

## THE WEATHER OF 1992

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This year brought slightly more of a mixed bag of weather than usual but most newsworthy weather events occurred overseas, the most notable being Hurricane Andrew which hit Florida during August. On the whole, the first half of the year was warmer than average, the latter half cooler. It was this latter half of the year which provided the most extreme weather events starting with heavy rain and gales in a very unsettled August, air frosts through October, gales and floods in South Wales in November, and a cold bleak December with freezing fog and snow almost up to Christmas.

*Temperature and rainfall values referred to in the following have been taken from Parkhead, the University's climatological station, unless otherwise stated.*

**January.** Unsettled and very wet at first, becoming more settled.

The recent trend towards wet and windy winter months was certainly in evidence for the first eight days of 1992. Scotland experienced a vigorous south-westerly airstream bringing gales on the 2nd and 3rd and an exceptionally wet day on the 7th (34.6mm). The Allan overtopped its banks on the 3rd and 8th. After the 9th, night temperatures fell very sharply and there were moderate frosts when the sky cleared, falling to -4.9°C early on the 10th. Patchy mist and fog formed which was dense and freezing on the morning of the 15th. A very mild south-westerly airstream then developed and a minimum temperature of 6.9°C was registered on the morning of the 19th, but as the wind went round to the east, temperatures fell sharply, and the 21st and 22nd were very dull cold days. The daytime temperature reached only 1.9°C on the 22nd. Dense freezing fog was a frequent hazard in the mornings up to the 31st and on the 29th it persisted all day.

**February.** Mild and rather wet.

Temperatures rose in warm tropical maritime air and reached 11.7°C on the 5th. The weather remained mild and unsettled for several days but temperatures began to fall in colder polar air. Snow showers fell on the 16th and during the afternoon of the 17th there was heavy and continuous snow which began to turn to sleet at altitudes below 30m. The 21st and 22nd were together the wettest 48hr period of the month (23.0mm). Unsettled weather continued until the end of the month.

**March.** Mild but very dull.

Unsettled weather persisted for the first seven days and the 4th and 5th were very dull with low cloud and drizzle. The weather turned much more wintry on the 10th when heavy snow showers returned a cover of

snow to ground above 60m. More snow fell on the 12th and 13th in a fresh to strong WNW breeze, and was lying to a depth of 0.5 cms in Bridge of Allan on the morning of the 13th. As the wind backed to SW the temperature rose very quickly and on the 16th the daytime temperature reached 12.4°C and the snowline had retreated to 450m. The mild and cloudy weather lasted until the 21st when the wind again returned to WNW. The wind eventually veered NNW by the 24th and stayed there until the 27th. The weather was bright and sunny and the visibility was excellent in the cold Arctic air, but no night frosts occurred. The 31st was a particularly wet and windy day, the rain turning to sleet and snow by the late afternoon (30.5mm Parkhead, 47.1mm Bridge of Allan).

**April.** Dull. Dry at first becoming wetter.

Changeable weather continued for the first two days with further light snow showers falling on the 2nd. There were two bright and sunny days on the 4th and 5th but these were displaced by exceptionally dull and damp weather between the 6th and 11th. A cold front crossed Scotland on the 12th and heavy hail showers fell in the cooler clearer polar maritime air behind it. The respite was, however, brief as cloud and rain returned on the 14th. Amounts of rain remained generally small, the 25th being the month's wettest day with only 8.2mm (6.6mm Bridge of Allan). There was a brief interlude of brighter weather on the 28th and 29th before rain returned again on the 30th.

**May.** Warm and moderately dry.

The first two days were bright and clear in a fresh WNW breeze but the weather became more settled in a mild, but occasionally quite vigorous, westerly airstream. Squally showers fell as snow on the 8th and as hail on the 10th and 11th, but later on the 11th heavy rain was falling in a strong south-westerly. By the morning of the 12th 14.2mm of rain had fallen, the month's largest daily total. The weather changed again on the 13th as Britain was affected by a very hot southerly airstream and on the 14th the daytime temperature reached a remarkable 28.0°C (29°C in Edinburgh, 28°C in Glasgow). The heat was, however, short-lived and on the 15th there was a return to fresher conditions. After five sunny days the warm spell came to an abrupt end on the 20th as a shallow thundery area of low pressure developed over south-east Scotland. From the 23rd the weather again became warm with an intermittent easterly breeze.

**June.** Warm and exceptionally dry.

Apart from the first few days, the weather was dominated for most of the month by high atmospheric pressure which maintained dry, but often cloudy, weather. The 1st was dull with drizzle but the weather improved slowly and, although there was a continuous cloud cover on most mornings, this usually cleared to give pleasantly sunny afternoons. With the wind in the east, haar was a frequent visitor to the east coast and this occasionally reached Stirling.

