

THE WEATHER OF 1996

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Recent trends towards a globally warmed climate, with warm westerly winds and heavy winter rains, seemed to have been set aside during 1996, which saw the return of winds from a more traditional easterly direction during the winter half-year. After the frost damage of Hogmanay 1995, low temperatures and snow were frequent. Spring was very late, with frosts well into May, and after a very mild autumn, cold easterlies and snow returned again in November. Although nowhere near as warm as 1995, summer temperatures frequently topped 20°C, and the June to September rainfall total was only 63% of the long-term average, culminating in a three-week dry spell between the 2nd and 22nd of September. At the end of the year the total rainfall was 92% of average.

Temperature and rainfall values in the following refer to Parkhead II climatological station unless otherwise stated.

January Cold and exceptionally dull

Daytime temperatures were low for the first six days but the cloud cover prevented night frosts. The cold and dull weather broke on the 7th over three wet and windy days during which the total rainfall was 17.3 mm. There was brief lull late on the 10th when the wind fell away and the sky cleared, resulting in patches of black ice by the morning of the 11th. Mild and unsettled weather continued, however, until the 14th and by the 15th the wind was a light southerly which kept daytime temperatures above 9°C. Easterly winds then held sway for the remainder of the month and by the 26th and 27th the daytime temperature struggled to reach 1.3°C in Bridge of Allan (-0.5°C Dunblane). Snow began falling late on the 26th and continued for most of the 27th. This accumulated to a depth of 5 cm in parts of the Forth Valley but exceeded 30 cm in Dunblane. Many roads, particularly over higher ground, became impassable. A slow thaw set in on the 28th but by the end of the month the snowline was still at 100 m. For much of Britain this was the dullest January on record and in parts of eastern Scotland the recorded hours of bright sunshine were less than 25% of average.

February Cold but quite sunny

There was bright sunny weather over the first three days, but night temperatures fell below freezing, reaching -5.6°C (-6.9°C Bridge of Allan). Heavy snow was falling by the morning of the 5th, which continued into the 6th. Parkhead recorded 19 cm (Dunblane 22 cm), while parts of Dumfries and Galloway registered in excess of 50 cm and the A(M)74 was closed,

stranding many motorists for 24 hours. After a brief respite on the 7th, more snow began to fall on the 8th, but by the 9th this had turned to rain. The resulting snowmelt floods caused extensive disruption. Daytime maximum temperatures rose from -0.1°C on the 6th to 7.5°C on the 10th. The weather remained mild, wet and windy until the 13th when night frosts returned. On the 17th a northerly airstream became established and the weather was bitterly cold, with snow flurries, until the 22nd. There were spells of rain between the 23rd and 25th, which eventually turned to snow. There was a light cover of snow by the morning of the 26th. The daytime temperature reached 11.2°C (12.7°C Bridge of Allan) on a sunny 29th.

March Dry and generally cold

Over the first six days there was fresh sunny weather with night frosts. The air temperature reached 13.4°C (14.5°C Bridge of Allan) on the 3rd but it fell to -3.7°C (-5.0°C Bridge of Allan) by the morning of the 5th. From the 7th onwards, an easterly airstream brought in cold damp air from continental Europe with poor visibility. There was heavy continuous rain over 48 hours from the 11th, which turned to snow by midday on the 12th. The 48-hour precipitation total was 35.4 mm (31.5 mm Dunblane, 42.6 mm Bridge of Allan). By late evening on the 12th, snow had accumulated to a depth of 3 cm or more and lay for the next two days, which were bitterly cold in a fresh ESE wind. The average daytime maximum temperature between the 12th and 14th was only 2.7°C (2.4°C Bridge of Allan). After the 15th, Scotland was again affected by a cold damp easterly airstream and the weather was very dull, with low cloud and occasional *drizzle*, up to the 23rd. Under clearing skies, night temperatures fell below freezing, reaching -2.8°C on the 24th (-4.0°C Bridge of Allan). The wind then turned towards the north, the weather became fresher and days were sunny, with excellent visibility. Dry and cold easterly winds dominated the month resulting in rainfall 50% of average and mean temperature 1.7°C below average.

