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John Nairn—Building a Heatwave Vulnerability Map for Australia.

Heatwaves, often described as the 'silent killers', cause more deaths in Australia than any other natural disaster (eg fires, floods and cyclones). For example, the devastating Victorian bushfires in 2009 caused 173 deaths – but the heatwave leading up to the fires claimed more than 370 lives. Heatwaves also have a range of economic and planning impacts across different sectors, including health care, transport, emergency services, energy and agriculture.

At our June meeting John Nairn, South Australian Manager, Bureau of Meteorology and Australia's National Heatwave Project Director, shared details of the exciting heat-wave vulnerability mapping project currently under development. When completed, this project, with input from diverse agencies including the Bureau, Australian Bureau of Statistics, the University of Adelaide, Geoscience Australia and state health bodies, will improve response to community needs during heat wave events, thereby reducing the morbidity and mortality risks as well as the economic costs.

A heatwave is said to occur when the daily maximum and minimum temperatures are unusually hot over a three-day period. Minimum (or overnight) temperatures are critical in determining community vulnerability. When the minimum temperature remains high then the maximum will occur earlier the next day and remain near that high temperature for a longer period. A higher minimum temperature also restricts the amount of recovery that can occur overnight, due to less opportunity to discharge heat. This puts more stress on the body, which, especially if coupled with other health problems, can increase people's vulnerability. For people with chronic disease, medications can also react differently when body temperatures are raised.

How do you define 'unusually hot'? This varies from location to location, taking into account the long term seasonal maximum and minimum temperatures and also the prevailing temperatures over the preceding days/weeks. Humans take time to adjust to the unusual conditions. The 2003 European heatwave, moderate by South Australian standards, had a death toll of around 80,000 people. Not only was the infrastructure inadequate (eg few air-conditioned areas) but the population was unaccustomed to the elevated temperatures.

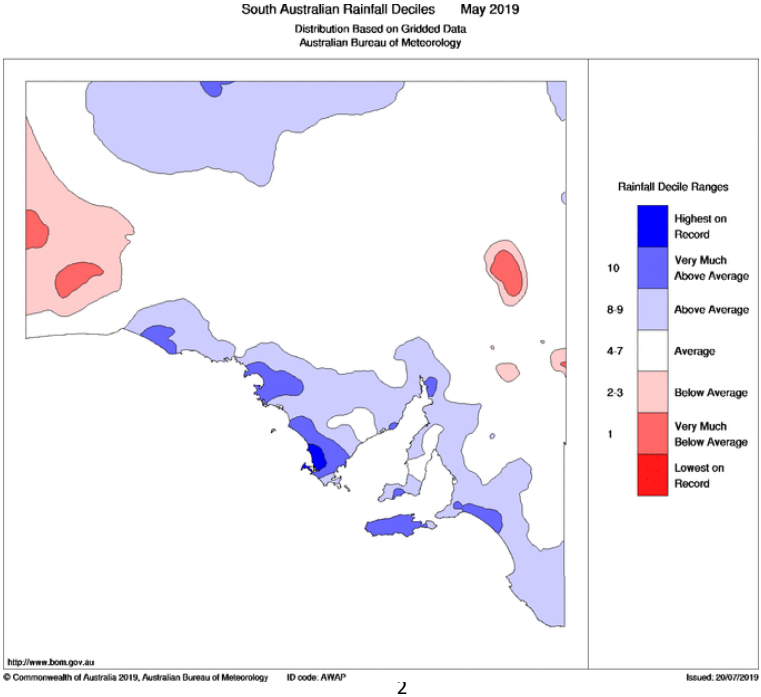
Better understanding of heatwaves and their potential impacts has come through using 'extreme value theory' on accumulated temperature distributions. Analysis of the distribution tails (ie the extreme events) shows that the 'generalised Pareto effect' applies, ie the upper 20% of events produce 80% of the adverse impacts. As

a result, heatwaves are classified by their intensity: low, severe or extreme. A low-intensity heatwave is an expected regular event during most summers so the majority of people are likely to have little problems with those heatwaves. Severe heatwaves are less frequent and are likely to be more challenging for the elderly, particularly if they have pre-existing medical conditions. Extreme heatwaves are quite rare, and they can affect the reliability of infrastructure such as power and transport. Extreme heatwaves are a problem for people who don't take precautions to keep cool. Even the healthy are at risk. People who work or exercise outdoors are particularly vulnerable.

Contributing meteorological factors to heatwaves in Australia include:- late monsoon onset in the tropics and across more southern regions; the speed of weather systems – eg highs moving slowly into the Tasman Sea with fronts approaching from the west can set up days of northerly winds, bringing down hot continental air to our latitudes; drought conditions with less soil moisture enhance daily temperatures; and even tropical cyclones off the Northwest Shelf which can act as heat pumps, warming the middle and upper atmosphere over large parts of the continent. Local urban heat islands can also enhance heatwave conditions. Climate change projections show extreme hot days will become more frequent and heatwaves are likely to be more intense.

The Bureau of Meteorology provides a heatwave service that runs from October until April. Maps provided in this service show the location and intensity of recent heatwaves, and any forecast heatwaves for the next seven days. Advance notice of severe and extreme heatwaves gives the emergency services, health authorities and the community the opportunity to prepare and reduce the level of impact on people, business and industry.

For more information about heatwaves, visit bom.gov.au/australia/heatwave.



Greater Adelaide in May 2019: wetter than average

Wetter than average

- Rainfall in May was above average across Adelaide and the Hills
- The highest monthly total was 199.2 mm at Cherry Gardens in the Adelaide Hills
- Rainfall totals ranged from 117% of average at Rosedale to 168% of average at Kuitpo Forest Reserve
- Several sites had either their highest total May rainfall on record or their highest total May rainfall for at least 20 years

Cool end to the month

- Daytime temperatures were within 1 °C of average throughout Adelaide & the Hills
- The month ended with a week of cool temperatures at the end of May, with temperatures almost 5 °C below average on the 29th
- The warmest temperature recorded in Greater Adelaide was 27.9 °C at Rosedale on the 23rd, towards the end of a warm spell that lasted more than a week
- Night-time temperatures were generally within 1 °C of average at sites throughout Greater Adelaide, ranging from 0.6 °C cooler than average at Parafield Airport to 1.0 °C warmer than average at Mount Barker
- The month ended with a very cold night on the 30th, with minimum temperatures below 5 °C at most sites and the lowest recorded was 1.3 °C at Rosedale

Adelaide (West Terrace / ngayirdapira)

- Total rainfall was 83.0 mm, which is 122% of the long-term average of 68.1 mm
- The mean daily maximum temperature was 18.6 °C, equal to the long-term average. The mean daily minimum temperature was 10.8 °C, 0.4 °C above the long-term average of 10.4 °C. The coldest morning was 4.9 °C on the 30th, and the warmest morning was on the 19th with a minimum temperature of 18.6 °C

Extremes in May 2019

Hottest day	27.9 °C at Rosedale on the 23rd
Warmest days on average	19.2 °C at Parafield Airport
Coolest days on average	13.0 °C at Mount Lofty
Coldest day	7.3 °C at Mount Lofty on the 9th
Coldest night	1.3 °C at Rosedale on the 30th
Coolest nights on average	7.8 °C at Mount Barker 7.8 °C at Mount Lofty
Warmest nights on average	11.4 °C at Noarlunga
Warmest night	18.9 °C at Noarlunga on the 19th
Warmest on average overall	14.8 °C at Noarlunga
Coolest on average overall	10.4 °C at Mount Lofty
Wettest overall	199.2 mm at Cherry Gardens
Driest overall	51.0 mm at Gawler
Wettest day	32.4 mm at Cudlee Creek (Odea Road) on the 8th
Strongest wind gust	87 km/h at Mount Crawford AWS on the 26th

Record highest May total rainfall

	New record (mm)	Old record	Years Held	May Average
McLaren Vale	117.2	106.0 in 2003	24	64.8
Belair	147.8	143.8 in 2016	22	83.7

For more information plus a summary of May's statistics please see:
http://www.bom.gov.au/climate/current/month/sa/archive/201905.adelaide.shtml

Adelaide (West Terrace / Ngayirdapira), South Australia
May 2019 Daily Weather Observations

