



Meteorologist Jeff Ray

CBS11 SENIOR METEOROLOGIST
GARDENING 101

GARDENING

101

WITH JEFF RAY





Royse City to Weatherford: 92 miles
New York to Philadelphia: 94 miles

DFW CLIMATE:

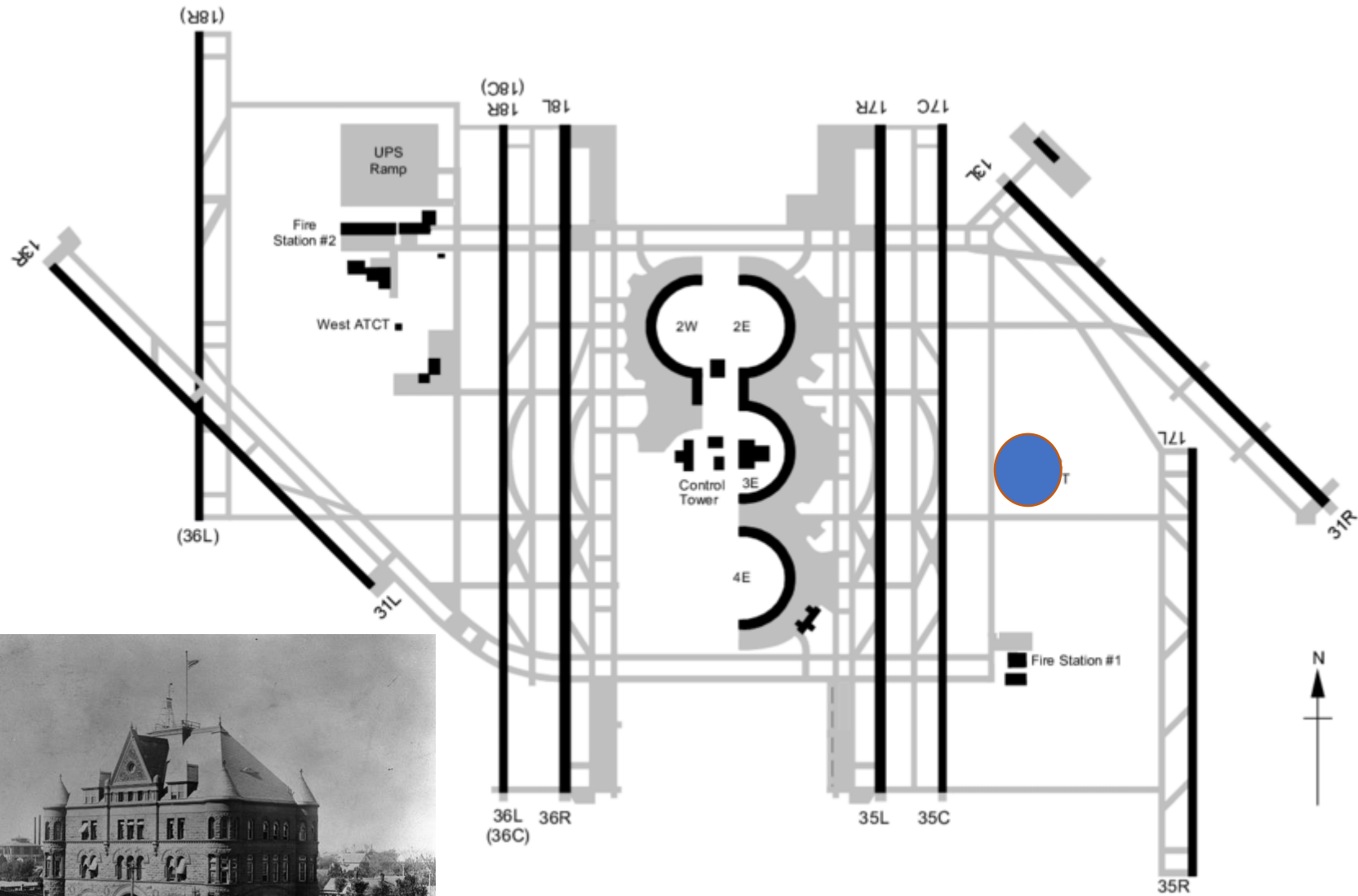
123 YEARS

OF DAILY RECORDS

-Started 1898 Federal
Building Fort Worth

- Hourly OBS start
1909

-DFW Airport Since
1974





CHANGING WEATHER, CHANGING GARDENS

- WHILE TEMPERATURES ARE GETTING WARMER, THE GROWING SEASON IS GETTING LONGER
- EXTREME WEATHER EVENTS ARE GETTING MORE COMMON



