



Storm Arwen

Explore a recent weather hazard event

Storm Arwen 'headline' facts

The frequency of tropical cyclone activity in the Atlantic, Caribbean and the Gulf of Mexico has been increasing sharply over the last decade. While in the UK we do not see the degree of hurricane threat found on the other side of the Atlantic, in a warming world we expect to see an increase in the frequency of high-energy meteorological events. This centrepiece is a case study of one such recent event: Storm Arwen.

On 26 November 2021, the Meteorological Office issued a rare red warning for northeast England and eastern Scotland. Storm Arwen was an intense low-pressure system which moved across the UK with the centre of the storm passing across Scotland and northern England on the evening of 26 November. By early on 27 November the centre of the low pressure had moved into the North Sea drawing strong northerly winds across Scotland and northeast England and depositing snow across much of the region. An animation of the storm can be viewed here: www.tinyurl.com/4rruz6zp.

A maximum gust of 117 mph was recorded in Aberdeenshire and a gust of 98 mph was recorded to the west of Alnwick in Northumberland (Figure 1).

Immediate impact

The storm caused considerable damage across the UK with the most significant impacts felt in Scotland and the northeast of England. Snow caused disruption, and trees falling onto power lines caused widespread power cuts. Over a million homes were affected. Over 70,000 were still without power after 48 hours and several thousand had to wait over a week for power to be restored. Initial estimates of the cost of the damage were in the range £250-£300 million. The extent of the impact on power supply was such that the UK government commissioned a review of lessons learnt which recommended better planning to deliver resilience in the network as well as improvements in customer communication and compensation.

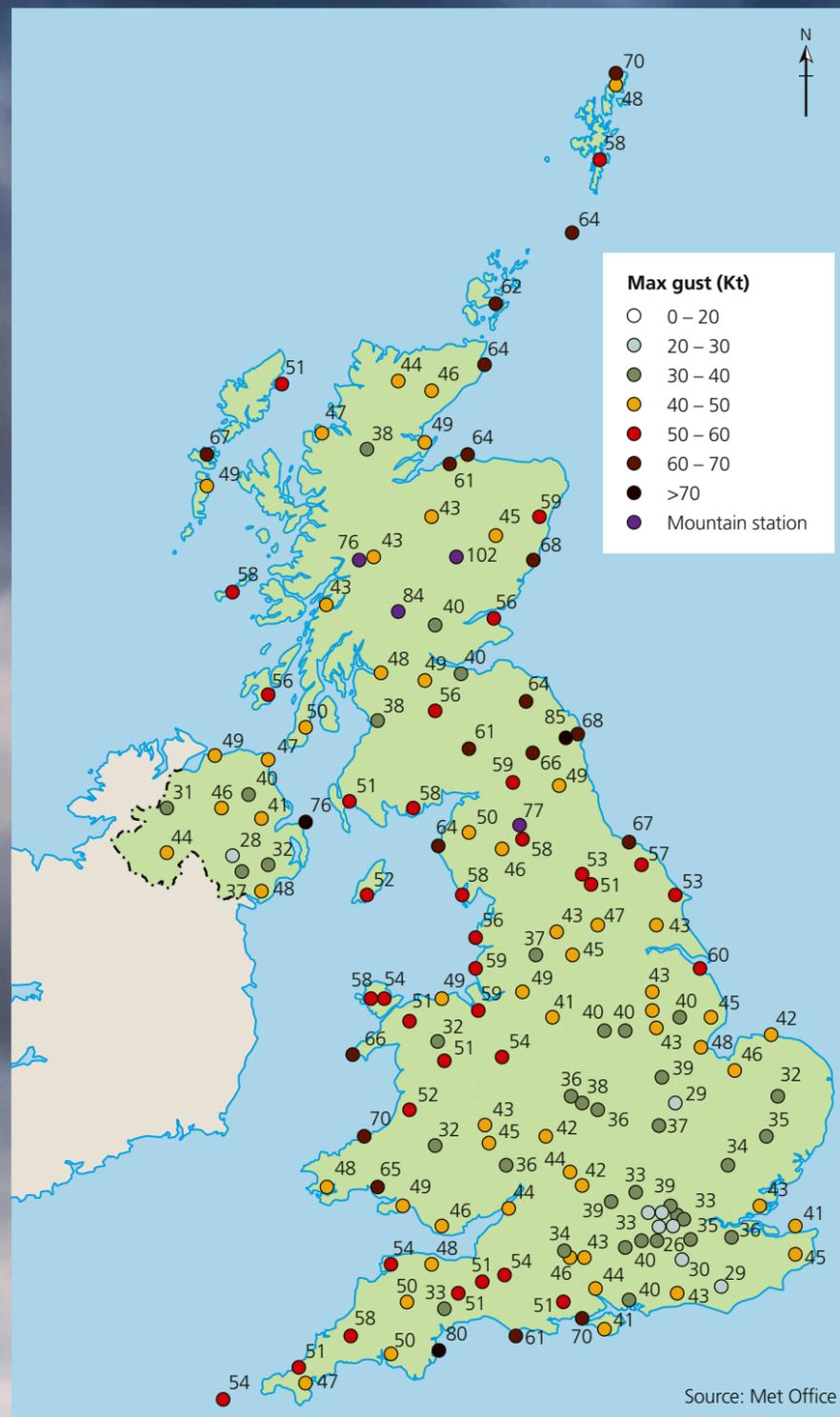


Figure 1 Maximum wind gusts across the UK during Storm Arwen (note that windspeeds are typically given in Knots (Kt) 1Kt = 1.15mph)

Windblow damage in Northumberland National Park as a result of Storm Arwen. The northerly winds have destroyed most of the upwind side of this woodland



Longer term clear-up

However, the effects of the storm extend far beyond the immediate impacts. The scale of treefall was vast. Forest Research set up a citizen science project to allow forest owners to self-report windblow (see the Resources box) which shows extensive damage across Scotland and northern England. In Scotland an estimated 16 million trees were felled.

The extent of treefall is partly related to the synoptic conditions. The gale-force winds hitting the northeast of England and Scotland were from an unusual direction. Northerly winds led to very extensive treefall, which was exacerbated because trees grow so that they are more resilient to prevailing winds that they experience regularly.

Trees which have fallen across roads and paths have to be removed and made safe before access is restored. The sheer volume of timber to be removed meant that in Northumberland National Park, tourist sites were still being made safe through the summer of 2022.



The force of the winds was such that many trees were not uprooted but the trunks simply snapped off as illustrated in this image

Across the region, large trees were felled across roads and paths. The scale of the work required to remove timber and to make these routes safe meant that large areas of forest remained closed to the public into the summer of 2022, including parts of the Pennine Way and popular mountain biking routes in Kielder Forest



RESOURCES

The Meteorological Office report on the storm which describes the synoptic conditions and weather conditions during the event is here: www.tinyurl.com/y38m473k.

Citizen science mapping (project by Forest Research) of windblow caused by Arwen can be viewed here: www.tinyurl.com/3u7ppyvk.

A government review of the impact on power supplies and lessons learnt is here: www.tinyurl.com/bde2ax88.

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