The official site for Adelaide, having reopened in May 2017.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	We	12.9	18.8	6.4			WNW	48	16:43	14.6	78		N	17	1008.5	18.4	47		N	20	1007.2
2	Th	11.4	17.9	8.0			N	39	01:37	11.6	88		N	19	1014.2	16.5	64		NNW	17	1015.3
3	Fr	10.0	18.9	5.2			WSW	54	14:36	14.0	78		N	13	1017.6	15.7	84		W	11	1016.2
4	Sa	11.4	18.7	4.6			SW	28	15:24	14.8	69		S	11	1025.2	17.2	54		SW	17	1024.6
5	Su	13.1	18.7	0			SSW	26	15:04	15.0	54		E	13	1027.3	17.2	48		SSE	11	1024.9
6	Mo	6.6	19.6	0			NE	30	22:49	14.4	63		NE	9	1024.1	19.0	48		WNW	9	1018.9
7	Tu	12.4	17.8	0			SW	63	15:53	15.8	51		N	15	1012.1	15.5	67		WSW	20	1012.0
8	We	11.2	17.1	15.2			NNW	41	23:14	14.7	58		SW	9	1019.3	14.6	66		W	15	1018.2
9	Th	10.6	12.3	5.2			WSW	41	12:39	11.0	91		S	9	1010.9	10.8	83		SSW	9	1011.2
10	Fr	7.5	15.4	9.6			SW	46	13:14	9.9	71		S	13	1024.2	14.9	48		SW	24	1025.7
11	Sa	9.8	17.3	1.6			W	41	11:17	14.2	83		SSE	4	1031.0	16.0	72		WSW	11	1030.0
12	Su	12.2	16.7	1.4			W	22	11:59	14.5	76		WNW	9	1031.2	16.2	56		W	13	1028.5
13	Mo	8.4	18.8	0			N	31	09:19	14.2	62		N	13	1027.4	18.6	51		NW	15	1024.8
14	Tu	7.6	19.5	0			NW	20	12:45	14.0	66		NE	7	1030.3	18.7	48		WSW	11	1029.0
15	We	7.6	19.5	0			ESE	24	21:12	13.7	70		N	6	1032.0	19.1	52		SW	9	1029.1
16	Th	8.4	21.1	0			NE	22	20:53	16.2	64		NE	9	1027.7	18.9	53		SW	7	1024.0
17	Fr	13.4	22.9	0			NE	22	05:33	16.2	48		NE	13	1024.7	22.0	27		NE	7	1021.8
18	Sa	11.6	24.9	0			ENE	33	22:43	18.6	46		ENE	15	1024.8	23.7	39		NNE	11	1021.8
19	Su	18.6	23.1	0			NNE	44	06:13	23.1	38		NNE	22	1020.0	17.8	80		ENE	9	1019.1
20	Mo	12.7	18.6	5.6			NW	33	10:17	14.7	69		N	11	1021.1	17.8	69		NW	19	1020.7
21	Tu	13.4	22.6	0			NW	24	13:34	15.7	58		NE	11	1023.5	22.2	32		NW	11	1021.5
22	We	7.7	21.6	0			SW	19	12:11	13.7	59			Calm	1027.6	19.9	51		SW	9	1025.4
23	Th	8.2	24.2	0			NNW	35	12:50	16.5	66		N	6	1024.1	22.6	47		WSW	15	1020.8
24	Fr	15.0	23.4	1.2			N	52	06:12	19.0	60		N	15	1016.9	18.9	72		SW	15	1016.6
25	Sa	12.7	16.8	1.0			WSW	37	19:06	13.8	94		NNW	15	1016.8	14.4	84		WSW	17	1015.1
26	Su	11.7	15.9	4.4			W	56	17:51	14.1	67		W	19	1018.8	14.2	83		WNW	20	1015.8
27	Mo	11.8	15.1	10.4			SW	52	05:10	13.5	54		SW	22	1019.8	13.6	63		SW	20	1020.2
28	Tu	11.7	15.8	0.4			WSW	54	22:55	13.8	82		NW	17	1017.9	14.5	88		WSW	20	1014.1
29	We	10.8	14.4	2.2			SSW	56	13:38	11.8	64		SW	19	1014.7	13.2	47		SSW	28	1016.2
30	Th	4.9	15.6	0.6			S	30	16:52	8.8	82			Calm	1029.3	13.5	55		S	19	1029.7
31	Fr	8.8	15.1	0			S	24	11:54	12.8	84			Calm	1032.9	14.5	80		SW	13	1031.5
Statistics for May 2019																					
	Mean	10.8	18.6							14.5	67			11	1022.4	17.1	59			14	1021.0
	Lowest	4.9	12.3							8.8	38			Calm	1008.5	10.8	27		#	7	1007.2
	Highest	18.6	24.9	15.2			SW	63		23.1	94		#	22	1032.9	23.7	88		SSW	28	1031.5
	Total			83.0																	

Observations were drawn from Adelaide (West Terrace / Ngayirdapira) {station 023000}

This is now the "official" site for Adelaide, having reopened in May 2017. Observations are also available from the Kent Town site {station number 023090}.

South Australia in May 2019: wetter than average in southern areas

Rainfall in May was below average for South Australia as a whole, but it was wetter than average in some Agricultural districts and in the State's far north. Daytime temperatures were generally warmer than average but night-time temperatures tended to be near-average or cooler than average.

Wetter than average in some agricultural districts

- Rainfall in May was 12% below average for South Australia as a whole
- Most areas of the State recorded at least some rain during the month, but totals were below average across most pastoral areas
- Rainfall was above average in areas of the far north of the state and across much of the South Australian Agricultural districts—in particular western Eyre Peninsula and Kangaroo Island
- The highest monthly totals were in the south and the Adelaide Hills and Kangaroo Island received more than 150 mm, with 199.2 mm at Cherry Gardens the highest total recorded in the State
- There were several rain events during the month, with 1 May being the State's wettest day as a cold front and associated cloud bands brought rain to most areas
- On 1 May, Flinders Chase had its highest May daily rainfall on record
- Many sites had either their highest total May rainfall on record or their highest total May rainfall for at least 20 years

Warm days in some areas, but cool nights

- Daytime temperatures were warmer than average in northern and eastern areas of the State, but were a little cooler than average on the Eyre Peninsula and parts of the West Coast district
- The State's mean maximum temperature for May was 0.73 °C above average
- Night-time temperatures were below average in the west, but near-average or above average in the east
- The State's mean minimum temperature for May was 0.36 °C below average, the lowest difference from average for a month since June 2018 (which was 0.69 °C below average)
- On 9 May, several sites had their coldest May day on record
- On the 30th, Minnipa and Wudinna had their lowest May temperature on record

Extremes in May 2019

Hottest day	32.5 °C at Nullarbor on the 23rd
Warmest days on average	24.1 °C at Oodnadatta Airport
Coolest days on average	13.0 °C at Mount Lofty
Coldest day	7.3 °C at Mount Lofty on the 9th
Coldest night	-1.1 °C at Yunta Airstrip on the 16th
Coolest nights on average	5.4 °C at Yunta Airstrip
Warmest nights on average	12.6 °C at Cape Willoughby
Warmest night	20.9 °C at Port Pirie Aerodrome AWS on the 19th
Warmest on average overall	17.6 °C at Moomba Airport
Coolest on average overall	10.4 °C at Mount Lofty
Wettest overall	199.2 mm at Cherry Gardens
Driest overall	1.0 mm at Gammon Ranges (Moolawatana)
Wettest day	87.0 mm at Mambray Creek on the 10th
Strongest wind gust	100 km/h at Cape Willoughby on the 29th

Some notable statistics for May were:

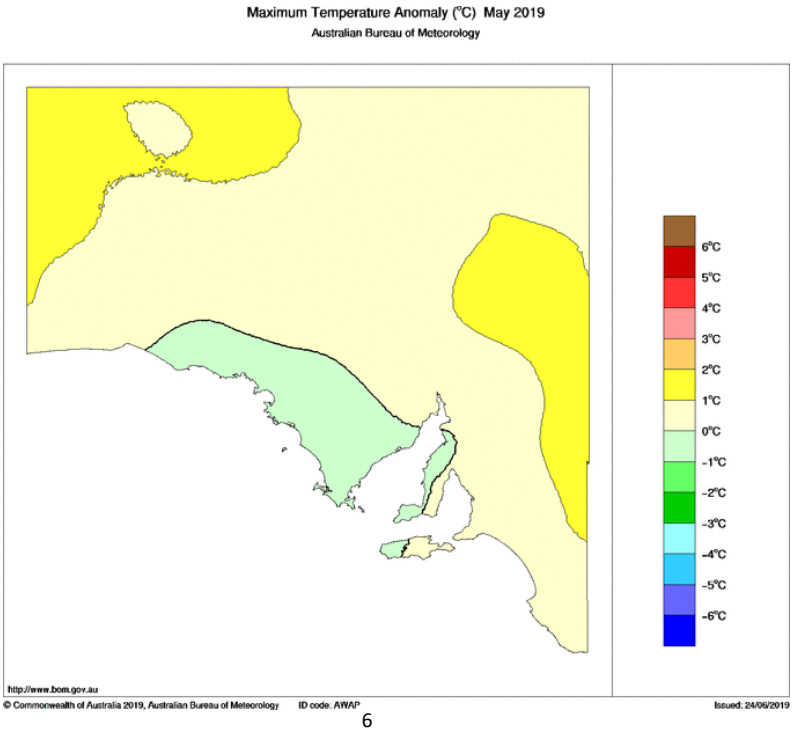
Record highest May daily rainfall

	New record (mm)	Old record	Years Held
Flinders Chase (Rocky River)	68.0 on the 1st	40.6 on the 1st in 1960	60

Record highest May total rainfall				
	New record	**Old record**	**Years Held**	**May Average**
Mount Hope	150.0	142.1 in 1971	106	50.2
Coffin Bay	131.1	98.9 in 1988	30	59.1
Kingscote	102.4	92.4 in 2003	26	49.2
Cape Jaffa	115.0	102.2 in 2000	25	55.8
McLaren Vale	117.2	106.0 in 2003	24	64.8
Belair	147.8	143.8 in 2016	22	83.7

Record lowest May daily maximum temperature				
	New record (°C)	**Old record**	**Years Held**	**May Average**
Kyancutta	12.1 on the 9th	= 12.1 on the 24th in 1942	90	21.1
Parawa	10.0 on the 9th	= 10.0 on the 23rd in 2006	25	14.9
Minnipa	11.1 on the 9th	11.7 on the 24th in 2012	23	20.3
Wudinna	11.6 on the 9th	13.0 on the 27th in 2000	21	20.9

For more information plus a summary of statistics please see:
http://www.bom.gov.au/climate/current/month/sa/archive/201905.summary.shtml



Greater Adelaide in autumn 2019: warmer and drier than average

Rainfall in autumn was near-average to below average for Adelaide and the Hills, despite a wetter than average May. Daytime temperatures were warmer than average throughout and night-time temperatures were warmer than average for the season as a whole, but autumn ended with cool nights towards the end of May.