April Cold at first; becoming warmer but very wet

The weather was very settled over the first seven days. Sunny periods developed under clearing skies but night temperatures fell below freezing on the 6th/7th (-2.0°C on 6th). Cloud and rain moved in from the west on the 8th but the next three days were much warmer. By the 11th there was drier weather over the east coast, but the west remained wet. The 12th was an unpleasantly cold, wet and raw day, the temperature rising only to 4.9°C (3.5°C Bridge of Allan and Dunblane). There were flurries of snow on the 13th but amounts of precipitation remained relatively small. More rain fell after the 15th and the 48-hour total over the 16th and 17th was 22.2 mm (19.5 mm Dunblane). The weather then remained very unsettled and snow fell in

thunderly showers on the 19th. The temperature rose briefly on the 20th and 21st in a warm southerly airstream. There was a clear and dry spell on the 25th but less settled weather with heavy showers and sunny spells persisted to the end of the month.

May Cold and dry at first, then warmer and wetter later

The wind was north-easterly over the first three days, which were cool and clear. The temperature fell to -2.0°C (-2.6°C Bridge of Allan; -2.9°C Dunblane) by the morning of the 3rd. While the weather remained cold, the snowline on the local hills remained at 400 m. After the 7th there were two days of calmer clear weather before the north-easterly breeze returned on the 10th. The 11th was a gusty day with intermittent rain, which fell as sleet or snow over higher ground. The air became warmer overnight on the 12th/13th and by 0900 GMT on the 13th the temperature had already reached 13.8°C in Bridge of Allan. Under a light south-westerly breeze and an almost cloudless sky, the maximum temperature eventually reached 18.3°C on the 14th (22.0°C Bridge of Allan). The north-easterly breeze paid another visit on the 15th and the temperature fell back to unseasonably low levels again for several days. The 22nd was wet and windy (14.3 mm). By the third week of the month the national press was announcing that May had been the coldest since records began in 1659! The 28th was another very wet and windy day (13.0 mm; 13.9 mm Bridge of Allan, 14.5 mm Dunblane). The north of Scotland experienced a severe south-westerly gale on the 31st but winds in the Forth Valley, while strong, did not reach gale-force.

June Warm and dry

Over the first eleven days there was generally unsettled weather but there were some long sunny spells. From the 5th onwards the wind changed to southerly which was very warm and humid and the daytime temperature topped 20°C locally on the 6th. Heavy showers occurred overnight on the 7th/8th, which were thunderly in some parts of Britain. The temperature fell on the 10th and the wind became fresh to strong westerly. Rain fell for much of the 11th and was exceptionally heavy during the afternoon. The 24-hour rainfall was 13.5 mm (11.3 mm Dunblane). More settled weather developed on the 12th and the next four days were bright and sunny, reaching 24.2°C on the 16th (25.8°C Bridge of Allan). The weather remained warm and dry, although night temperatures fell quite sharply, reaching 2.6°C by the morning of the 21st. There were three very hot days from the 22nd, reaching 27.3°C in Bridge of Allan on the 24th. There was continuous rain late on the 27th, after which the weather remained unsettled up to the end of the month.

July Mostly warm and quite dry

Over the first four days the weather was unsettled, with heavy showers and spells of more persistent rain. On the 5th, a fresh to strong WNW breeze developed and there were lengthy sunny spells over the next few days before a falling cloud-base and fine drizzle arrived on the 10th. The weather remained cloudy, but daytime temperatures managed to top 20°C on the 12th and 13th. Calm settled weather then persisted until the 20th. Between the 15th and 18th an easterly sea-breeze developed during afternoons, suppressing temperatures a little, but in its absence, the temperature on the 19th and 20th exceeded 25°C. The hot spell was brought to an end on the 21st and continuous heavy rain arrived on the 22nd (15.5 mm; 15.2 mm Bridge of Allan). This cleared away slowly on the 23rd, and the 24th was warm, sunny and fresh, but rain returned on the 25th.

