy and communities, from hotter, drier summers and warmer, wetter winters, along with increasing extreme weather events.
- 7.2. The Lake District National Park greenhouse gas assessment provides a net carbon budget and outlines pathways to achieve net zero emissions by 2040. While reduction progress is being made, as evidenced by the estimated emission reduction, this is still only achieving about a third of what is needed annually to meet its 2040 target. The dominance of car travel (91%) to the Lake District and contribution it makes to carbon emissions, presents a significant challenge.
- 7.3. There are many opportunities for decarbonising the National Park which requires significant commitment from all sectors to reduce emissions. Some actions, such as peat restoration, will also contribute to adaptation actions that deliver a wide range of benefits such as reduced flood risk. While a full farm carbon account is not available for every farm, audits indicate that some farms have a positive carbon balance due to sequestration and have the potential to make a significant contribution to storing carbon.
- 7.4. Storm and flood events, and warmer drier summers are likely to bring their own issues such as more frequent droughts, wildfires, and inhospitable climates to habitats and species. These pose the most significant risk to communities, particularly farming, water resources and water quality as well as range of wildlife and the experience visitors have in the National Park.
- 7.5. Climate change acts as a threat multiplier, exacerbating current risks and creating new ones through interconnected and cascading impacts. Understanding these extreme events and their increasing frequency is crucial for developing effective adaptation plans.
- 7.6. Adaptation and mitigation interventions (tree planting, work to restore peat habitat, natural flood management schemes) help the landscape respond to climate change. However, if not undertaken in a sympathetic way can impact on the Lake District's special qualities and attributes of outstanding universal value, landscape character/aesthetics, historic environment as well as functioning of the agro-pastoral farming system
- 7.7. Climate action planning is needed now to build a pipeline of feasible projects that are investment ready to deliver appropriate, sensitive and respectful adaptation of the landscape and built environment, for the place

be resilient to the future predicted climate extremes. These events will impact the experiences of people living, working and visiting the National Park. Adaptation and resilience measures are therefore crucial alongside decarbonisation efforts.

References and policy context

Some of the key international, national, regional and local strategies that provide important context for updating the Management Plan include:

- [The Climate Change Act 2008, updated in 2019](#), established in law the UK Government's contribution to reducing all greenhouse gas emissions to net zero by 2050.
- [The Environment Act 2021](#) sets out targets to restore the natural environment in four priority areas: air quality, biodiversity, water and waste that will contribute to delivering climate action.
- [UK's Seventh Climate Change Committee Budget](#)
- [Delivery Plan for Climate Leadership](#) in National Parks, National Parks England (2020) underpins the collaboration between national parks working together and at scale, to achieve rapid collective action towards net zero.
- [Protected Landscapes Targets and Outcomes Framework](#) established ambitious targets for mitigating and adapting to climate change for reducing greenhouse gas emissions, restoring peat and increasing tree canopy and woodland cover.

Decarbonisation

- [Net Zero Strategy: Build Back Greener](#) (2021) is the Government's policies and proposals for decarbonising all sectors of the UK economy to meet its net zero target by 2050
- [Zero Carbon Cumbria](#) is the strategic partnership leading on the regional Decarbonisation Plan Emission Reduction Action Plan through sector groups.

Adaptation and Resilience

- [A Green Future: Our 25 Year Plan to Improve the Environment](#) (25YEP), Defra (2018) sets out the UK Government's ambitions for improving the environment.
- [Environmental Improvement Plan 2023](#), Defra (2023) is the first 5-yearly review of the 25YEP, establishing interim targets to measure progress to delivering the 25YEP.

- [Third National Adaptation Programme](#) (NAP3) (2024) requires Protected Landscape Authorities to produce Climate Change Adaptation plans, including contributing to achieving net zero by 2050.
- [UK Climate Risk Technical report \(CCRA3-IA\)](#) A Technical Report providing a full analysis for 61 UK climate change risks and opportunities
- [Historic England's Climate Change Strategy](#) sets out how it will support and help better manage heritage as a solution to climate change.
- [Cumbria Flood Risk Management Strategy](#) (2022) aims to coordinate available resources, raise awareness and involve everyone in reducing flood risk.
- [Zero Carbon Cumbria Farming and Other Land Use Emissions reduction and sequestration action plan](#) has established an action plan for supporting sustainable farming, increased peat restoration and woodland creation.
- [Westmorland and Furness Council's Climate Action Plans One](#) and [Two](#) support decarbonisation and developing resilience with partners for community benefit.
- [Cumberland Council's Climate and Nature Strategy](#) 2024 – 2027 seeks to work with partners to achieve net zero by 2037 whilst embedding adaptation for communities' health and wellbeing.
- [Lake District National Park Climate Change Adaptation Risk Assessment](#) (2021), assesses and evaluate vulnerabilities and opportunities related to climate change.