Drier than average despite a wet May

- Autumn rainfall was near-average to below average across Greater Adelaide
- Several rain events in May brought above average totals for the month, but March and April were both much drier than average
- The wettest days for the season were during May, with 32.4 mm at Cudlee Creek on 8 May the highest daily total
- The wettest site was Aldgate, recording 228.1 mm for the season
- Rainfall totals ranged from 62% of average at Rosedale to 94% of average at Mount Lofty and Kuitpo Forest Reserve
- A much drier than average first five months of the year for Adelaide and the Hills

Warmer than average

- Autumn was warmer than average throughout Adelaide and the Hills
- Mean maximum temperatures were warmer than average in all suburbs, despite some cool days during May
- Mean maximum temperatures ranged from 0.4 °C above average at Noarlunga to 2.3 °C above average at Mount Lofty
- A very warm start to the season, with temperatures on 1 March over 40 °C in many suburbs and some sites having their highest autumn temperature on record
- Night-time temperatures were warmer than average for the season as whole, but ended with cool nights at the end of May
- Mean minimum temperatures ranged from 0.1 °C below average at Rosedale to 1.2 °C above average at Adelaide Airport
- A warmer than average first five months of the year

Adelaide (West Terrace / ngayirdapira)

- Total rainfall was 94.2 mm, which is 69% of the long-term average of 135.8 mm
- The mean daily maximum temperature was 23.2 °C, which is 0.9 °C above the long-term average of 22.3 °C. The warmest day was 40.3 °C on 1 Mar, and the coolest day was on 9 May when the temperature reached 12.3 °C
- The mean daily minimum temperature was 13.5 °C, which is 0.7 °C above the long-term average of 12.8 °C. The coldest morning was 4.9 °C on 30 May, and the warmest morning was on 2 Mar when the minimum temperature was 29.3 °C

Extremes in autumn 2019

Hottest day	42.3 °C at Edinburgh RAAF on 1 Mar
Warmest days on average	24.2 °C at Parafield Airport
Coolest days on average	18.2 °C at Mount Lofty
Coldest day	7.3 °C at Mount Lofty on 9 May
Coldest night	1.3 °C at Rosedale on 30 May
Coolest nights on average	10.3 °C at Mount Lofty
Warmest nights on average	14.1 °C at Noarlunga
Warmest night	31.3 °C at Noarlunga on 2 Mar
Warmest on average overall	18.5 °C at Adelaide (Kent Town)

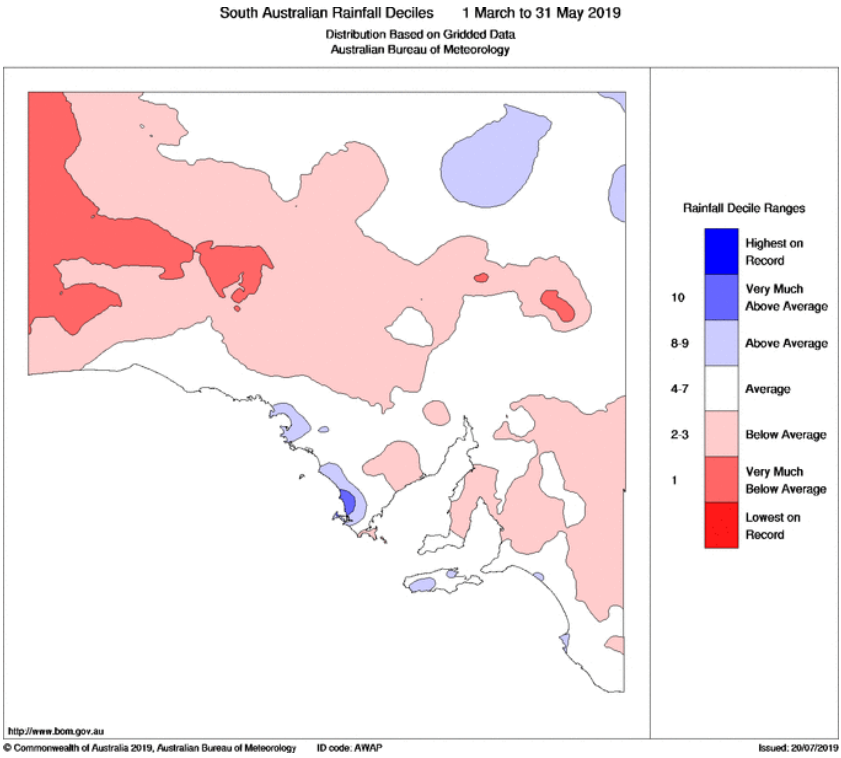
Coolest on average overall	14.3 °C at Mount Lofty
Wettest overall	228.1 mm at Aldgate
Driest overall	54.4 mm at Gawler
Wettest day	32.4 mm at Cudlee Creek (Odea Road) on 8 May
Strongest wind gust	94 km/h at Mount Crawford AWS on 24 March

Some notable statistics for Autumn were:

Record highest autumn temperature

	New record (°C)	Old record	Duration	Autumn Average
Kent Town	42.2 on 1 Mar	41.9 on 6 Mar 1986	43	22.8
Mount Crawford	37.6 on 1 Mar	36.9 on 17 Mar 2008	26	19.2
Kuitpo Forest	38.1 on 1 Mar	37.4 on 8 Mar 2008	22	19.7

For more information plus a summary of Autumn's statistics please see:
http://www.bom.gov.au/climate/current/season/sa/archive/201905.adelaide.shtml



All the detail you could possibly want and more is available on the BoM website.

Visit http://www.bom.gov.au/climate and wander through the various archived climate reports and summaries which are available in text and graphical forms.

South Australia in autumn 2019: drier than average with warm days

Rainfall in autumn was below average in most areas of South Australia apart from some southern coastal fringes and in the northeast. Daytime temperatures in autumn were very much above average across large areas of the State and night-time temperatures were near-average or warmer than average.

Drier than average in most areas

- Rainfall in autumn was 50% below average for the State as a whole
- March and April were drier than average for South Australia and May was drier than average across large areas of the State's north
- Rainfall was below average in many eastern Agricultural districts and throughout much of the State's west
- Rainfall was near average to above average in the northeast and in some southern coastal areas
- On 1 May, Flinders Chase had its highest autumn daily rainfall on record
- A very dry first five months of the year, with rainfall very much below average in many areas
- Driest first five months of the year since 2008

Warm days

- A very warm autumn for much of the State
- Daytime temperatures were particularly warm, with mean maximum temperatures above to very much above average across most of the State
- The season began with a hot day on 1 March and many sites had their highest autumn temperature on record
- On 1 March, daily maximum temperatures were more than 12 °C above average across the State's south and 45.3 °C was recorded at Nullarbor
- Later in the season on 9 May, several sites had their coldest autumn day on record
- Despite May having temperatures closer to average, the State's mean maximum temperature for autumn was fifth-warmest on record, 1.80 °C above average
- Night-time temperatures were warmer than average though not as extreme, with the State's mean minimum temperature 0.59 °C above average
- Mean minimum temperatures were above average in most areas, particularly in the northwest
- On 2 March, many sites had their warmest autumn night on record
- The lowest minimum temperature recorded for the month was -1.1 °C at Yunta Airstrip on 16 May
- On 30 May, Minnipa and Wudinna had their lowest autumn temperature on record
- Ernabella (Pukatja) equalled its highest autumn mean daily maximum temperature on record and had its highest autumn mean temperature on record
- A very warm first five months of the year, with most of the State very much warmer than average and the mean maximum temperature highest on record

Extremes in autumn 2019

Hottest day	45.3 °C at Nullarbor on 1 Mar
Warmest days on average	30.6 °C at Oodnadatta Airport
Coolest days on average	18.2 °C at Mount Lofty
Coldest day	7.3 °C at Mount Lofty on 9 May
Coldest night	-1.1 °C at Yunta Airstrip on 16 May
Coolest nights on average	8.3 °C at Coonawarra

Warmest nights on average	16.3 °C at Moomba Airport
Warmest night	31.3 °C at Noarlunga on 2 Mar
Warmest on average overall	23.1 °C at Moomba Airport
Coolest on average overall	14.3 °C at Mount Lofty
Wettest overall	228.1 mm at Aldgate
Driest overall	3.2 mm at Marree Aero
Wettest day	87.0 mm at Mambray Creek on 10 May
Strongest wind gust	100 km/h at Cape Willoughby on 29 May

Some notable statistics for Autumn were:

Record highest autumn daily rainfall

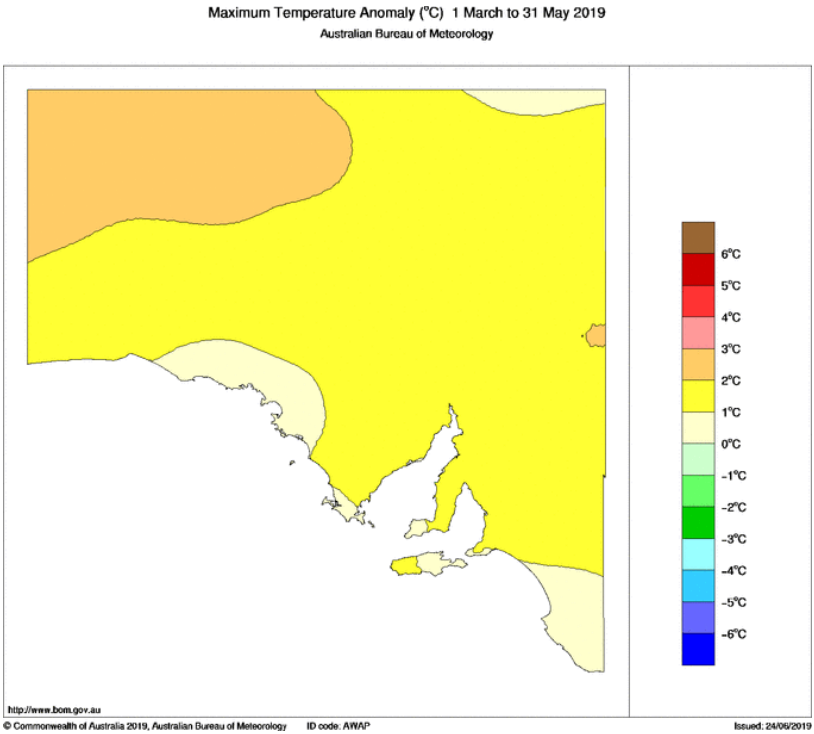
	New record (mm)	Old record	Years Held
Flinders Chase (Rocky River)	68.0 on 1 May	67.2 on 27 Mar 2006	6

Record highest autumn temperature (^{0}C)				
	New record	**Old record**	**Duration**	**Avge**
Streaky Bay	42.8 on 1 Mar	42.6 on 5 Mar 1986	63	23.7
Meningie	40.8 on 1 Mar	40.5 on 17 Mar 2008	53	21.5
Cape Willoughby	38.5 on 1 Mar	37.2 on 1 Mar 1989	52	19.0
Kent Town	42.2 on 1 Mar	41.9 on 6 Mar 1986	43	22.8
Nullarbor	45.3 on 1 Mar	43.4 on 26 Mar 2017	33	24.3
Cape Jaffa	38.4 on 1 Mar	37.3 on 11 Mar 1998	28	19.9
North Shields	43.3 on 1 Mar	42.4 on 9 Mar 2008	28	22.1
Mount Crawford	37.6 on 1 Mar	36.9 on 17 Mar 2008	26	19.2
Parawa	38.2 on 1 Mar	36.9 on 9 Mar 2008	25	18.1
Stenhouse Bay	41.9 on 1 Mar	41.2 on 9 Mar 2008	24	21.0
Minnipa	42.4 on 1 Mar	= 42.4 on 26 Mar 2017	23	24.8
Nuriootpa	39.6 on 2 Mar	39.2 on 16 Mar 2008	23	21.8
Strathalbyn	41.6 on 1 Mar	40.3 on 9 Mar 2008	23	22.1
Ernabella	42.2 on 11 Mar	41.1 on 2 Mar 2007	22	26.7
Kuitpo Forest	38.1 on 1 Mar	37.4 on 8 Mar 2008	22	19.7
Roseworthy	42.6 on 1 Mar	41.7 on 13 Mar 2008	22	24.1
Snowtown	41.5 on 1 Mar	41.1 on 8 Mar 2016	21	24.5

Record lowest autumn daily maximum temperature (°C)				
	New record	**Old record**	**Duration**	**Average**
Kyancutta	12.1 on 9 May	= 12.1 on 24 May 1942	90	25.5
Parawa	10.0 on 9 May	= 10.0 on 23 May 2006	25	18.1
Minnipa	11.1 on 9 May	11.7 on 24 May 2012	23	24.8
Wudinna	11.6 on 9 May	13.0 on 27 May 2000	21	25.4

Record highest autumn daily minimum temperature (°C)				
	New record	**Old record**	**Duration**	**Avge**
West Terrace	29.3 on 2 Mar	29.1 on 4 Mar 1942	95	12.8
Cleve	29.3 on 2 Mar	28.8 on 3 Mar 1965	62	12.4
Elliston	26.0 on 2 Mar	25.7 on 2 Mar 2000	58	12.3
Maitland	27.5 on 2 Mar	27.0 on 17 Mar 2008	39	12.4
Coonawarra	25.0 on 2 Mar	24.1 on 4 Mar 2004	34	8.3
North Shields	23.4 on 2 Mar	22.8 on 8 Mar 2013	28	12.5
Clare	24.1 on 2 Mar	23.3 on 11 Mar 2014	26	9.3
Parawa	27.1 on 2 Mar	25.2 on 10 Mar 2008	25	11.3
Stenhouse Bay	23.7 on 2 Mar	= 23.7 on 2 Mar 2000	24	14.1
Cleve	29.8 on 2 Mar	29.1 on 14 Mar 2008	23	12.5
Minnipa	29.0 on 2 Mar	27.5 on 17 Mar 2008	23	12.1
Nuriootpa	26.3 on 2 Mar	24.1 on 8 Mar 2013	23	9.4
Naracoorte	26.0 on 2 Mar	25.0 on 14 Mar 2008	21	8.5
Padthaway Sth	25.5 on 2 Mar	24.0 on 10 Mar 2001	20	8.6

For more information plus a summary of Autumn's statistics please see:
http://www.bom.gov.au/climate/current/season/sa/archive/201905.summary.shtml



Greater Adelaide in June 2019: rainfall above average, cool nights

Rainfall in June was generally above average in Adelaide and the Hills. Daytime temperatures for June were generally close to average, while night-time temperatures tended to be cooler than average.

Near-average rainfall

- Rainfall in June was generally above average in Adelaide and the Hills
- The wettest day was on the 12th, when a strong cold front and associated cloud band crossed the city, with daily totals of more than 60 mm recorded at several sites in the Hills
- Monthly rainfall totals ranged from 89% of average at Rosedale to 144% of average at Adelaide Airport
- On the 12th, Burnside and Belair had their highest June daily rainfall on record

Daytime temperatures close to average, cool nights

- Daytime temperatures for June were generally close to average
- The warmest days were on the 11th and 28th, with northerly winds ahead of cold fronts resulting in the daytime temperatures over 22 °C in the city
- Mean maximum temperatures ranged from 0.2 °C cooler than average at Noarlunga to 0.9 °C warmer than average at Mount Lofty
- Night-time temperatures were generally cooler than average for June
- The lowest temperature was -1.8 °C at Parafield Airport on the 24th during a week when high pressure systems dominated and brought clear, cold nights
- Mean minimum temperatures ranged from 1.0 °C below average at Parafield Airport to 0.5 °C above average at Mount Barker
- Both the daytime and night-time temperatures on the 24th were cooler than average, with a daily mean temperature (average of the maximum and minimum temperature) of 6.65 °C at Kent Town, which was the site's second-lowest on record (after 6.05 °C on 9 July 1983)

Adelaide (West Terrace / ngayirdapira)

- Total rainfall was 83.4 mm, which is 117% of the long-term average of 71.2 mm
- The mean daily maximum temperature was 16.0 °C, which is 0.2 °C above the long-term average of 15.8 °C. The warmest day was 22.2 °C on the 11th, and the coolest day was on the 24th when the temperature reached 11.7 °C
- The mean daily minimum temperature was 8.2 °C, which is 0.2 °C below the long-term average of 8.4 °C. The coldest morning was 1.8 °C on the 23rd, and the warmest morning was on the 28th when the minimum temperature was 16.0 °C
- Strong winds
- On the 10th, a cold front crossed the city, bringing rain and wind gusts in excess of 70 km/h to many locations
- The strongest recorded gust was 78 km/h at Adelaide Airport on the 10th

Extremes in June 2019

Hottest day	22.5 °C at Parafield Airport on the 28th
	22.5 °C at Rosedale on the 28th
Warmest days on average	16.3 °C at Adelaide (Kent Town)
	16.3 °C at Parafield Airport
Coolest days on average	10.2 °C at Mount Lofty
Coldest day	6.2 °C at Mount Lofty on the 4th

Coldest night	-1.8 °C at Parafield Airport on the 24th
Coolest nights on average	5.5 °C at Mount Lofty
Warmest nights on average	8.9 °C at Noarlunga
Warmest night	16.1 °C at Adelaide (Kent Town) on the 28th
Warmest on average overall	12.1 °C at Adelaide (West Terrace / ngayirdapira) 12.1 °C at Noarlunga
Coolest on average overall	7.9 °C at Mount Lofty
Wettest overall	167.2 mm at Mount Lofty
Wettest day	64.8 mm at Aldgate on the 12th
Strongest wind gust	78 km/h at Adelaide Airport on the 10th