LONGER U.S. GROWING SEASON

More Days Above Freezing

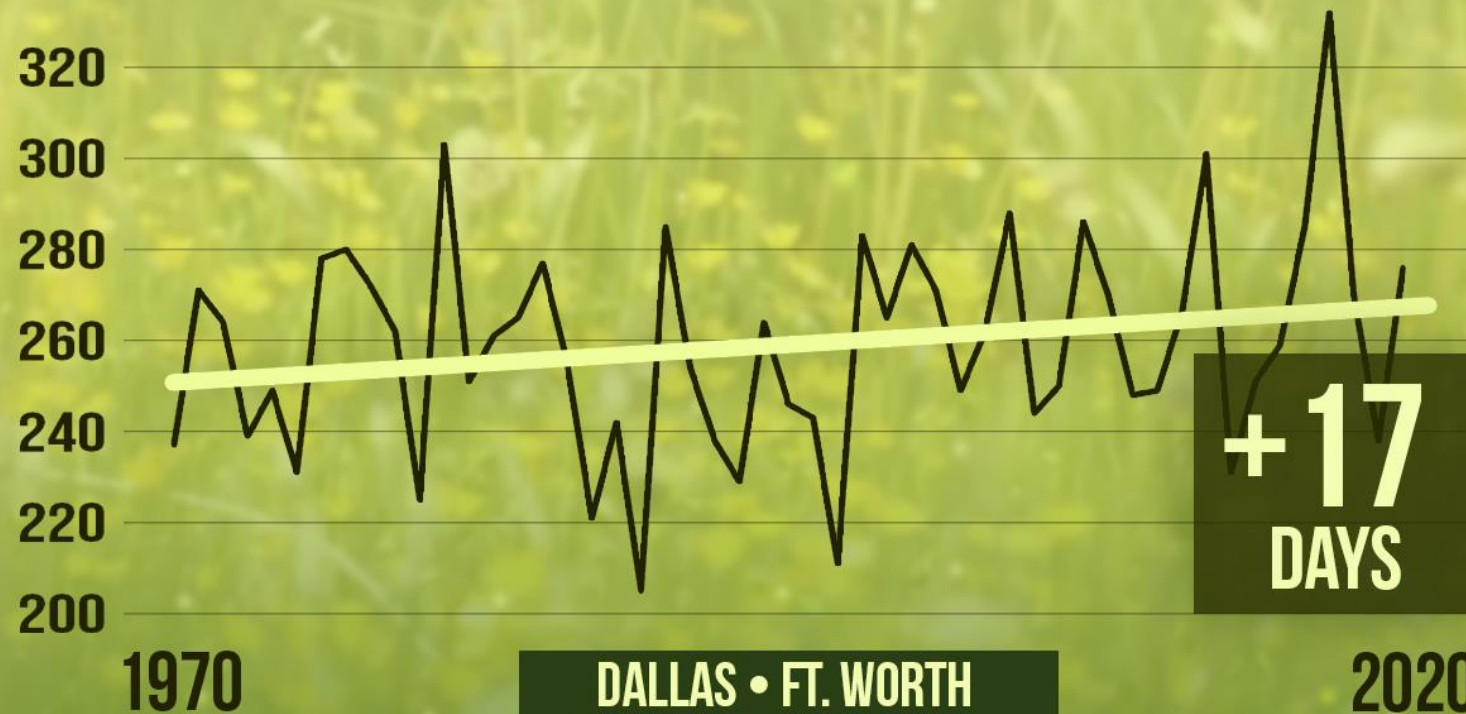


Deviation from average days, based on frost-free season
Source: EPA/ Kunkel 2021

CLIMATE  CENTRAL

LONGER GROWING SEASON = LONGER ALLERGY SEASON

CONSECUTIVE DAYS ABOVE FREEZING



Source: RCC-ACIS.org
Days between the annual last and first occurrence of 32°F

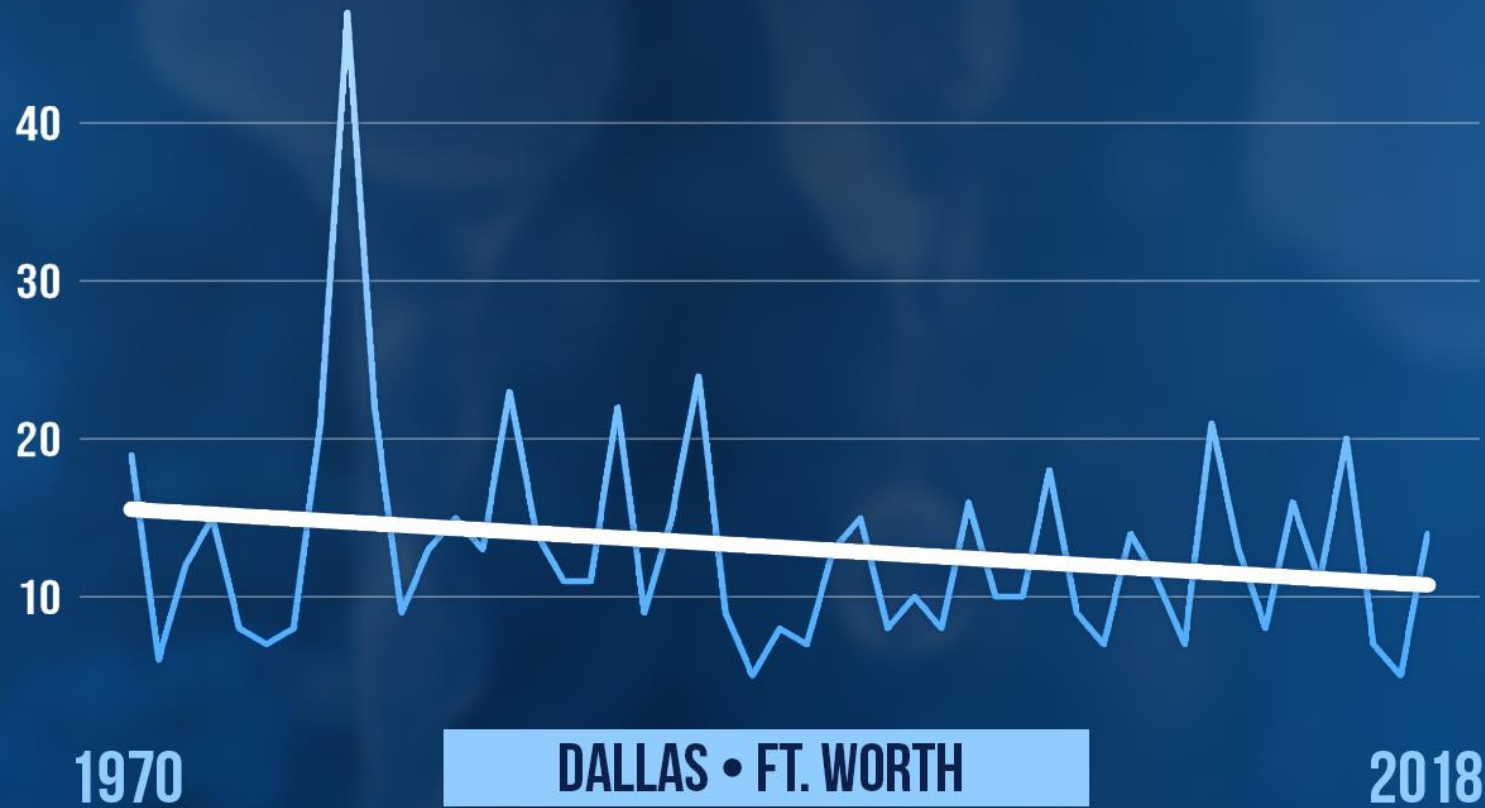
CLIMATE  CENTRAL

WINTER

Shorter, Warmer, More Extreme

LESS COLD, LESS OFTEN

CONSECUTIVE WINTER DAYS BELOW NORMAL



Most consecutive days each Dec-Feb below NCEI 1980-2010 normal
Average Daily Temperature used. Source: RCC-ACIS.org. Produced 2/13/2019