August Warm with rain later

Showers fell in a fresh south-westerly breeze over the first two days before a warm southerly airstream became established on the 4th. However, while daytime temperatures topped 20°C on most days, cloud tended to be ever-present and conditions were often rather dull. After the 8th there were steadily increasing amounts of rain and the 10th was a wet day (9.8 mm; 11.8 mm Bridge of Allan, 13.0 mm Dunblane). Parts of the Gleneagles Golf Course became flooded for a short while. From the 12th, there was a spell of dry and very warm weather until the 19th, when the maximum temperature reached 25.3°C. Rain was falling by the late afternoon of the 19th, heralding a spell of unsettled weather. Rain fell as heavy showers with thunder and lightning on the 23rd and the Borestone Bar in St Ninians was struck by lightning, which set the roof on fire. There were further spells of rain over the next few days until more settled weather regained a foothold on the 28th, resulting in a sunny and dry last few days.

September Warm and exceptionally dry

On the 1st, rain fell over Scotland in a very light south-westerly breeze after which the daytime temperature rose quickly, reaching 23.5°C (25.2°C Bridge of Allan). However, conditions were very dull at times with low cloud and poor visibility. A cold easterly airstream on the 5th pulled the maximum temperature down to 14.9°C. After the 6th, warm dry weather returned until the 10th, although the light winds still came from an easterly direction. Under relatively *clearer* skies, night temperatures began to fall, resulting in heavy morning dew and occasional ground fog around dawn. Cloud increased and the easterly breeze freshened to become strong overnight on the 11th/12th. Dry weather continued between the 13th and 16th before the easterly wind returned again. Cloud cover increased after the 20th which brought an end to almost three weeks without measureable rainfall. The 24th was the first of the truly wet days after the dry spell, and there were more substantial rainfalls over the following days. The wind became

strong south-westerly on both the 26th and 28th, and there was heavy driving rain overnight on the 28th/29th (10.0 mm). The weather remained unsettled for the rest of the month, in a showery south-westerly airstream.

October Warm and very wet

The weather for most of the month was dominated by a succession of rainy days which totalled 25 by the end of the month, but the air temperature was well above the seasonal average. The first two days were calm and almost cloudless but there was a strong south-westerly wind and heavy rain overnight on the 2nd/3rd. The wind remained in the west over the following days, which were wet with some lengthy sunny spells. There were calmer conditions between the 8th and 10th and, during breaks in the cloud cover, the night temperature reached -0.1°C in Bridge of Allan by the morning of the 8th (grass minimum -1.0°C). Further unsettled weather, with spells of heavy continuous rain and strong winds then persisted almost unabated until the 21st. The 14th and 15th were particularly wet, the 48-hour fall being 31.1 mm. Night temperatures fell during breaks in the cloud cover on the 21st but unsettled weather resumed on the 23rd, with more rain in fresh to strong winds. Former hurricane Lili crossed the British Isles between the 27th and 29th and was centred off south-west Scotland by midday on the 28th, which was a wild and wet day, and the Allan eventually overtopped its banks. The wind was very strong in central Scotland, resulting in some structural damage. The 48-hour rainfall over the 27th and 28th amounted to 30.2 mm.