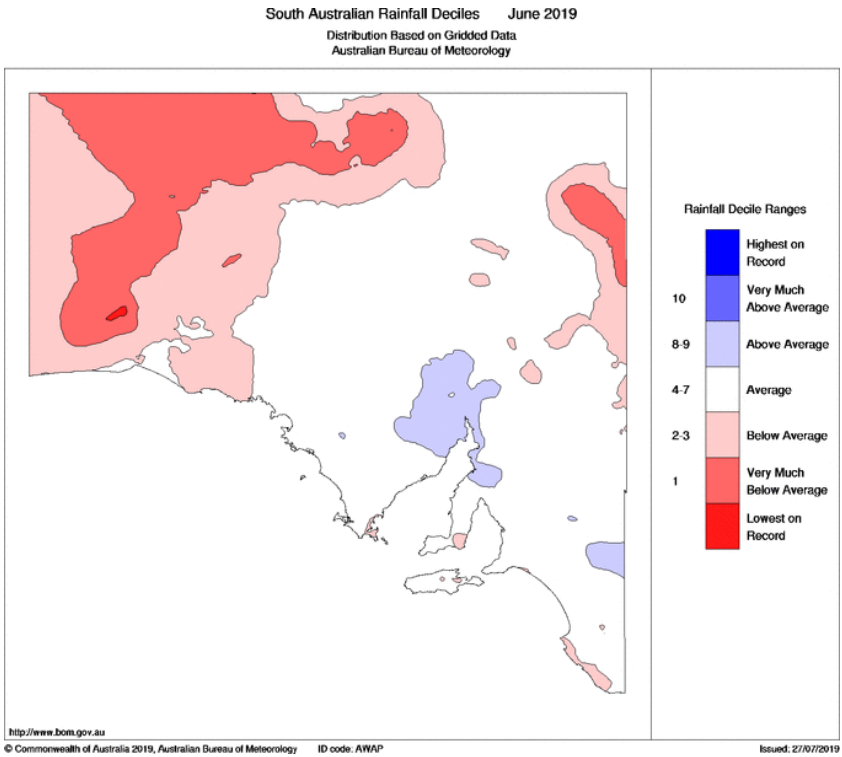
Some notable statistics for June were:

Record highest June daily rainfall (mm)

	New record	Old record	Years Held
Burnside	50.8 on the 12th	47.5 on the 22nd in 1908	41
Belair	51.0 on the 12th	44.2 on the 1st in 2007	21

For more information plus a summary of June's statistics please see:

http://www.bom.gov.au/climate/current/month/sa/archive/201906.adelaide.shtml



Adelaide (West Terrace / Ngayirdapira), South Australia
June 2019 Daily Weather Observations

The official site for Adelaide, having reopened in May 2017.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Sa	9.4	15.4	0.2			SE	20	14:04	12.7	69		SE	6	1034.9	15.3	63		SSE	9	1032.5
2	Su	11.1	15.5	1.2			SW	43	13:53	11.8	93			Calm	1032.7	15.1	66		SSW	20	1029.1
3	Mo	5.9	14.1	0.6			SSW	41	11:26	10.3	70		S	7	1030.7	12.8	58		SSE	13	1029.4
4	Tu	4.9	12.8	0			SSE	26	15:25	10.0	81		SSW	4	1033.4	12.2	72		SSE	13	1032.2
5	We	4.4	14.1	0			SSW	20	15:17	8.3	77		N	2	1037.0	13.2	59		SSW	11	1034.8
6	Th	8.3	15.1	0			SW	24	13:18	11.3	64		SE	6	1038.5	13.5	59		WNW	7	1035.6
7	Fr	3.4	16.6	0			NNE	30	10:01	11.1	73		NNE	9	1034.3	16.3	53		NNE	9	1030.4
8	Sa	6.2	17.2	0			NNW	26	12:20	11.0	70		N	7	1027.1	16.9	46		NW	9	1022.9
9	Su	11.0	16.7	0			NNE	39	21:07	15.0	42		NNE	15	1017.4	13.4	76		ENE	15	1012.9
10	Mo	11.7	17.6	4.2			WNW	52	03:07	13.2	80		N	13	1014.6	17.0	59		N	13	1015.3
11	Tu	11.1	22.2	0.2			NNE	35	20:41	14.3	51		NE	13	1019.0	21.8	37		NNW	17	1015.3
12	We	14.3	17.7	39.8			NNW	39	11:46	14.4	96		N	17	1014.4	17.5	76		WNW	17	1013.3
13	Th	10.3	16.9	1.2			NNW	31	12:31	11.5	92		N	11	1019.1	16.3	68		WNW	15	1018.0
14	Fr	10.8	17.1	0.2			WNW	28	10:30	12.4	93		NNW	11	1020.7	15.9	76		NW	17	1019.6
15	Sa	10.9	16.0	1.4			NW	26	14:04	11.9	87		NNE	11	1022.2	15.2	70		NNW	17	1020.0
16	Su	9.9	16.8	0			ENE	20	05:49	13.1	61		NE	9	1022.1	16.6	53		NW	9	1021.4
17	Mo	8.4	15.1	0			NW	35	14:35	10.4	78		NNE	11	1022.6	14.0	66		NNW	19	1020.0
18	Tu	8.5	14.0	5.4			WSW	43	14:06	10.8	70		SSW	9	1024.2	13.1	61		SW	15	1024.5
19	We	4.5	13.7	0			N	20	11:42	8.0	76		NNE	6	1028.4	13.2	55		NW	13	1026.0
20	Th	7.4	12.4	0			N	20	10:37	9.5	66		NNE	9	1026.9	12.3	61		N	9	1025.2
21	Fr	6.9	16.2	0			NNE	20	09:55	10.9	60		NNE	7	1030.5	13.7	52		SE	4	1029.3
22	Sa	3.5	15.0	0			NNE	22	10:06	9.6	62		NE	11	1032.3	12.1	56		WSW	9	1029.4
23	Su	1.8	13.7	0			NNE	20	16:13	7.0	70			Calm	1031.7	12.9	40		NE	6	1028.9
24	Mo	2.4	11.7	0			NE	28	14:43	5.7	72		N	9	1031.1	11.4	48		NE	13	1027.1
25	Tu	5.7	16.8	0			NE	26	01:51	10.9	49		NE	9	1031.0	16.5	36		NW	9	1029.7
26	We	8.5	19.1	0			NNE	30	10:11	13.9	57		NE	11	1031.3	18.6	40		N	13	1027.6
27	Th	12.0	21.5	0			N	41	13:31	16.0	52		N	13	1026.3	21.5	41		NNW	20	1021.0
28	Fr	16.0	21.9	0			NNW	46	12:49	17.6	50		NNE	20	1019.8	21.4	48		N	19	1015.0
29	Sa	10.2	13.9	10.4			WSW	57	21:39	10.2	93		N	15	1011.9	11.6	74		W	19	1012.6
30	Su	7.2	13.2	18.6			NNW	41	16:13	8.7	91		N	13	1022.9	12.9	62		NW	19	1021.9
Statistics for June 2019																					
	Mean	8.2	16.0							11.4	71			9	1026.3	15.1	57			13	1024.0
	Lowest	1.8	11.7							5.7	42			Calm	1011.9	11.4	36		SE	4	1012.6
	Highest	16.0	22.2	39.8			WSW	57		17.6	96		NNE	20	1038.5	21.8	76		#	20	1035.6
	Total			83.4																	

Observations were drawn from Adelaide (West Terrace / Ngayirdapira) {station 023000}
This is now the "official" site for Adelaide, having reopened in May 2017. Observations are also available from the Kent Town site {station number 023090}.

South Australia in June 2019: cooler than average nights, dry in the north

Rainfall in June was below average for the State as a whole, but was generally close to average in the southern Agricultural districts. Daytime temperatures in June were close to average across most of the State, but night-time temperatures were cooler than average in most areas, with a week of frosty mornings across much of the State around both sides of the winter solstice.

Drier than average in the north

- Rainfall in June was 42% below average for the State as a whole
- Rainfall was generally close to average in the southern Agricultural districts
- It was a very dry June with no rain or little rainfall (less than 5 mm) in the northwest and eastern areas of the Pastoral districts
- Several cold fronts during the month brought rainfall to southern areas
- The wettest day was on the 12th, when a strong cold front and associated cloud band crossed the State, bringing widespread rain to the southern Agricultural districts and daily totals of more than 60 mm to several sites in the Adelaide Hills
- On the 12th, several sites had their highest June daily rainfall on record
- The year-to-date (January–June) rainfall for the State as a whole was the fourth-driest first six month of the year on record, and driest since 1970.