NIGHTS BELOW 32°




Based on annual daily minimum temperatures (°F).
Source: RCC-ACIS.org



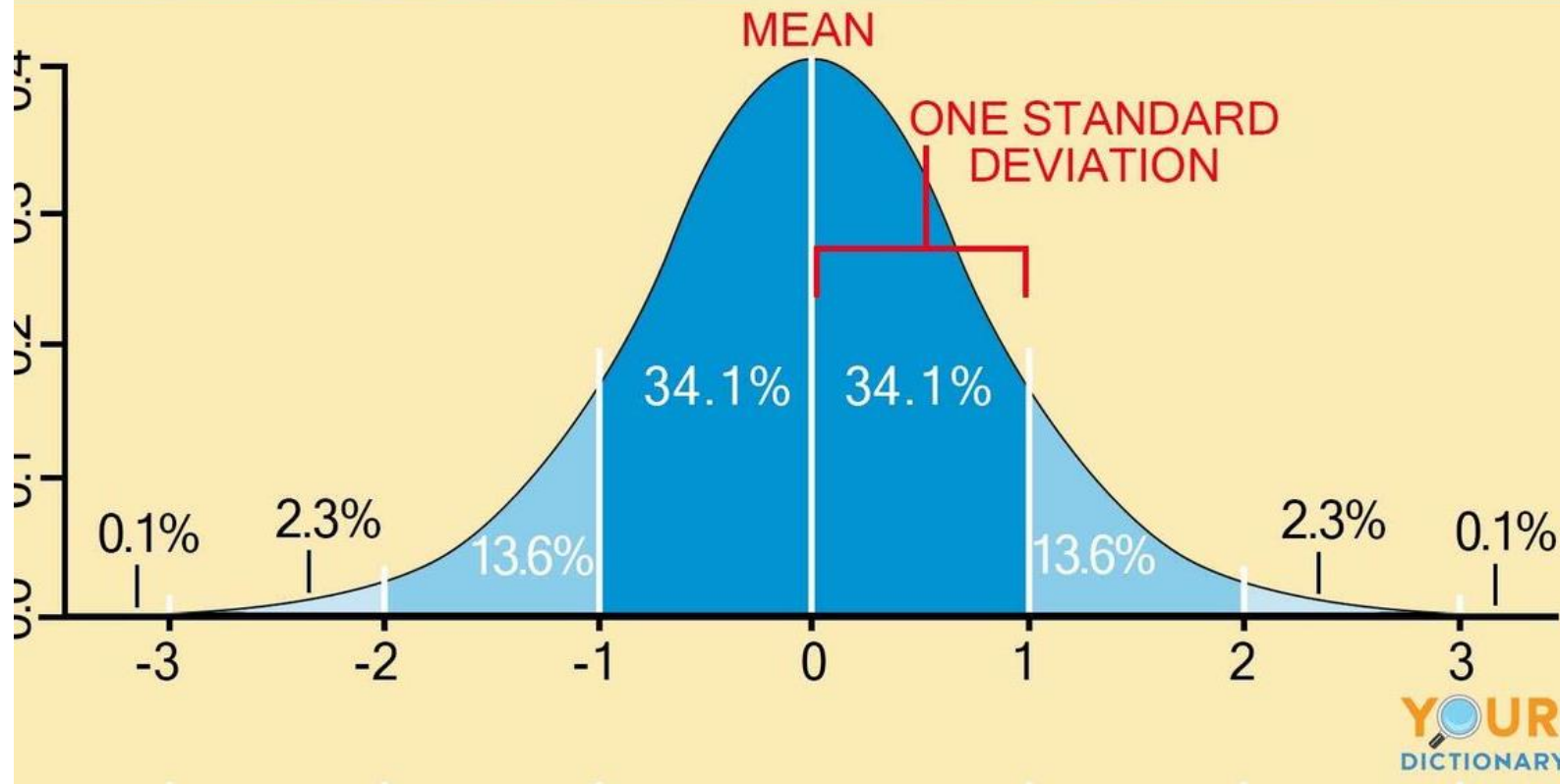
CHANGING
WEATHER,
CHANGING
GARDENS

DECEMBER 2021:

WARMEST ON RECORD

- AVERAGE TEMPERATURE: 61.2
 - (OLD RECORD: 54.0° 1933)
 - Would Be 11th Warmest NOVEMBER
- 

STANDARD DEVIATION



- One SD: 68% of the Group
- Two SD: 95% of the Group
- Three SD: 99.7% of the Group

A large orange circle on the left side of the slide, partially cut off by the edge.

CHANGING WEATHER, CHANGING GARDENS

- TOP TWO WARMEST WINTERS SINCE 2000
 - 1) 2016-2017
2) 1999-2000
 - OF THE TEN WARMEST WINTERS AT DFW,
FIVE ARE SINCE THE YEAR 2000
 - (124 YEARS OF RECORDS)
- 
- A decorative yellow dashed line in the bottom right corner, consisting of several curved segments.

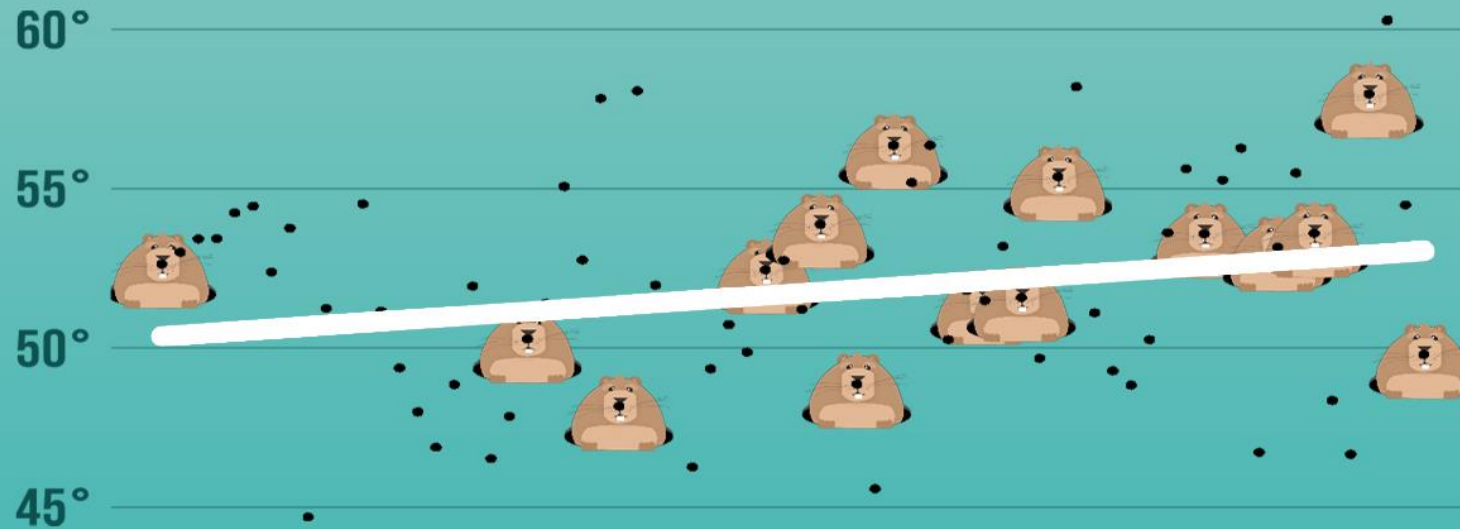
SPRING

STARTING EARLIER

DALLAS • FT. WORTH

SPRING COMING EARLIER

SIX WEEKS FOLLOWING GROUNDHOG DAY



1970

Average temperature Feb 2 - Mar 16
Source: RCC-ACIS.org, Produced 1/29/2020



= NO SHADOW

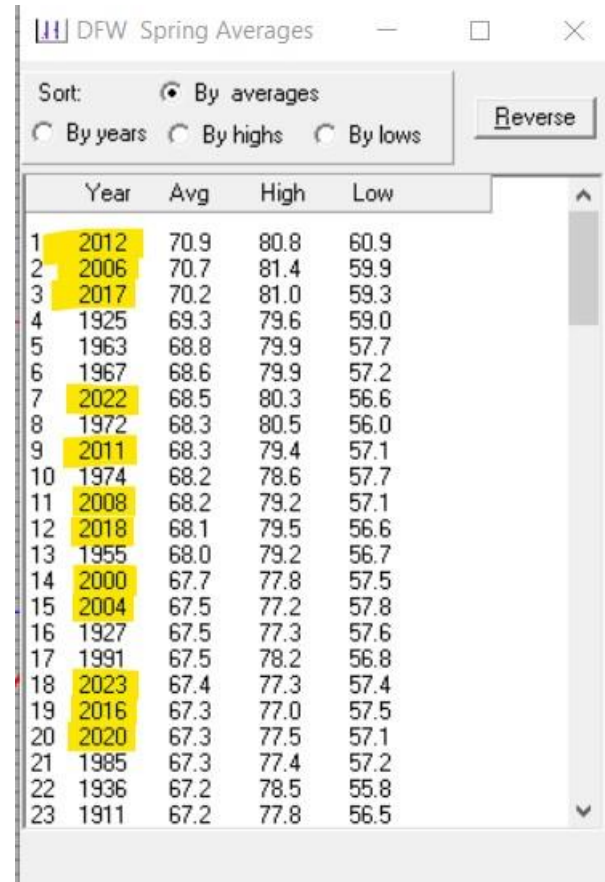
2019

CLIMATE  CENTRAL



CHANGING WEATHER, CHANGING GARDENS

- TOP THREE WARMEST SPRINGS ALL IN LAST 15 YEARS
- OF THE TWENTY WARMEST SPRINGS AT DFW, TWELVE ARE SINCE THE YEAR 2000
- Spring '22 #7, Spring '23 #18