The 12th was particularly warm reaching the month's highest daytime temperature of 25°C. The weather became consistently sunny between the 18th and 25th but visibility was only moderate on days when a lower atmosphere haze developed. Warm sultry weather brought rain on 30th, the month's wettest day (5.0mm).

**July.** Cloudy and damp.

Any hopes of 1992 being the year of the much awaited long hot summer were soon dashed as the settled conditions of May and June gave way to unsettled weather from the Atlantic. The first four days were cloudy with occasional rain, although amounts were small in comparison to the heavy 48hr falls, in excess of 50mm, which occurred over England and Wales. On the 5th and 6th the weather became very warm and sultry and a temperature of 20.0°C was registered at 07.30GMT on the 7th in Bridge of Allan, where the maximum temperature reached 28.8°C later the same day (26.5°C at Parkhead). There was cloud and continuous light rain on the 11th heralding the start of an extended spell of generally unsettled weather. A particularly vigorous depression moved slowly eastwards over Scotland between the 16th and 19th and the month's heaviest rain fell on the 17th. The 28th to 30th were dry with a light to fresh SW breeze but rain returned again on the 31st as another Atlantic system moved in from the west.

**August.** Unsettled and very wet.

The weather over the first five days was dominated by a south-westerly wind which was occasionally very blustery, and heavy rain fell on the 2nd, the wettest day of the month at Parkhead (15.6mm). After two pleasantly bright sunny days a thundery low moved northwards from France on the 8th and heavy rain fell over much of England. The rain reached Scotland by the afternoon of the 8th and persisted until the evening of the 9th but no thunder was heard in the Stirling area. The 19th and 20th were sunny, but the respite was brief as cloud and rain returned on the 21st. Although there were a few brighter intervals the weather was dominated by wind and rain, which was heavy at times over England and Wales. There were thundery outbreaks over central Scotland on the 29th and on the 30th the weather became very wet and windy with occasional thunder. Overnight SW gales caused considerable damage over England and Wales and continued throughout the 31st in Scotland.

**September.** Cold and wet.

Unsettled weather persisted into September and by the 3rd the winds veered towards a cool north-westerly direction. There was very heavy and continuous rain (25.5mm) in a strong SW wind on the 6th. Although the rain died away to showers by the 7th, a run of strong SW winds remained for several days. A shallow thundery low over southern Britain on the 17th and 18th brought violent storms with heavy rain, hail and lightning damage in England but in Scotland the weather was

little more than very dull and grey. of the 20th, the clouds had descended to low ground to give a very wet fog which turned to rain by the afternoon. There were spells of heavy rain in parts of Britain after the 21st, and severe floods occurred in parts of south-east England. Rainfall amounts in Scotland were, however, relatively small and it was not until the 29th that heavy rain fell (24.8mm).

**October.** Very cold but dry.

17.5mm of rain fell in Stirling on the 2nd, the wettest day of the month after which temperatures fell below freezing at Bridge of Allan on the 7th (-1.0°C) under clear night skies, the first autumnal frost. Mornings were occasionally misty with a heavy dewfall. Cloud amounts were remarkably small at times which allowed night temperatures to fall below freezing on the 19th (-2.5°C). The skies again cleared briefly on the 25th and 26th causing night temperatures to fall below freezing, reaching -5.5°C on the 25th, but wind and rain returned on the 27th.

**November.** Mild and wet.

24.1mm of rain had fallen by 09.00 on the 2nd causing the Allan to overtop its banks a few hours later. There was a marked increase in daytime temperature which reached 15.5°C on the 5th but the weather remained generally dull with occasional drizzle until the 7th. As the wind veered westerly, showers of sleet fell on the 11th and the first substantial fall on the local hills brought the snowline down to 450m. The month's lowest temperature -4.3°C was registered at 09.00 on the 14th. Generally unsettled weather returned late on the 14th although there were a few sunny spells over the following days. By the 21st the weather showed signs of a return to the strong winds and rain familiar in recent winters. The 23rd and 27th were unpleasantly wet and windy days but rainfall amounts in Scotland were, however, considerably less than in south-west England and South Wales where 25mm of rain was exceeded on several successive days resulting in severe floods in the Welsh valleys by the 30th.