November Cold and quite wet, with snow later

Unsettled, wet and windy weather continued over the first eight days and westerly winds reached gale-force in many places. There was heavy rain and severe gales overnight on the 5th/6th. After the storm had passed, the 7th was a calm and sunny day, but night temperatures then fell substantially below freezing for the first time, reaching -3.0°C in Dunblane. The wind had veered towards the north by the 11th at the start of what was to be a protracted spell of generally cold weather, heralded by the appearance of a capping of snow above 600 m on local hills. The 18th dawned calm and exceptionally cold under a cloudless sky, the temperature having fallen to -4.7°C (-6.8°C Bridge of Allan). The daytime temperature on the 19th reached only 3.0°C (1.5°C Dunblane). Heavy wet snow, with very large flakes, began falling after 08.00 GMT on the 21st, which had accumulated to more than 10 cm by midday. The snow became showery and began to turn to sleet by the afternoon. The 24-hour equivalent rainfall was 20.4 mm. As the clouds cleared, the night temperature fell below freezing and by the morning of the 22nd up to 5 cm of crusted frozen snow lay on the ground. This thawed a

little during the day but refroze at night. The 24th was a miserably cold day with persistent sleet, which turned to snow later and the maximum temperature reached only 1.4°C in Bridge of Allan. Snow lay to a depth of 3 cm or more by the morning of the 25th and a succession of moderate to severe night frosts ensured that frozen snow lingered until the end of the month, despite some daytime thawing.

December Cold and rather dull

There was wind and rain on the 1st (15.2 mm), followed by a brisk westerly on the 2nd. On the 3rd there was further rain, which turned to snow in a freshening northerly wind (16.5 mm; 14.9 mm Bridge of Allan). The temperature began to fall in a cold north-westerly on the 5th, the cloud cover clearing to allow night temperatures to fall sharply and by the 6th, the temperature had fallen to -7.5°C. Scotland was then affected by mild air which gave very dull weather with a low cloud base until the 12th. The night minimum on the 9th fell to only 7.0°C. Colder air and night frosts returned on the 12th but milder air from the 14th took daytime temperatures over 9.0°C for three consecutive days. There was heavy overnight rain on the 17th, which continued through the day on the 18th (48-hour total 25.1 mm; 33.5 mm Dunblane). A cold easterly airstream then developed which limited the daytime temperature to 4.8°C on the 19th. Settled weather extended over Scotland on the 20th for three days, which brought bright sunny weather but a return to night frosts. Cloud increased late on the 23rd and the Christmas period was dull and cold. Rain fell late on the 26th, but as the cloud cleared, night temperatures again fell below freezing. By the afternoon of the 30th, snow was beginning to fall in a freshening north-easterly. The last day of the year brought further snow showers and the daytime temperature rose to only 2.0°C in Bridge of Allan (0.0°C Dunblane).

WEATHER NOTES

Heavy snow in February

As warmer Atlantic air pushed very slowly eastwards into cold polar continental air on the 5th, snow began to fall. Snow was already falling in the Stirling area by dawn on the 5th and it continued for the rest of the day and on into the 6th. The leading edge of the snow was exceptionally slow moving and the southerly wind gusted to very strong, particularly in exposed places. By dawn on the 6th, more than 50 cm had accumulated over higher ground and drifts of 2 to 3 m were reported. The region worst affected by the snow was Dumfries and Galloway where a state of emergency was declared. Local opinion was that conditions were the worst they had experienced for at least 30 years, and comparisons were made with the snows of February 1947. It proved impossible to keep the A(M)74 open and many vehicles were stranded