	Year	Avg	High	Low
1	2012	70.9	80.8	60.9
2	2006	70.7	81.4	59.9
3	2017	70.2	81.0	59.3
4	1925	69.3	79.6	59.0
5	1963	68.8	79.9	57.7
6	1967	68.6	79.9	57.2
7	2022	68.5	80.3	56.6
8	1972	68.3	80.5	56.0
9	2011	68.3	79.4	57.1
10	1974	68.2	78.6	57.7
11	2008	68.2	79.2	57.1
12	2018	68.1	79.5	56.6
13	1955	68.0	79.2	56.7
14	2000	67.7	77.8	57.5
15	2004	67.5	77.2	57.8
16	1927	67.5	77.3	57.6
17	1991	67.5	78.2	56.8
18	2023	67.4	77.3	57.4
19	2016	67.3	77.0	57.5
20	2020	67.3	77.5	57.1
21	1985	67.3	77.4	57.2
22	1936	67.2	78.5	55.8
23	1911	67.2	77.8	56.5



SUMMER

HOTTER, WARMER NIGHTS

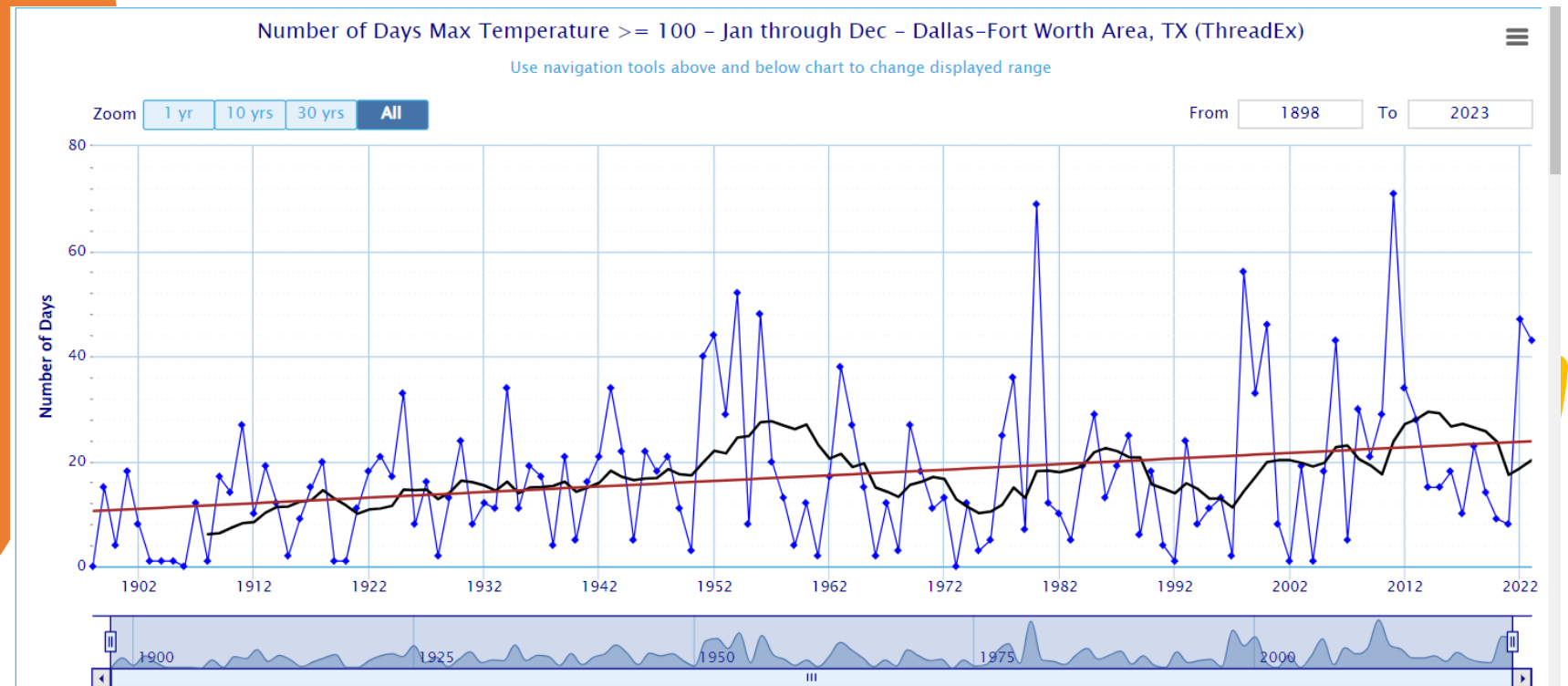


CHANGING
WEATHER,
CHANGING
GARDENS

- 2011 HOTTEST SUMMER ON RECORD AT DFW (Record 71 Days 100° or Above)
#3 Hottest: 2023
#4 Hottest: 2022
 - OF THE 20 WARMEST SUMMERS AT DFW, NINE ARE SINCE THE YEAR 2000 (THIS CENTURY)
- 

CHANGING WEATHER, CHANGING GARDENS

More 100° Days:
1899-1999: Average of 16 Per Year
Since 2000: Average of 23 Per Year



CHANGING
WEATHER,
CHANGING
GARDENS

More “Intense Heat” (Days 105°F or Above)
1899-1999: 13% of All 100° This Hot
This Year: 47% of All 100° This Hot

Daytime Highs 105 or Above												
1900-1909	1910-19	1920-29	1930-39	1940-49	1950-59	1960-69	1970-79	1980-89	1990-1999	2000-2009	2010-19	2020-23
0	1	0	2	0	0	0	0	28	1	10	3	1
4	4	0	0	0	17	0	0	0	0	0	19	0
0	1	0	0	1	14	0	1	0	0	0	10	7
0	1	3	1	4	5	2	0	0	0	2	2	26
0	2	1	1	1	12	6	3	1	0	0	0	
0	0	4	1	0	0	0	0	2	1	0	2	
0	0	0	5	1	9	0	0	3	3	6	1	
0	2	1	0	2	1	0	2	0	0	0	0	
0	1	0	0	4	0	0	1	3	9	5	5	
2	0	1	7	0	0	0	0	0	5	0	0	
6	12	10	17	13	58	8	7	37	19	23	42	34
									187			99
								Per Year	1.87		Per Year	4.1

LONGER STREAKS OF 100°+

Highest Number of Consecutive Days



Longest streak of high temperatures of 100°+ each year.
Source: RCC-ACIS.org

CLIMATE  CENTRAL

CHANGING WEATHER, CHANGING GARDENS

- Number of Nights were temperature stays in the 80s, SEVEN of top ten since 2000

DFW Search hi/lo temps above/below X degree...
Days in a year the High Low temperature is
at or Above Below 80 degrees
Search
Sort: By Totals By Year Reverse

1	2011	55
2	2023	45
3	2022	42
4	1998	39
5	2008	27
6	2010	24
7	2006	23
8	1925	22
9	1980	22
10	2000	20
11	2016	19
12	1954	18
13	1952	16
14	1956	16
15	1999	16
16	2019	16
17	2015	15
18	1934	14
19	1951	14
20	2012	14
21	1944	13
22	2013	13
23	2017	13

CHANGING WEATHER, CHANGING GARDENS

VERY Warm Nights (84° or Above) New to this Century:

1899- 1999: Once a decade

Since 2010: Once a Year

85°? Only ONE in Previous Century. Since 2011 DFW has had 19.

