



## **Texas Climate 101: Winter Temperature Extremes**

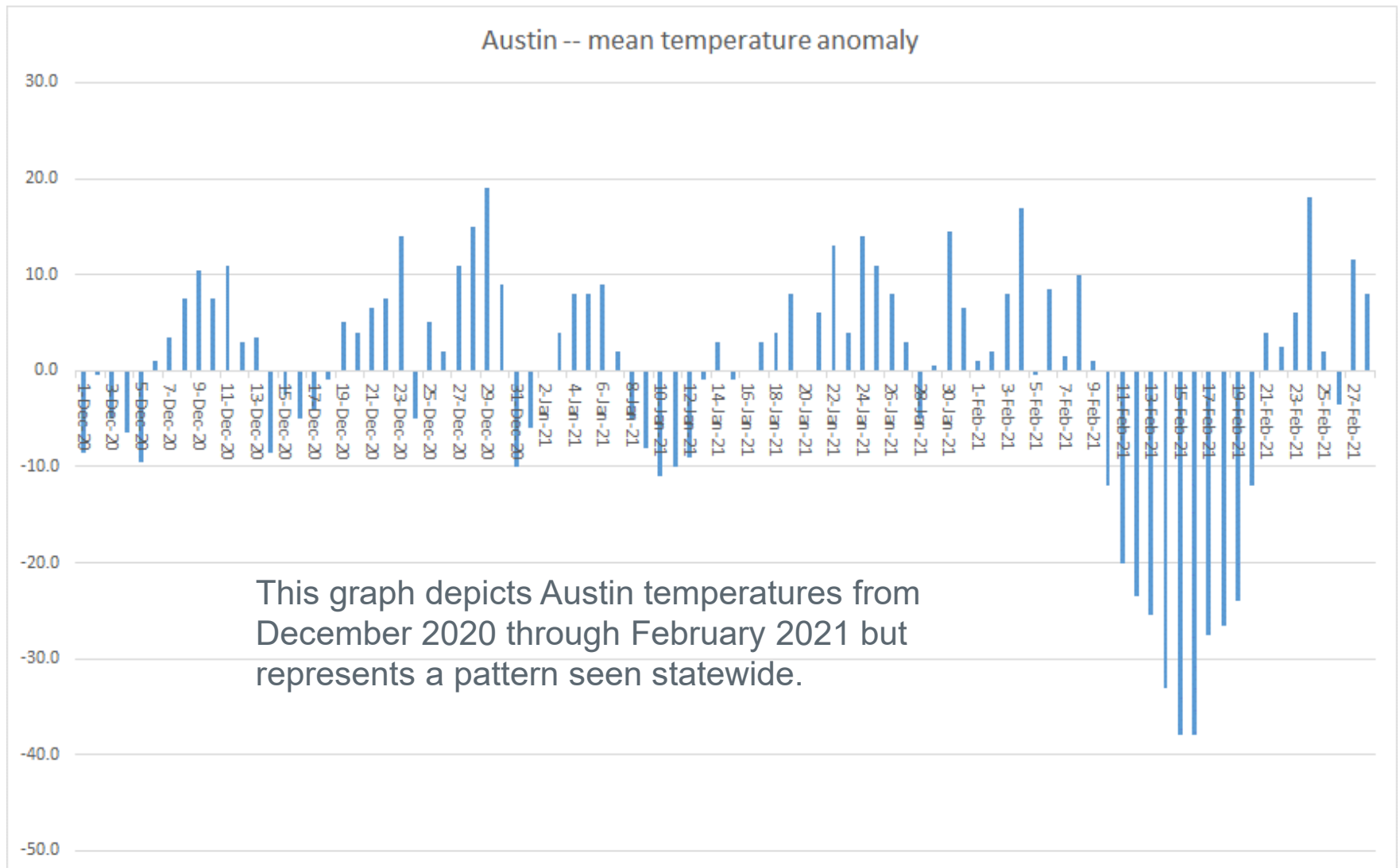
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# Summary of Winter Weather Extremes in Texas

- Periods of extreme winter temperatures similar to what impacted the Texas power grid in February 2021 are rare, and the coldest extremes do not necessarily coincide with a cold winter overall.
- Since the 1890s (over 120 years), there have only been five winters in Texas with extreme, prolonged cold temperatures impacting the entire region, including February 2021.
- Until February 2021, it had been 31 years since the Texas power grid experienced a period of extreme, prolonged cold temperatures.
- The most extreme winter periods typically have consecutive days of cold build up and are driven largely by a combination of low temperatures across the region's largest urban load centers.
  - Today's presentation considers extreme cold periods in Dallas, Houston, Austin, Abilene (representation of West Texas) and Brownsville (representation of South Texas).