Daytime temperatures close to average, cool nights

- Daytime temperatures were close to average for June across most of South Australia, but tended warmer in the northwest
- The mean maximum temperature was 0.42 °C warmer than average for the State.
- The year-to-date (January–June) mean maximum temperature for the State was 2.03 °C above average, the highest for the first six months of the year on record
- Night-time temperatures in June were generally cooler than average
- Keith and Coonawarra each had six consecutive mornings with minimum temperatures at or below 0 °C between the 19th and 24th, exceeding their previous longest runs of five such days in June (14–18 June 2007 and 11–15 June 1972 at Keith, 12–16 June 1996 at Coonawarra)
- The June mean minimum temperature was 0.94 °C cooler than average for the State as a whole
- On the 11th, Marree Aero had its highest June temperature on record and a late-season record of 31.6 °C at Oodnadatta Airport
- On the 24th, several sites had either their coldest June day on record or their lowest June temperature on record
- A few days later on the 29th, some sites in the Lower South East had their warmest June night on record
- The year-to-date mean minimum temperature was 0.61 °C above average for South Australia

Severe wind gusts

- On the 9th and 10th, a cold front crossed southern South Australia, bringing rain and wind gusts in excess of 80 km/h to many locations
- A cold front on the morning of the 29th again brought strong winds to South Australia, with gusts in excess of 80 km/h at several locations in southern areas of the State
- The strongest recorded gust was 106 km/h at Neptune Island late on the night of the 9th

Extremes in June 2019

Hottest day	31.6 °C at Oodnadatta Airport on the 11th
Warmest days on average	20.0 °C at Oodnadatta Airport
Coolest days on average	10.2 °C at Mount Lofty
Coldest day	6.2 °C at Mount Lofty on the 4th
Coldest night	-7.1 °C at Yunta Airstrip on the 24th
Coolest nights on average	2.5 °C at Yunta Airstrip
Warmest nights on average	12.0 °C at Neptune Island
Warmest night	16.1 °C at Adelaide (Kent Town) on the 28th
Warmest on average overall	13.6 °C at Neptune Island
Coolest on average overall	7.9 °C at Mount Lofty
Wettest overall	167.2 mm at Mount Lofty
Driest overall	0 mm at Ernabella (Pukatja)
Wettest day	64.8 mm at Aldgate on the 12th
Strongest wind gust	106 km/h at Neptune Island on the 9th

Some notable statistics for June were:

Record highest June daily rainfall (mm)			
	New record	**Old record**	**Years Held**
Burnside	50.8 on the 12th	47.5 on the 22nd in 1908	41
Brinkworth	46.0 on the 12th	43.9 on the 2nd in 1939	119
Burra	30.0 on the 12th	28.0 on the 28th in 1980	51
Rhynie	43.4 on the 12th	41.0 on the 23rd in 1996	63
Belair	51.0 on the 12th	44.2 on the 1st in 2007	21
Clare	44.6 on the 12th	37.2 on the 1st in 2013	26
Snowtown	41.6 on the 12th	37.0 on the 23rd in 2013	21
Nonning	41.0 on the 12th	35.2 on the 16th in 2016	110

Record highest June temperature

	New record (°C)	**Old record**	**Years Held**	**June Average**
Marree	29.0 on the 11th	27.7 on the 30th in 2009	21	19.4

Record lowest June daily maximum temperature (°C)

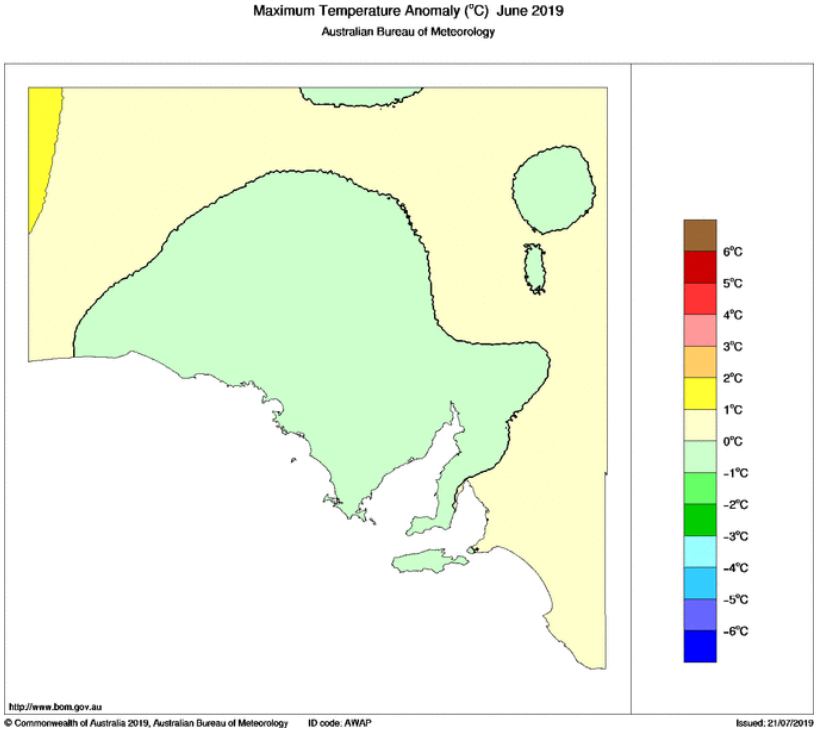
	New record	**Old record**	**Years Held**	**Average**
Stenhouse Bay	11.3 on the 24th	11.9 on the 25th in 1997	24	16.3
Minnipa	11.4 on the 24th	= 11.4 on the 19th in 2018	23	16.7
Tarcoola	12.6 on the 24th	12.9 on the 8th in 2008	22	18.8

Record highest June daily minimum temperature (°C)

	New record	**Old record**	**Years Held**	**June Avge**
Mount Gambier	14.1 on the 29th	13.9 on the 10th in 1987	78	5.8
Coonawarra	14.7 on the 29th	14.5 on the 4th in 1988	34	5.4
Naracoorte	14.6 on the 29th	14.0 on the 10th in 2005	21	5.5

Record lowest June temperature (°C)				
	New record	**Old record**	**Duration**	**Avg**
Coonawarra	-3.8 on the 22nd	-3.2 on the 3rd in 2017	34	5.4
Edithburgh	-0.5 on the 24th	0.8 on the 14th in 2006	27	8.8
Parawa	1.4 on the 24th	2.0 on the 21st in 2015	26	7.8
Stenhouse Bay	2.5 on the 24th	3.5 on the 23rd in 2007	24	10.1
Gluepot	-6.7 on the 24th	-6.2 on the 23rd in 2007	21	4.1
Yunta	-7.1 on the 24th	-7.0 on the 14th in 2006	21	3.6
Padthaway Sth	-4.0 on the 23rd	-3.2 on the 16th in 2007	20	5.5

For more information plus a summary of June's statistics please see:
http://www.bom.gov.au/climate/current/month/sa/archive/201906.summary.shtml



Greater Adelaide in July 2019: warmer than average

Rainfall in July was below average at sites across Adelaide and the Hills, including a couple of sites that had their driest July since 1997. Both daytime and night-time temperatures were warmer than average, contributing to all sites across Adelaide and the Hills having a warmer than average year-to-date.

Drier than average

- Rainfall in July was below average in Adelaide and the Hills after two months of wetter than average conditions in May and June
- Adelaide (West Terrace / ngayirdapira) had 14 raindays during the month, two fewer than average for July
- Rainfall totals for July ranged from 41% of average at Edinburgh RAAF to 77% of average at Kuitpo Forest Reserve
- Edinburgh RAAF and Happy Valley Reservoir had their lowest total July rainfall since 1997
- Year-to-date rainfall has been below average at all sites across Adelaide & the Hills

Warmer than average days and nights

- All sites across Adelaide and the Hills had warmer than average mean maximum temperatures for July, despite a cooler than average week in the middle of the month and a cold day on the 31st
- The warmest day was the 6th, as northerly winds ahead of an approaching cold front saw temperatures above 20 °C recorded at most sites around the city
- Mean maximum temperatures ranged from 0.6 °C warmer than average at Mount Crawford to 1.7 °C warmer than average at Mount Barker
- Night-time temperatures were warmer than average at all sites across Adelaide and the Hills, despite a few cold nights and most sites had temperatures that dipped below 5 °C at least once during the month
- Mean minimum temperatures ranged from 0.3 °C warmer than average at Rosedale to 2.6 °C warmer than average at Mount Barker
- On the 6th, Kuitpo Forest Reserve had its highest July temperature on record and Adelaide (Kent Town) had its warmest July night on record
- A few sites had their highest July mean daily minimum temperature on record, including West Terrace (equalled its previous record). Mount Barker had its highest July mean daily minimum temperature since installation of a Stevenson screen
- Some sites had either their highest July mean temperature on record or their highest July mean temperature for at least 20 years
- For the year-to-date, all sites across Adelaide and the Hills have had a warmer than average January to July period

Adelaide (West Terrace / ngayirdapira)

- Total rainfall for Adelaide (West Terrace / ngayirdapira) was 39.8 mm, which is 60% of the long-term average of 66.3 mm
- The mean daily maximum temperature for Adelaide (West Terrace / ngayirdapira) was 16.1 °C, which is 1.2 °C above the long-term average of 14.9 °C. The warmest day was 21.7 °C on the 6th, and the coolest day was on the 31st when the temperature reached 12.6 °C
- The mean daily minimum temperature for Adelaide (West Terrace / ngayirdapira) was 9.4 °C, which is 1.9 °C above the long-term average of 7.5 °C. The coldest morning was 4.6 °C on the 30th, and the warmest morning was on the 6th when the minimum temperature was 15.5 °C