Overnight low 85 or Above												
<u>1900-1909</u>	<u>1910-19</u>	<u>1920-29</u>	<u>1930-39</u>	<u>1940-49</u>	<u>1950-59</u>	<u>1960-69</u>	<u>1970-79</u>	<u>1980-89</u>	<u>1990-1999</u>	<u>2000-2009</u>	<u>2010-19</u>	<u>2020-23</u>
											10	
												2
												10
											1	
			1									
0	0	0	1	0	0	0	0	0	0	0	11	12
									1			23
								Per Year	0.01		Per Year	1.0

This summer 17 record High lows at DFW
-Longest # of hours above 80° (377 hours)

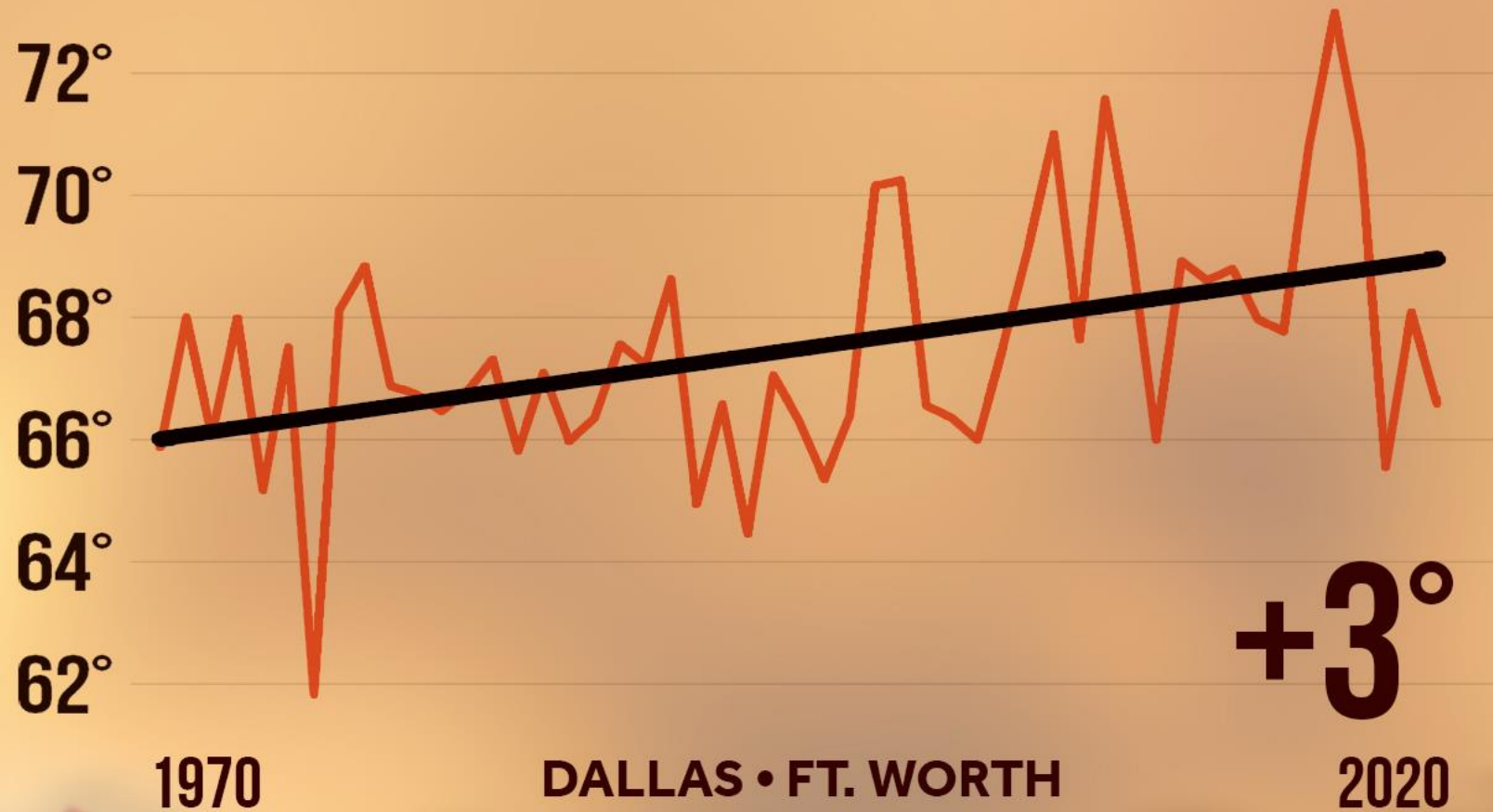
**Total:
24**

FALL

WHEN DOES IT START

FALL WARMING


AVERAGE FALL TEMPERATURE



Average fall temperature (Sep-Nov).
Source: RCC-ACIS.org. Produced 9/2/2021

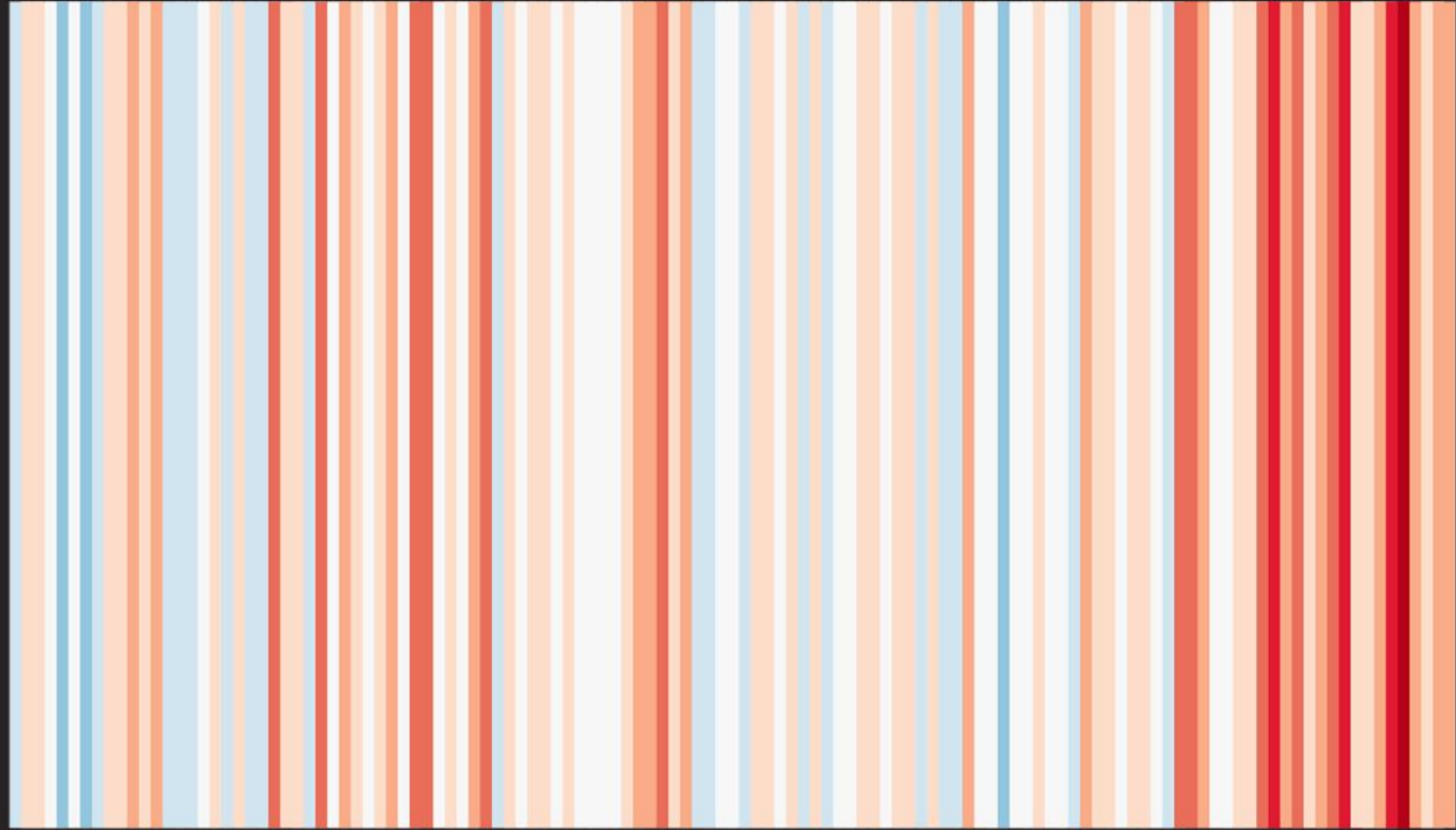


CHANGING
WEATHER,
CHANGING
GARDENS

- OF THE TOP TEN WARMEST FALLS ON RECORD, 5 OF TOP 6 IN THE LAST 16 YEARS
 - 1) 2016
 - 2) 1931
 - 3) 2007
 - 4) 2005
 - 5) 2015
 - 6) 2017
- 

CALENDAR YEAR

WARMER WEATHER



1899

DALLAS • FT. WORTH

2020

Based on Ed Hawkins "Warming Stripes".
Source: RCC-ACIS.org

CLIMATE  CENTRAL

CHANGING
WEATHER,
CHANGING
GARDENS

ALL FIVE TOP WARMEST YEARS HAVE OCCURRED THIS CENTURY

Sort yearly temperatures for...