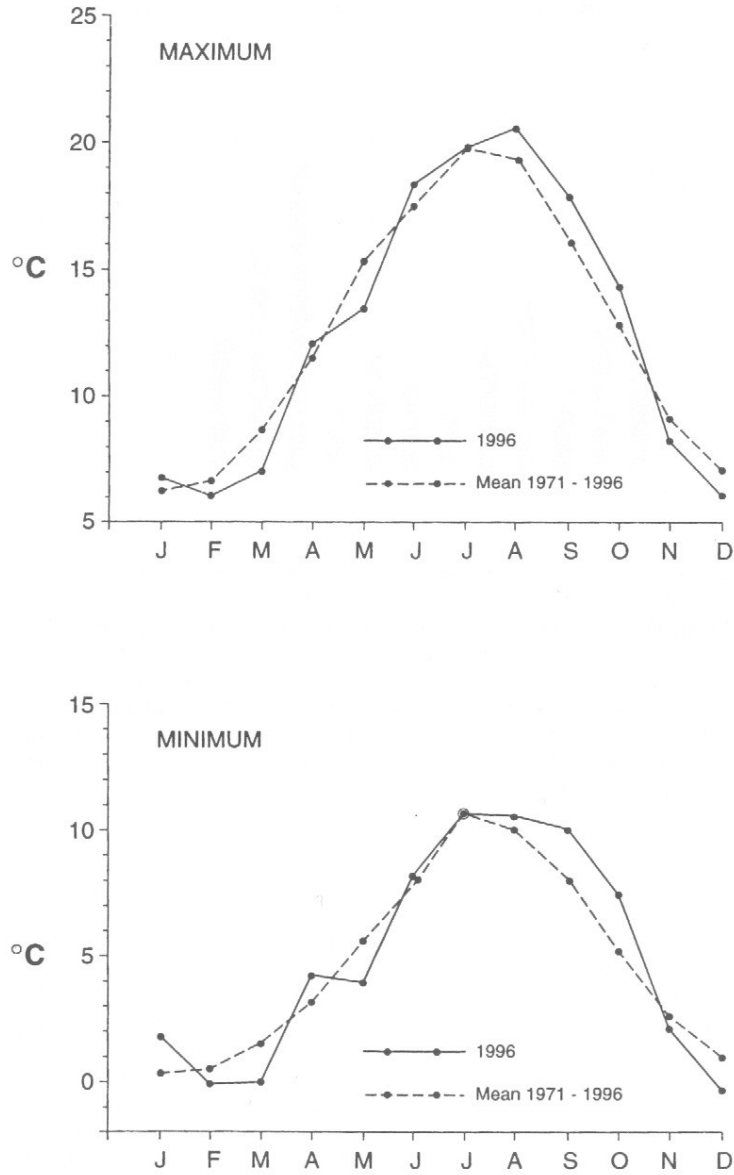


Figure 1. Monthly air temperatures (maximum and minimum) at Parkhead II 1996.

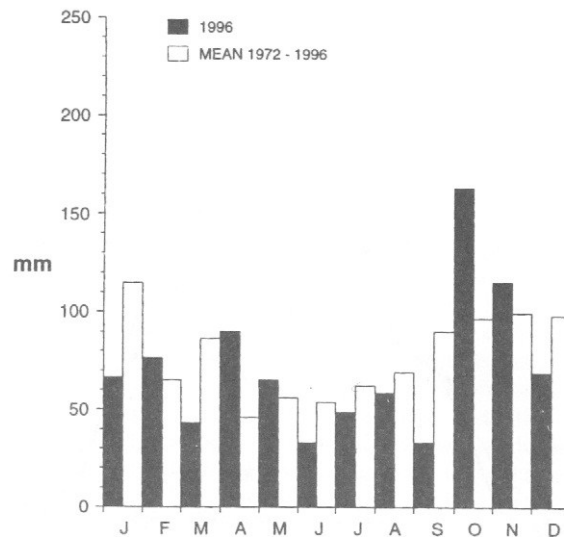


Figure 2 Monthly Rainfall at Parkhead II 1996

for up to 24 hours near Beattock. As many as 1,000 motorists were affected. Snow also brought down power lines and more than 25,000 homes were without electricity. All schools in south-west Scotland were closed. The army was called in to rescue the stranded and to take supplies to outlying settlements. On the railways, sixteen passengers were stranded when the 07.09 GMT Stranraer to Glasgow train became stuck in a 5 m drift four miles south of Barrhill. The coastguard helicopter from Belfast was called in to airlift the passengers to a local hotel. Elsewhere, trains on the West Coast Main Line were delayed by up to five hours.