Extremes in July 2019

Hottest day	21.9 °C at Adelaide Airport on the 6th
Warmest days on average	16.4 °C at Adelaide (Kent Town)
Coolest days on average	10.4 °C at Mount Lofty
Coldest day	7.4 °C at Mount Lofty on the 14th
Coldest night	0.7 °C at Rosedale on the 31st
Coolest nights on average	5.8 °C at Mount Lofty
Warmest nights on average	9.7 °C at Noarlunga
Warmest night	16.0 °C at Adelaide (Kent Town) on the 6th
Warmest on average overall	12.8 °C at Adelaide (West Terrace / ngayirdapira)
Coolest on average overall	8.1 °C at Mount Lofty
Wettest overall	133.8 mm at Ashton
Driest overall	22.0 mm at Edinburgh RAAF
Wettest day	25.2 mm at Macclesfield on the 11th
Strongest wind gust	113 km/h at Mount Crawford AWS on the 23rd

Some notable statistics for July were:

Record highest July temperature (°C)

	New record	Old record	Years Held	July Average
Kuitpo Forest	20.4 on the 6th	20.1 on the 21st in 2016	22	12.4

Record highest July daily minimum temperature (°C)

	New record	Old record	Years Held	July Average
Kent Town	16.0 on the 6th	15.5 on the 1st in 2011	43	7.6

Record highest July mean daily minimum temperature (°C)

	New record	Old record	Years held	July Average
West Terrace	9.4	= 9.4 in 1975	94	7.5
Adelaide Airport	9.0	8.8 in 2013	64	7.1
Kuitpo Forest	7.9	7.7 in 2013	21	6.7

Record highest July mean temperature (°C)

	New record	Old record	Years Held	July Average
Kent Town	12.7	= 12.7 in 2013	42	11.5
Kuitpo Forest	10.5	10.4 in 1999	21	9.5

South Australian Record highest July mean temperature (°C)

	New record	Old record	Years Held	July Average
Kent Town	12.7	= 12.7 in 2013	42	11.5
Leigh Creek	12.6	12.1 in 2009	35	10.7
Loxton	11.5	11.1 in 2018	35	9.9
Coonawarra	10.8	10.6 in 1999	33	9.5
Cape Jaffa	12.0	= 12.0 in 1992	27	10.8
Parawa	10.3	= 10.3 in 2013	25	9.3
Renmark	11.6	11.3 in 2018	23	10.1
Stenhouse Bay	13.1	= 13.1 in 2002	23	12.3
Kuitpo Forest	10.5	10.4 in 1999	21	9.5
Roseworthy	11.5	11.4 in 2018	21	10.6
Yunta	10.6	10.5 in 2017	21	9.4
Gluepot	11.5	11.4 in 1999	20	10.3

Adelaide (West Terrace / Ngayirdapira), South Australia
July 2019 Daily Weather Observations

The official site for Adelaide, having reopened in May 2017.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Mo	8.2	14.5	0			NNW	39	14:23	9.7	69		N	13	1021.4	13.4	58		NNW	19	1017.6
2	Tu	8.2	15.3	0			NNE	22	04:10	10.4	67		NE	9	1022.8	14.9	69			Calm	1023.0
3	We	7.7	17.7	0			ESE	26	10:59	11.0	91			Calm	1030.4	15.3	58		SE	6	1029.9
4	Th	7.4	16.5	0			ENE	24	10:36	11.4	68			Calm	1034.3	14.9	55		SE	11	1030.5
5	Fr	6.5	21.3	0			ENE	43	22:52	16.4	62		NE	13	1028.2	20.9	46		N	13	1025.4
6	Sa	15.5	21.7	0			NNE	39	06:15	17.7	54		NNE	17	1024.6	21.1	49		NNE	17	1021.9
7	Su	12.4	16.3	5.4			N	30	01:41	13.8	88		NNW	9	1025.1	15.8	66		WNW	13	1024.9
8	Mo	8.6	15.3	0			SSW	24	13:53	10.1	91		N	9	1028.5	14.3	67		WSW	11	1026.5
9	Tu	7.2	16.2	0.2			N	30	23:41	10.5	80		NE	13	1023.8	15.7	61		NNW	17	1018.5
10	We	8.0	16.6	0			W	81	18:06	10.7	69		N	13	1012.1	15.7	66		NW	31	1006.3
11	Th	10.6	16.0	2.0			W	41	05:47	12.9	85		NW	19	1015.3	15.2	77		W	15	1015.2
12	Fr	12.3	14.0	4.0			SW	59	16:42	13.8	74		WNW	20	1014.3	12.9	80		WSW	17	1013.5
13	Sa	8.1	13.2	4.8			SW	43	00:02	11.2	62		SW	20	1024.9	12.1	59		SW	19	1027.4
14	Su	9.0	13.5	2.0			WSW	43	15:24	11.3	93		W	15	1030.8	13.2	67		WSW	20	1029.0
15	Mo	9.9	13.7	1.8			SW	31	00:56	11.7	91		SSW	9	1030.1	12.3	94		WSW	13	1029.9
16	Tu	11.1	13.2	2.2			WSW	17	13:38	12.0	97			Calm	1030.1	12.8	86		WSW	7	1027.9
17	We	10.7	14.4	1.8			W	37	11:20	11.1	93		NW	15	1024.2	13.2	78		W	17	1021.5
18	Th	10.4	14.7	0.4			NW	35	12:19	10.7	93		N	13	1021.8	14.5	69		NW	19	1018.9
19	Fr	7.8	17.9	0			N	28	12:46	10.5	76		NE	13	1022.0	17.7	48		N	15	1018.6
20	Sa	10.5	19.6	0.2			N	48	14:09	14.8	38		NNE	22	1014.1	19.5	36		N	28	1007.3
21	Su	9.3	15.9	0			WNW	33	00:34	12.5	71		WNW	13	1014.0	15.5	60		WNW	15	1013.4
22	Mo	9.3	18.4	0			NNW	56	13:06	12.1	64		N	15	1012.0	17.5	40		NNW	26	1008.7
23	Tu	10.8	15.7	5.6			NW	54	12:44	12.3	85		NW	20	1015.6	14.7	73		NW	24	1015.8
24	We	8.9	16.0	4.2			NW	30	14:41	12.1	95		NNW	7	1025.1	14.9	79		NW	17	1024.6
25	Th	10.7	16.8	0			N	37	13:21	13.0	75		N	9	1024.9	15.8	72		NW	22	1021.5
26	Fr	12.3	16.1	0			SW	28	15:02	13.4	79		NNE	9	1021.5	15.7	72		WSW	15	1021.2
27	Sa	7.2	15.5	0			SW	24	13:53	10.0	82		E	6	1024.4	14.4	48		SW	9	1022.8
28	Su	9.0	19.3	0			NE	24	11:44	13.3	63		NE	11	1022.3	18.0	57		N	11	1018.6
29	Mo	10.9	16.6	5.2			SW	28	16:10	11.9	87		S	6	1024.6	15.0	55		S	15	1023.7
30	Tu	4.6	14.8	0			WSW	20	15:05	9.7	91			Calm	1030.3	13.2	67		WSW	9	1028.9
31	We	8.4	12.6	0			SSW	31	13:28	9.5	60		NE	11	1033.9	12.1	61		S	7	1031.9
Statistics for July 2019																					
Mean		9.4	16.1							12.0	77			11	1023.5	15.2	63			15	1021.4
Lowest		4.6	12.6							9.5	38			Calm	1012.0	12.1	36			Calm	1006.3
Highest		15.5	21.7	5.6			W	81		17.7	97		NNE	22	1034.3	21.1	94		NW	31	1031.9
Total				39.8																	

Observations were drawn from Adelaide (West Terrace / Ngayirdapira) {station 023000}
This is now the "official" site for Adelaide, having reopened in May 2017. Observations are also available from the Kent Town site {station number 023090}.

South Australia in July 2019: warmer and drier than average

Rainfall in July was below average across large areas of South Australia, making it the State's eighth-driest July on record and driest since 1997. Both daytime and night-time temperatures were warmer than average, resulting in South Australia's third-warmest July on record.