Sort: By averages By years By Highs By lows

	Year	Avg	High	Low
1	2017	69.9	80.2	59.5
2	2006	69.3	80.4	58.1
3	2012	69.3	80.0	58.6
4	2016	69.2	79.0	59.3
5	2008	68.7	79.7	57.6
6	1999	68.6	79.3	57.8
7	2011	68.5	79.5	57.6
8	1998	68.3	78.1	58.4
9	1933	68.2	78.7	57.7
10	2022	68.1	79.2	57.0
11	1934	68.1	78.7	57.4
12	1954	68.1	79.5	56.7
13	2005	67.9	78.7	57.1
14	1921	67.9	78.4	57.3
15	1939	67.8	78.5	57.0
16	1925	67.8	78.0	57.5
17	1956	67.6	79.2	55.9
18	1938	67.6	77.8	57.4
19	2021	67.5	77.5	57.5
20	2007	67.5	77.0	58.0
21	2000	67.4	77.4	57.3

(This Year Currently the Hottest Year on Record)



CHANGING
WEATHER,
CHANGING
GARDENS

Since 2011 at DFW....

WARMEST YEAR (2017)

WARMEST SPRING (2012)

WARMEST SUMMER (2011)

WARMEST FALL (2016)

WARMEST WINTER (2016-2017)



Weather is Getting Extreme

2021

- Coldest Three Days in DFW History:
Feb. 14th -16th of 2021
(\$80-\$130 Billion in Economic Loss)

On 2/14/21 The Daytime High at DFW was 14°. The record LOW for that date WAS 18°

- High of 18° on 2/17. SIX DAYS LATER: High of 81°

2022

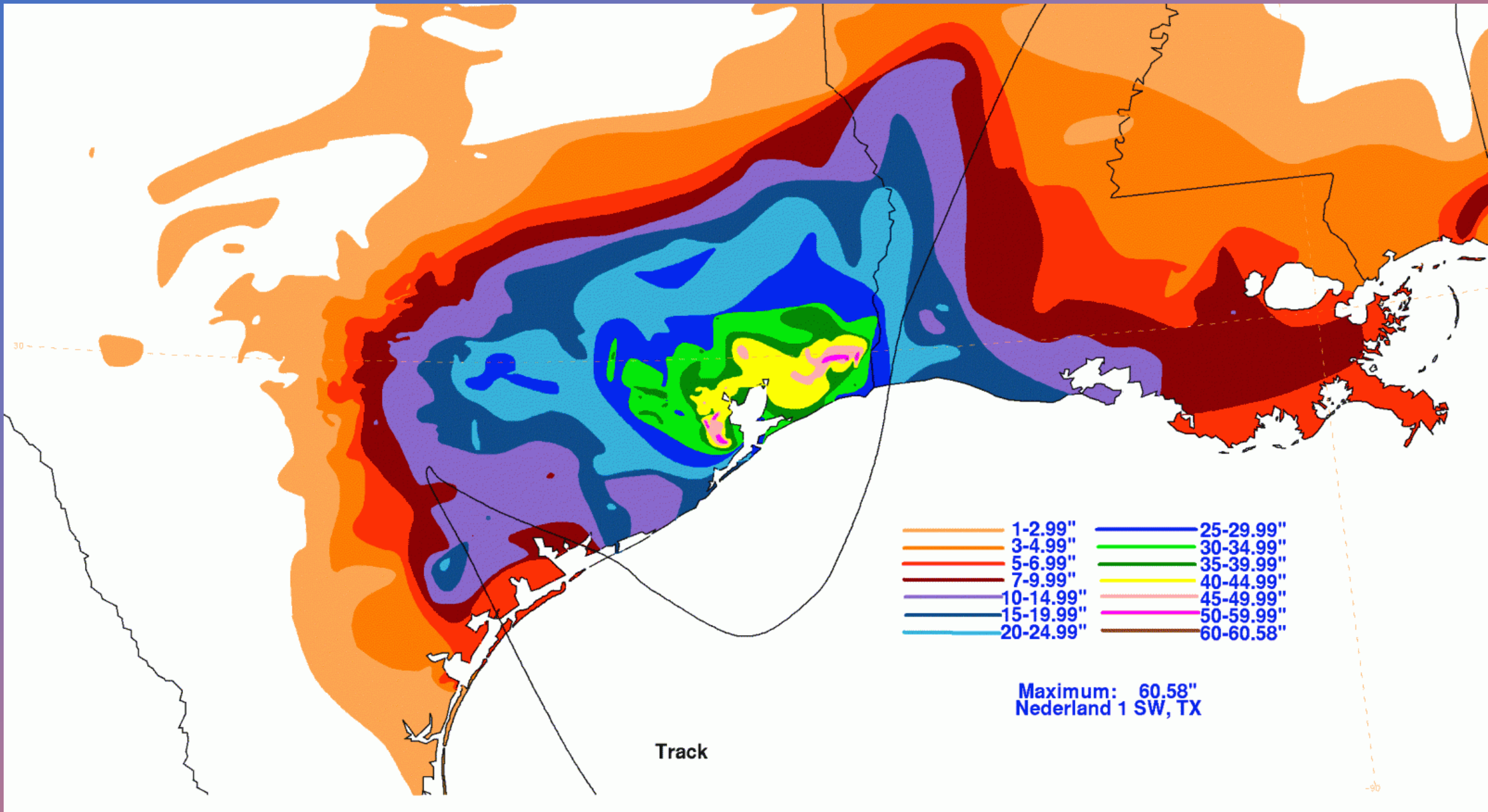
- June 4th – August 10th No Measurable Rain
(67 days - 2nd Longest Streak on Record)
- Average High for Period: 100.2°F (2nd Hottest Ever)
- August 12th/13th : 9.19” of Rain
(2nd Biggest Rain Event on Record)

2023

- 3rd Hottest, 4th Driest Summer
- August: 2nd Hottest Month ever recorded
- 2nd Hottest September Ever

Weather is Getting Extreme

- Most Tornadoes in a Year (76 in 2015)
- Most Rainfall in a Year (62.61" in 2015)
2nd Most Rainfall in a Year (55.97" in 2018)
- Longest Dry Spell in a Year (84 Days, Summer 2000)
- Most 100° in a Year (71 in 2011)
- Biggest 24hr Snowfall (12.5" Feb. 11-12, 2010)
- Earliest Last Freeze Ever (1/08/17) Previous Record 2/04