**December.** Unsettled and wet at first, becoming dry and cold.

A vigorous westerly airstream dominated the first three days bringing heavy rain, adding to the already serious flood problems in the south-west corner of Britain. 15.7mm was registered at Parkhead on the 1st. By the 4th temperatures had fallen in cold Arctic air and it began to snow. On the morning of the 5th the temperature fell to below freezing (-1.2°C) and there was a lethal glaze on local pavements and roads. By contrast, the 6th was wet and windy (13.3mm). Dense fog formed in the cold damp air on the 9th which persisted for much of the day. Snow returned on the 15th and 16th, and 45cm fell in Aviemore, which brought down overhead power and phone lines. Although no snow lay in central Scotland, except on the highest ground, snow falling overnight on 18th/19th lay to a depth of 1cm or so at the start of a spell of very cold weather. There were spells of

snow which lay to 2cms or more by the 22nd. An additional hazard was dense freezing fog which persisted all day on the 20th when the maximum temperature in Bridge of Allan reached only  $-2.6^{\circ}\text{C}$ . Minimum temperatures fell below  $-5.0^{\circ}\text{C}$  on consecutive nights on the 20th and 21st. With Christmas approaching the weather on the 24th became mild and dull for a while but freezing fog returned on the 29th. More unsettled weather was imminent as Hogmanay approached.

### **Storms and floods in Scotland 1-3 January**

With Scotland sandwiched between high pressure over southern England and very low pressure over Iceland there was a brisk start to 1992 in northern Scotland. Severe gale force winds caused considerable structural damage to the Shetlands. Irvine (1992) writes "Gusts exceeding 100 mph were recorded at Sumburgh. The wind was particularly violent in hail showers. Two people were killed when the hut in which they were sheltering was blown over the cliffs into the sea. Many houses were damaged and some, including two hotels, were demolished. This is thought to be the worst *hurricane* in Shetland since the south-east hurricane of 16 February 1990". The wind was accompanied by rain and, although there was little wind damage in the Stirling area, there was widespread flooding and the Allan overtopped its banks. Irvine S G 1992 *The Shetland hurricane of 1 January 1992 Journal of Meteorology (UK)* 17 (167) 96.

### **Increasing Wetness in Scotland**

During the period 1970 to 1989 the mean annual rainfall increased markedly over Scotland to produce the largest inter-decadal shift in hydroclimate that has occurred for 60 years. Consequently, several drainage basins showed amplified increases in annual river flows over the two decades. For some rivers the flows also appear to have become more variable, although the patterns are not consistent between individual basins and suggest the presence of regional factors. There has been a definite increase in the annual spill of water from reservoirs in Scotland but it has proved impossible to link the shift in hydrological conditions directly to increased flood events or flood losses. It is important that some central initiative is taken for the future collection of information on flood emergency events and data on economic losses in Scotland.

A questionnaire survey of senior water managers in Scotland indicated a high level of awareness of existing climatic impacts coupled with concern for future conditions. If, as a result of climate change, there is to be a longer-term trend towards wetter conditions over Scotland, a more detailed study of the two recent decades could provide an analogue for future water management strategies. Given the present state of knowledge, the recent fluctuations cannot be regarded either as unusual in the context of very long-term records, or as a fingerprint of future climatic changes. This is because what appears as a trend in the short term may be only part of an oscillation in the longer term. (K. Smith).

### Weather Radar Study

This ongoing one-year project, scheduled between May 1992 and May 1993, is looking at the potential use of both real-time and archived weather radar data in Scotland. A variety of information collection techniques, including in-depth interviews and questionnaires, have been used to determine the existing demand for short-term (0-6 hours ahead) weather forecasts and to assess the likely demand for more specific precipitation forecasts available from weather radar. Apart from looking at the potential applications and financial benefits, more detailed studies of actual decision-making processes are being undertaken with the cooperation of two organisations which currently access radar images directly (K. Smith).

These notes have been extracted from the Annual Climatological Bulletin which can be obtained for £2.50 from Dr S. J. Harrison, Department of Environmental Science, University of Stirling, FK7 4LA.

	Maximum Temperature	Minimum Temperature	Soil Temperature	Rainfall.
	°C	°C	°C	mm
	(0.3m)			
January	6.2	0.3	2.9	107.3
February	6.6	0.5	2.7	66.4
March	8.9	1.7	4.5	85.5
April	11.6	3.2	7.6	42.4
May	15.3	5.7	11.6	56.2
June	17.5	8.2	14.7	56.1
July	19.8	10.7	16.6	62.7
August	19.1	10.0	16.2	72.8
September	16.0	8.1	13.7	94.5
October	12.7	5.3	10.1	94.3
November	9.0	2.4	6.2	101.4
December	7.2	1.3	3.8	96.6
YEAR	12.5	4.8	9.2	936.2