The gale of May 31st

A deepening depression (984 mb) lay 300 miles off the coast of south-west Ireland at 06.00 GMT on the 30th. During the course of the day it drifted slowly north-eastwards and by midnight it had moved to a position 100 miles west of the Hebrides where the central pressure had fallen to 974 mb. As the depression moved northwards and continued to deepen, reaching 971 mb by 12.00 GMT on the 31st, the wind to the south of its centre strengthened to severe south-westerly gale-force over much of northern Scotland. The strong winds persisted all day but had abated to a strong breeze in most places by midnight. During the course of the day a double-decker bus loaded with school children was blown off the road on Slocht summit south of Inverness and clouds of dust were blown off dry fields bringing poor visibility along the main Aberdeen to Inverness road.

Lossiemouth meteorological station recorded several hours of blowing sand during the afternoon. A postal van was blown off the road on Harris, and ferry traffic was disrupted in the Shetlands.

A dry September

The weather during much of September was dominated by high pressure and winds from a dry easterly direction. This was most marked between the 2nd and 21st. The average atmospheric pressure in Bridge of Allan (09.00 GMT) was 1018.0 mb but on 17 days the pressure was greater than 1020 mb. Over the British Isles as a whole, rainfall was well below average almost everywhere and it was the driest September since 1986. In south-east England it was the driest since 1959. In the Stirling area there were 21 consecutive days without measureable rainfall, which was matched by similar dry spells elsewhere. Over Scotland, the greatest shortfalls were generally in the east, Leuchars (Fife), for example, receiving only 30% of the 35-year average for the month. The figures in the west were only marginally better, but Stornoway managed to reach 64% of the average.

Mountain snows of Scotland

Habitats which are sensitive to the persistence of snow cover in montane environments have been identified as favourable for conservation under the EC Habitats Directive. In recent years, changes have occurred in the Scottish climate during the winter months. These have been, with some exceptions, warmer and wetter than in previous decades, and winds have been more frequently from a westerly direction. This has led to changes in the location and persistence of snowbeds in the Scottish Highlands. Snow persistence arises as a result of a combination of favourable site (aspect, altitude, topographic shelter) and weather (airflow, intensity of precipitation, heat and moisture advection) conditions. Research is planned which will explore the relationship between snowbed location and site and weather variables. Identification of snowbed locations at fixed points in time will be based initially on the personal field records made by Mr J M Pottie (Inverness) who has detailed the locations and persistence of snowbeds on Ben Wyvis and Braeriach since 1974.

Automatic weather station at the University

Some while ago the University was approached by *Westwind* of Telford New Town in Shropshire with a view to adopting Stirling as a location for one of a UK-wide network of automatic weather stations. A Davis Weather Wizard III has been installed on one of the service towers above 'A' corridor in the Cottrell Building. The equipment monitors wind speed and direction, rainfall and temperature, which are displayed in the Environmental Science soils laboratory. The system is connected to the phone network which means that *Westwind* can interrogate the data at any time. At the Stirling end, a

manual record is currently kept of conditions at 09.00 GMT but plans are in hand to use the telephone connection to transfer the weather data into a datafile in the climatology laboratory. After processing, an ongoing summary of the previous week's weather will then be made available on the campus information network.

Acknowledgement

This paper is based on the Annual Climatological Bulletin which is published by the Department of Environmental Science at the University of Stirling.

REVIEWS (Naturalist)

Ardentallen - land use history of an Argyll peninsula. D. N. McVean. *The Scottish Naturalist* 108, pp3-105.196.

This study of an oakwood area, south of Oban, is also available as a separate from the author, and Craignish Conservation Trust. It was originally offered to FNH but routed to Dr Gibson of *The Scottish Naturalist*. It is a salutary 'failure' story, a sound land management project, frustrated by nature and an unsympathetic landowner.

The Rhosdhu House Reindeer Antlers. John Mitchell. *Glasgow Naturalist* 23(2), p49. 1997.

A short paper on this Ice Age historic discovery of 1935, with photo.

L.C.