HURRICANE HARVEY 2017

- COSTLIEST WEATHER EVENT IN TEXAS HISTORY (OVER \$150 BILLION)
- BIGGEST TROPICAL RAIN EVENT IN U.S. HISTORY (60.58" IN Nederland, Tx)
- AREAL COVERAGE OF 20" OF RAIN GREATER THAN SIZE OF WEST VIRGINIA
- LONGEST LIFE AS A NAMED STORM AFTER LANDFALL (117 HOURS)
- ESTIMATED TO HAVE DROPPED 19 TRILLION GALLONS OF RAIN OVER TEXAS

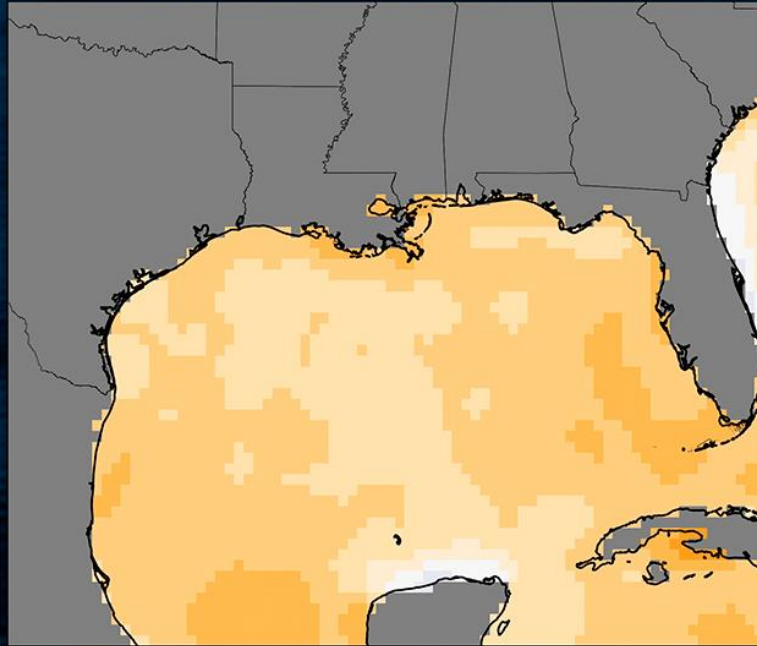
19 Trillion Gallons of Water

FOR PERSPECTIVE



**Enough to
Cover All
of Texas in
Nearly 5"
of Water**

OCEAN WARMING: GULF OF MEXICO



IMPACTS



Hurricanes



Water quality



Marine ecosystems

OBSERVATIONS

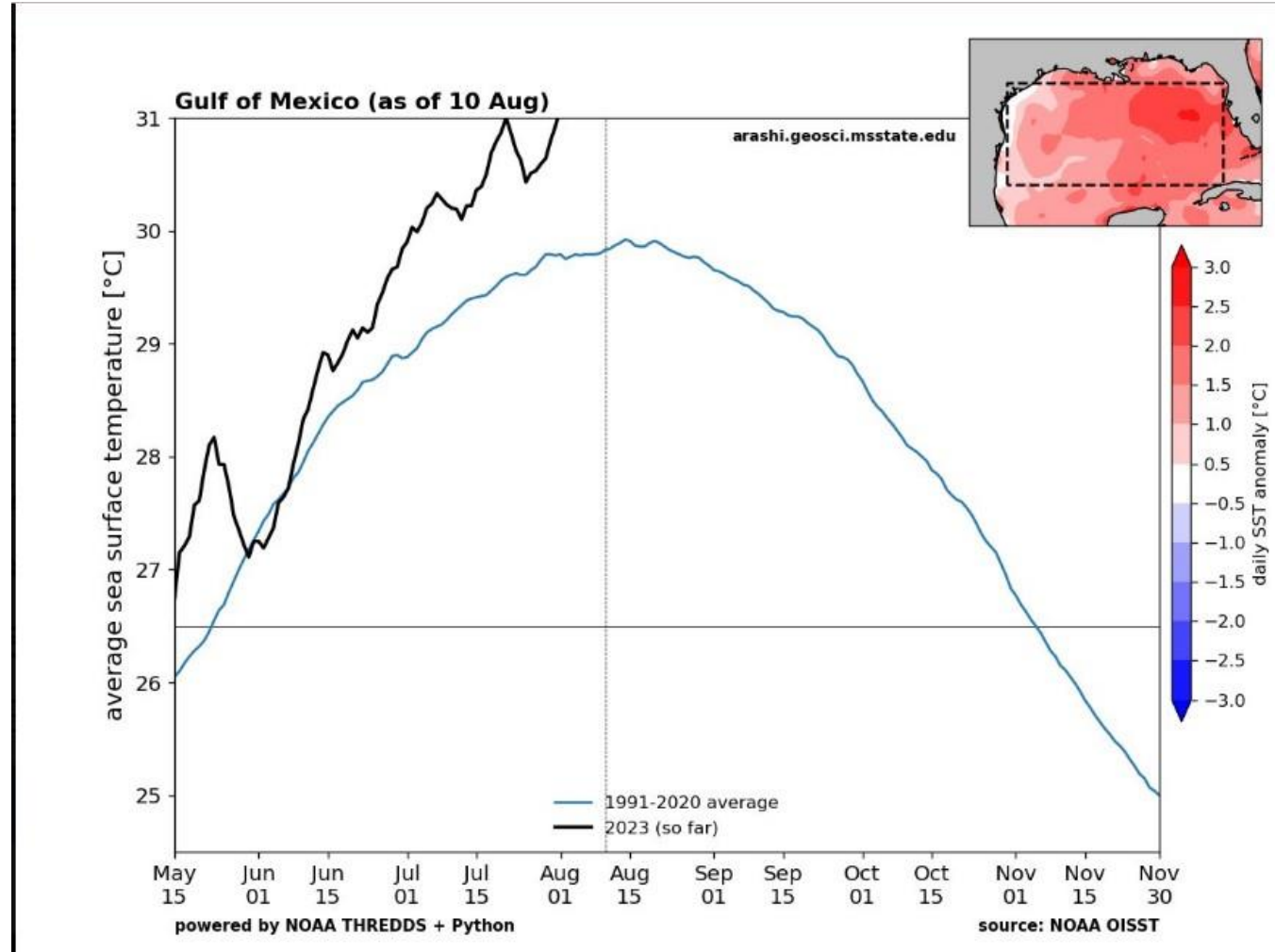


GCOOS

Summer sea surface temperature trend (1982-2021) Data: NOAA OISST, Impacts: NCA2018
GCOOS = Gulf of Mexico Ocean Observing System

CLIMATE  CENTRAL

2023 Gulf of Mexico
Sea Surface
Temperatures
Breaking Records



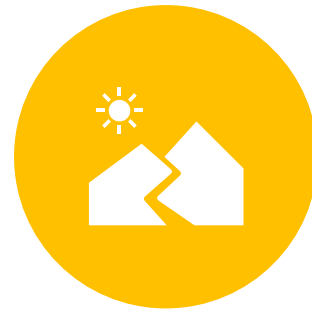
AND YOUR GARDEN ADVICE???