# Mild Winters Can Have Periods of Extreme Cold



# Dallas and Houston Extremes

- In **Dallas**, there were 14 winters dating back to 1899 that recorded a low of 5 degrees or colder.
  - During every decade from the 1890s through the 1990s, Dallas had at least two winters with temperatures that were 10 degrees or colder.
  - Temperatures never dropped to 10 degrees or colder between 1997 and 2020.
  - Coldest temperature in 2011 was 13 degrees.
- In **Houston**, there were 14 winters dating back to 1895 that recorded a low of 15 degrees or colder.

*Dallas*

2021 (40)	1933 (43)
1989 (71)	1930 (40)
1983 (7)	1918 (11)
1964 (5)	1912 (6)
1949 (52)	1911 (119)
1947 (31)	1905 (2)
1943 (95)	1899 (1)

*Figures in parenthesis represent the rankings for the coldest Texas winters, with 1 being the coldest.*

*Houston*

2021 (40)	1933 (43)
1989 (71)	1930 (40)
1983 (7)	1918 (11)
1982 (54)	1912 (6)
1951 (62)	1905 (2)
1949 (52)	1899 (1)
1940 (21)	1895 (?)

*Years highlighted in blue represent the top 11 coldest years on record.*

# Most Extreme Winter Periods

- The worst periods of extreme, prolonged cold impacting the entire ERCOT region occurred in **2021, 1989, 1983, 1930 and 1899**.
- Dallas recorded temperatures of 5 degrees or colder and Houston recorded temperatures of 15 degrees or colder during winters occurring in: 2021, 1989, 1983, 1949, 1933, 1930, 1918, 1912, 1905 and 1899.
- Using the 10 coldest periods in Dallas and Houston as a baseline, these other cities also recorded extreme cold temperatures during some of the same years:
  - Austin recorded a temperature of 12 degrees or colder in 2021, 1989, 1983, 1949, 1933, 1930, 1918 and 1899.
  - Abilene recorded a temperature of 2 degrees or colder in 2021, 1989, 1983, 1933, 1930, 1918 and 1899.
  - Brownsville recorded a temperature of 23 degrees or colder in 2021, 1989, 1983 and 1899.

(Temperature thresholds were determined to get between 10 and 15 years.)

# Appendix

# Dallas Historical Extreme Cold Comparisons

2021		
Dallas	max tmp	min tmp
9-Feb-21	39	30
10-Feb-21	31	28
11-Feb-21	29	24
12-Feb-21	26	21
13-Feb-21	33	20
14-Feb-21	22	9
15-Feb-21	14	4
16-Feb-21	18	-2
17-Feb-21	27	18
18-Feb-21	31	22
19-Feb-21	40	15
20-Feb-21	56	22

8 of 9 days didn't get above Freezing  
\*\*\*\*\*  
3 days with lows in the single digits or below

1983		
Dallas	max tmp	min tmp
18-Dec-83	36	18
19-Dec-83	20	16
20-Dec-83	31	18
21-Dec-83	29	10
22-Dec-83	15	5
23-Dec-83	19	11
24-Dec-83	13	7
25-Dec-83	18	6
26-Dec-83	29	16
27-Dec-83	31	25
28-Dec-83	31	18
29-Dec-83	28	10
30-Dec-83	35	7
31-Dec-83	49	17

9 Consecutive Days (and 13 of 14) with lows in the teens or Colder  
\*\*\*\*\*  
11 Consecutive days with sub-freezing Highs  
\*\*\*\*\*  
4 days with lows in the single digits

2011		
Dallas	max tmp	min tmp
1-Feb-11	38	14
2-Feb-11	20	13
3-Feb-11	23	17
4-Feb-11	29	19
5-Feb-11	54	17
6-Feb-11	54	35
7-Feb-11	49	32
8-Feb-11	56	29
9-Feb-11	47	16
10-Feb-11	36	15
11-Feb-11	55	20

2011 doesn't measure up with the most extreme events (however wind chill was a significant factor)

1949 actual temperatures		
Dallas	max tmp	min tmp
28-Jan-49	36	16
29-Jan-49	22	14
30-Jan-49	20	8
31-Jan-49	30	-2
1-Feb-49	37	14

1933		
Dallas	max tmp	min tmp
7-Feb-33	57	7
8-Feb-33	22	2
9-Feb-33	31	11
10-Feb-33	30	20
11-Feb-33	37	16

1989		
Dallas	max tmp	min tmp
12-Dec-89	40	18
13-Dec-89	58	18
14-Dec-89	63	29
15-Dec-89	40	14
16-Dec-89	27	12
17-Dec-89	35	24
18-Dec-89	36	30
19-Dec-89	38	22
20-Dec-89	42	17
21-Dec-89	29	12
22-Dec-89	14	3
23-Dec-89	22	-1
24-Dec-89	42	13
25-Dec-89	68	21