Driest July since 1997

- July rainfall for South Australia was 68% below average, the eighth-lowest on record and the driest July for the State as a whole since 1997
- Some areas of the South East districts had close to average rainfall, but most areas of the State had below to very much below average rainfall for July
- The highest monthly totals were in the Lower South East and in the Adelaide Hills, with several sites recording more than 100 mm for July
- The Pastoral districts recorded little or no rain for the month
- The State's wettest day was in the 24 hours to 9am on the 11th, when a cold front brought severe winds, rain, and hail to southern parts of the State, with more than 25 mm recorded at sites in the Lower South East
- Numerous sites had either their lowest total July rainfall on record or their lowest total July rainfall for at least 20 years, many since 1997
- For the year-to-date, it has been South Australia's driest first seven months of the year since 1970, with rainfall below average across most of South Australia and large areas very much drier than average

Third-warmest July on record

- The State's mean temperature was 1.53 °C above average, making it South Australia's third-warmest July on record (behind 2017 and 1975)
- Daytime temperatures were warmer than average across all of South Australia, with most areas very much above average
- The mean maximum temperature for South Australia was 2.39 °C warmer than average, the fifth-highest on record, but cooler than July 2017 and 2018
- Night-time temperatures were much warmer than average in some central and eastern Agricultural districts, highest on record in an area extending from the Adelaide region to the Murraylands, but near average in the State's SW and NE.
- The State's mean minimum temperature was 0.66 °C warmer than average
- On the 6th, Kuitpo Forest Reserve had its highest July temperature on record and Adelaide (Kent Town) had its warmest July night on record
- A few sites had their highest July mean daily max. temperature for at least 20 years
- Many sites had either their highest July mean daily minimum temperature on record or their highest July mean daily minimum temperature for at least 20 years
- Many sites had either their highest July mean temperature on record or their highest July mean temperature since 1975, including Adelaide (Kent Town) equalling its previous warmest July from 2013
- For the year-to-date, SA’s mean maximum temperature has been the highest on record, and mean minimum temperatures have also been warmer than average

Strong winds at times

- Cold fronts brought strong winds to southern areas several times during the month
- Gusts in excess of 100 km/h were recorded at several sites in southern and elevated areas on the 10th as a cold front crossed the State
- Another cold front on the 23rd brought strong winds and the State's highest

recorded gust for the month, 113 km/h at Mount Crawford

- Total wind run for July was above average at many sites around Adelaide and in the South East

Extremes in July 2019

Hottest day	28.2 °C at Ceduna AMO on the 20th
Warmest days on average	22.2 °C at Oodnadatta Airport
Coolest days on average	10.4 °C at Mount Lofty
Coldest day	7.4 °C at Mount Lofty on the 14th
Coldest night	-3.5 °C at Yunta Airstrip on the 2nd
Coolest nights on average	4.0 °C at Yongala
Warmest nights on average	12.1 °C at Neptune Island
Warmest night	16.0 °C at Adelaide (Kent Town) on the 6th
Warmest on average overall	14.1 °C at Oodnadatta Airport
Coolest on average overall	8.1 °C at Mount Lofty
Wettest overall	139.2 mm at Kalangadoo (Mirnat)
Driest overall	0 mm at several locations
Wettest day	33.0 mm at Kalangadoo (Mirnat) on the 11th
Strongest wind gust	113 km/h at Mount Crawford AWS on the 23rd

Some notable statistics for July were:

Record lowest July total rainfall (mm)

	New record	Old record	Years Held	July Average
Snowtown	16.6	24.2 in 2018	22	39.8

Record highest July temperature (°C)

	New record	Old record	Years Held	July Average
Kuitpo Forest	20.4 on the 6th	20.1 on the 21st in 2016	22	12.4

Record highest July daily minimum temperature (°C)

	New record	Old record	Years Held	July Average
Kent Town	16.0 on the 6th	15.5 on the 1st in 2011	43	7.6

Record highest July mean daily minimum temperature (°C)

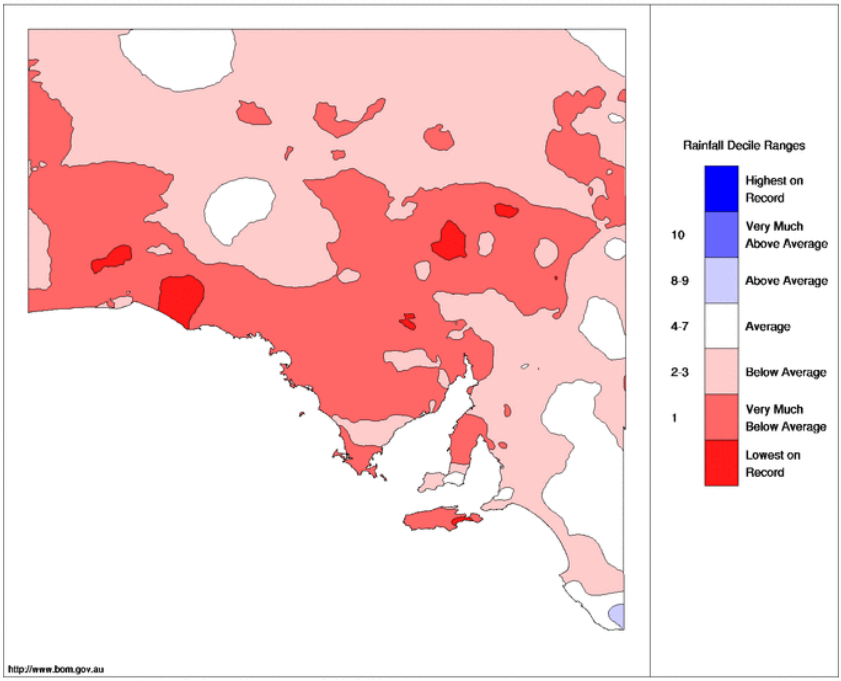
	New record	Old record	Years Held	July Average
West Terrace	9.4	= 9.4 in 1975	94	7.5
Adelaide Airport	9.0	8.8 in 2013	64	7.1
Warooka	8.8	= 8.8 in 2002	60	7.6
Eudunda	7.3	6.9 in 1975	54	5.0
Loxton	5.7	5.4 in 1999	35	3.9
Coonawarra	6.8	6.4 in 2013	33	5.2
Parawa	8.0	7.9 in 2013	25	6.9
Renmark	5.5	= 5.5 in 1996	23	3.8
Stenhouse Bay	10.1	9.9 in 2009	23	9.1
Kuitpo Forest	7.9	7.7 in 2013	21	6.7
Roseworthy	6.8	6.7 in 2013	21	5.8

Many other records were also set in July. For more information plus a summary of statistics please see:

http://www.bom.gov.au/climate/current/month/sa/archive/201907.adelaide.shtml &
http://www.bom.gov.au/climate/current/month/sa/archive/201907.summary.shtml

South Australian Rainfall Deciles July 2019

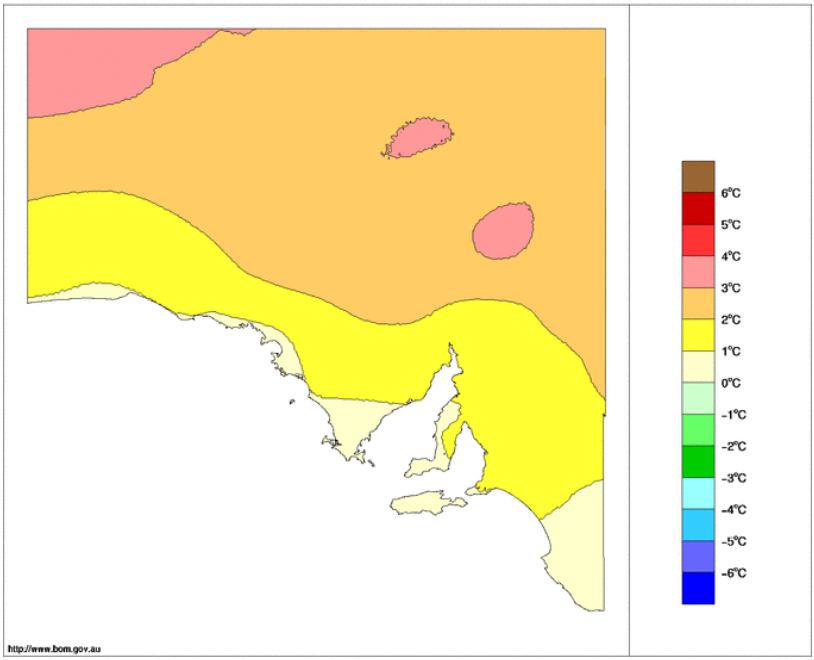
Distribution Based on Gridded Data
Australian Bureau of Meteorology



 ID code: AWAP Issued: 31/07/2019

Maximum Temperature Anomaly (°C) July 2019

Australian Bureau of Meteorology



 ID code: AWAP Issued: 01/08/2019

Australian Meteorological Association Inc (AMetA)
www.ameta.org.au

NEXT MEETING

Please note the change of venue

An event organized by AMetA, Flinders Uni. and AMOS.

6:00 PM to 7:30 PM TUESDAY 20 August 2019

Flinders University (City) 182 Victoria Square (NE corner) Adelaide

OUR CLIMATE: TRENDS AND DRIVERS
A NATIONAL SCIENCE WEEK EVENT

Our climate is changing. In the last ten years many long-term temperature and climate extremes have occurred in South Australia. So, what drives our climate and why are we breaking records so frequently? Darren Ray, resident climatologist at the Bureau of Meteorology and Jochen Kaempf, Associate Professor of Oceanography at Flinders University, will describe how the atmosphere, ocean and the Antarctic all play critical roles in our climate system.

With intimate knowledge of the complex forces that now demand our attention, our experts will explain what our climate drivers are and how they're changing. The audience will be encouraged to participate in an extended question and answer session *related to the science of climate variability and climate change. The Forum panel will consist of our two speakers along with Beth Walton, Climatologist and John Nairn (Chair), State Manager, Bureau of Meteorology.*
Our four experts will interest senior high school as well university students and the general public - in fact anybody interested in our climate and what it's doing.

Please also note that the AMETA AGM will now take place at the October meeting –6pm 15th Oct 2019 at the Bureau of Meteorology office L4 431 King William St, Adelaide, due to this special event

Secretary:	*Darren Ray*
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Inquiries or suggestions, please contact the Secretary on the phone number listed above.