Climatological averages for Parkhead 1971-92

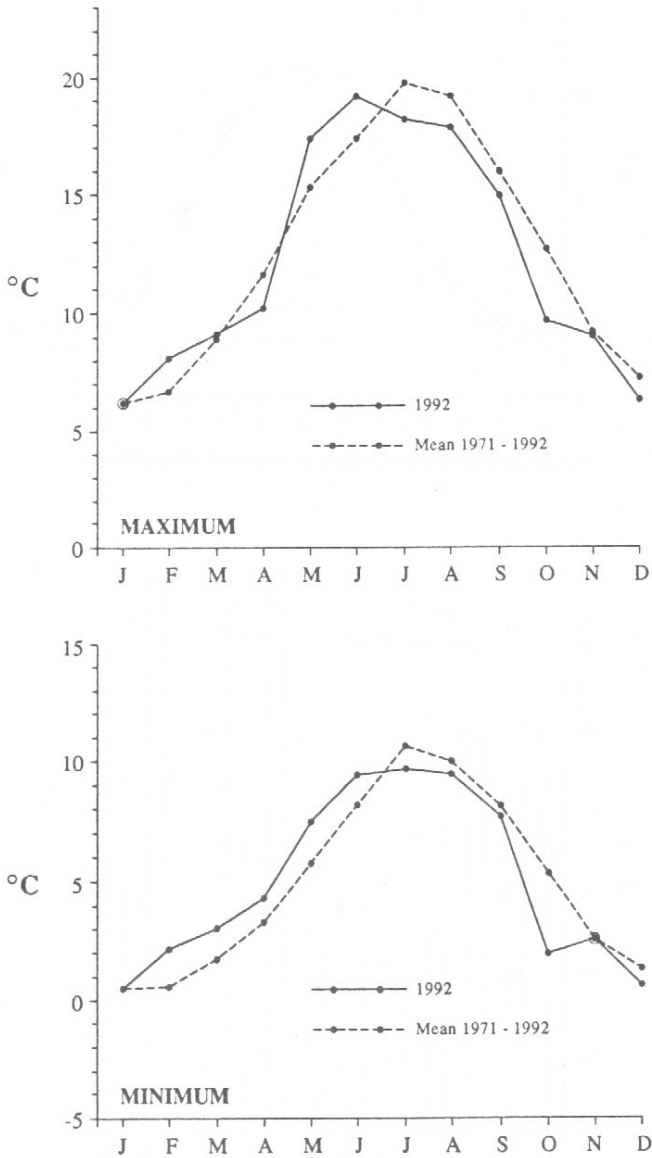


Figure 1. Air Temperatures at Parkhead 1992

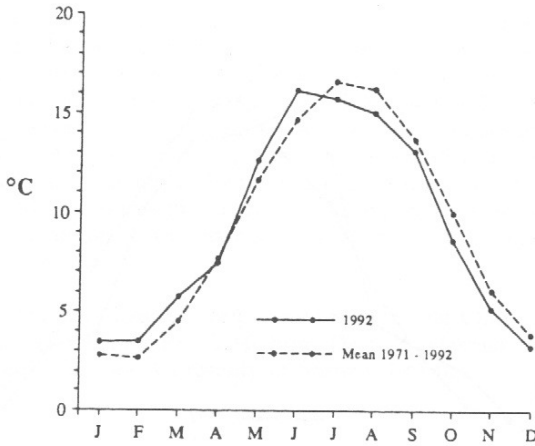


Figure 2. Soil Temperatures at Parkhead 1992

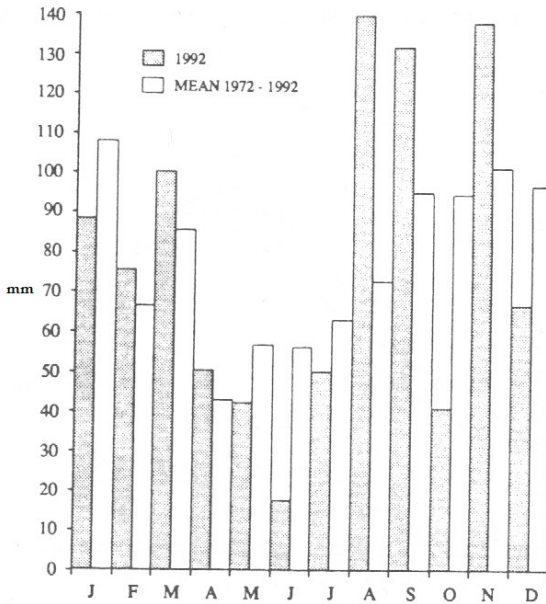


Figure 3. Monthly Rainfall at Parkhead 1992