As a whole 1989 was not nearly as cold as 1983, but there were two mornings with colder extremes

1930 actual temperatures		
Dallas	max tmp	min tmp
8-Jan-30	35	22
9-Jan-30	30	19
10-Jan-30	28	16
11-Jan-30	40	22
12-Jan-30	44	33
13-Jan-30	45	35
14-Jan-30	40	29
15-Jan-30	35	17
16-Jan-30	31	11
17-Jan-30	24	2
18-Jan-30	30	-1
19-Jan-30	32	14
20-Jan-30	32	28
21-Jan-30	32	12
22-Jan-30	31	8
23-Jan-30	44	17

8 of 9 days with lows in the teens or Colder  
\*\*\*\*\*  
7+ Consecutive days when the high didn't get above freezing

# Dallas Historical Extreme Cold Comparisons

2021		
Dallas	max tmp	min tmp
9-Feb-21	39	30
10-Feb-21	31	28
11-Feb-21	29	24
12-Feb-21	26	21
13-Feb-21	33	20
14-Feb-21	22	9
15-Feb-21	14	4
16-Feb-21	18	-2
17-Feb-21	27	18
18-Feb-21	31	22
19-Feb-21	40	15
20-Feb-21	56	22

8 of 9 days  
didn't  
get above  
freezing  
\*\*\*\*\*  
3 days  
with lows  
in the single  
digits or  
below

1912	actual temperatures	
Dallas	max tmp	min tmp
6-Jan-12	45	11
7-Jan-12	27	6
8-Jan-12	30	15
9-Jan-12	52	15
10-Jan-12	58	34
11-Jan-12	52	9
12-Jan-12	19	1
13-Jan-12	30	7
14-Jan-12	63	16

1918	actual temperatures	
Dallas	max tmp	min tmp
10-Jan-18	47	12
11-Jan-18	19	4
12-Jan-18	33	4
13-Jan-18	42	15
14-Jan-18	41	28
15-Jan-18	53	24
16-Jan-18	51	26
17-Jan-18	45	31
18-Jan-18	46	25
19-Jan-18	44	26
20-Jan-18	29	21
21-Jan-18	32	14
22-Jan-18	44	6
23-Jan-18	58	28
24-Jan-18	63	34
25-Jan-18	76	40
26-Jan-18	77	37
27-Jan-18	37	21
28-Jan-18	36	19
29-Jan-18	43	21
30-Jan-18	43	18
31-Jan-18	29	14
1-Feb-18	26	12
2-Feb-18	50	17

Prolonged  
stretch  
with periods  
of extreme  
cold  
interrupted  
by milder  
periods

1905	actual temperatures	
Dallas	max tmp	min tmp
12-Jan-05	26	18
13-Jan-05	26	12
14-Jan-05	31	13
15-Jan-05	32	11
16-Jan-05	44	23
17-Jan-05	49	37
18-Jan-05	60	42
19-Jan-05	60	35
20-Jan-05	67	40
21-Jan-05	48	34
22-Jan-05	37	30
23-Jan-05	38	31
24-Jan-05	40	27
25-Jan-05	28	15
26-Jan-05	38	13
27-Jan-05	55	31
28-Jan-05	48	40
29-Jan-05	46	37
30-Jan-05	42	27
31-Jan-05	47	40
1-Feb-05	41	21
2-Feb-05	21	15
3-Feb-05	19	14
4-Feb-05	23	12
5-Feb-05	29	17
6-Feb-05	25	15
7-Feb-05	32	25
8-Feb-05	48	24
9-Feb-05	47	30
10-Feb-05	47	25
11-Feb-05	48	15
12-Feb-05	15	5
13-Feb-05	26	1
14-Feb-05	43	15

1899		
Dallas	max tmp	min tmp
1899-01-29	40	15
1899-01-30	59	26
1899-01-31	29	12
1899-02-01	60	19
1899-02-02	44	40
1899-02-03	38	36
1899-02-04	28	24
1899-02-05	27	21
1899-02-06	29	18
1899-02-07	31	14
1899-02-08	49	19
1899-02-09	24	16
1899-02-10	26	18
1899-02-11	16	15
1899-02-12	12	-8
1899-02-13	35	4

13 total  
days over  
this  
prolonged  
stretch that  
did not get  
above  
freezing

February 2,  
1899:  
coldest day  
on record  
for Dallas  
\*\*\*\*\*  
8  
Consecutive  
days  
with lows  
in the  
teens or  
colder  
(2/6-2/13)

## Coldest days:

2/12/1899: -8  
1/31/1949: -2  
2/16/2021: -2  
1/18/1930: -1  
1/23/1989: -1