BIGGER RAIN EVENTS:
RAISED BEDS



HOTTER SUMMERS:
AFTERNOON SHADE,
DRIP IRRIGATION



LONGER GROWING SEASON:
FROST CLOTH, INDOOR
GROWING OF TRANSPLANTS



WARMER NIGHTS:
WATER EARLY EVENING

Looking at house June 2013



Same View June 2022





Shade and Raised Beds

Protection from Afternoon Sun



Rest some Beds in Summer







**Join the
conversation!**

@cbs11jeffrey

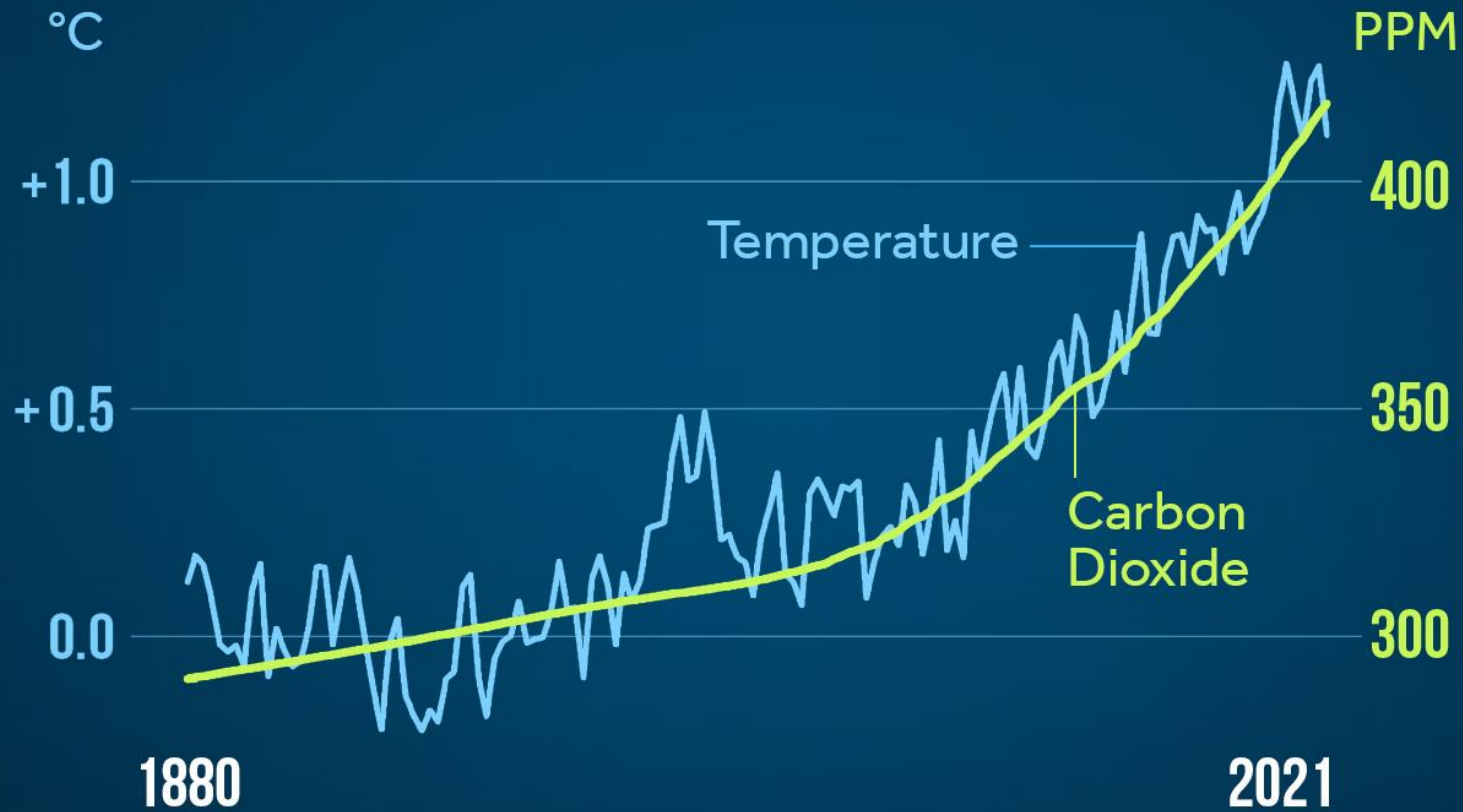


Become a Fan!

Meteorologist Jeff Ray

Questions?

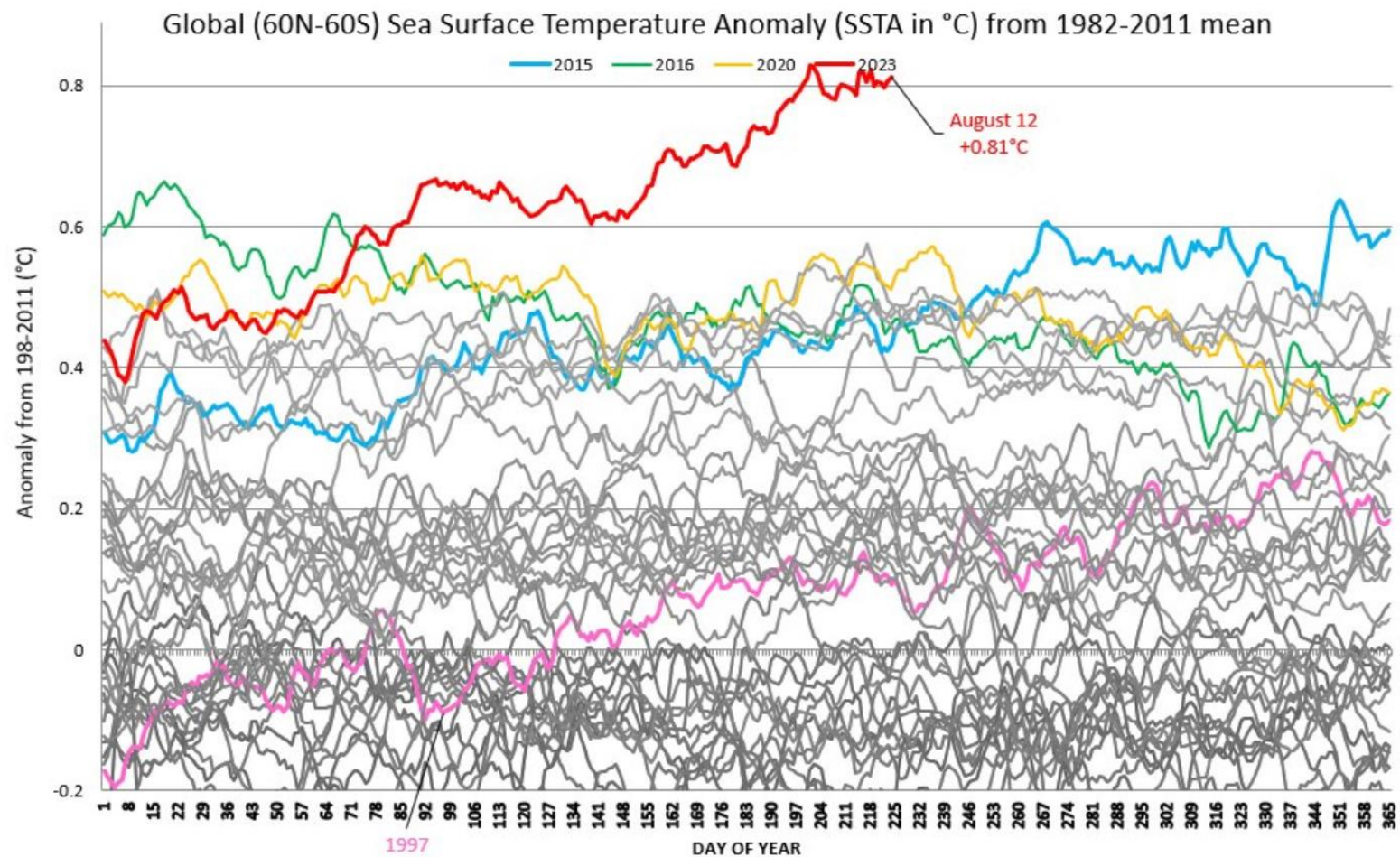
TEMPERATURE & CARBON DIOXIDE

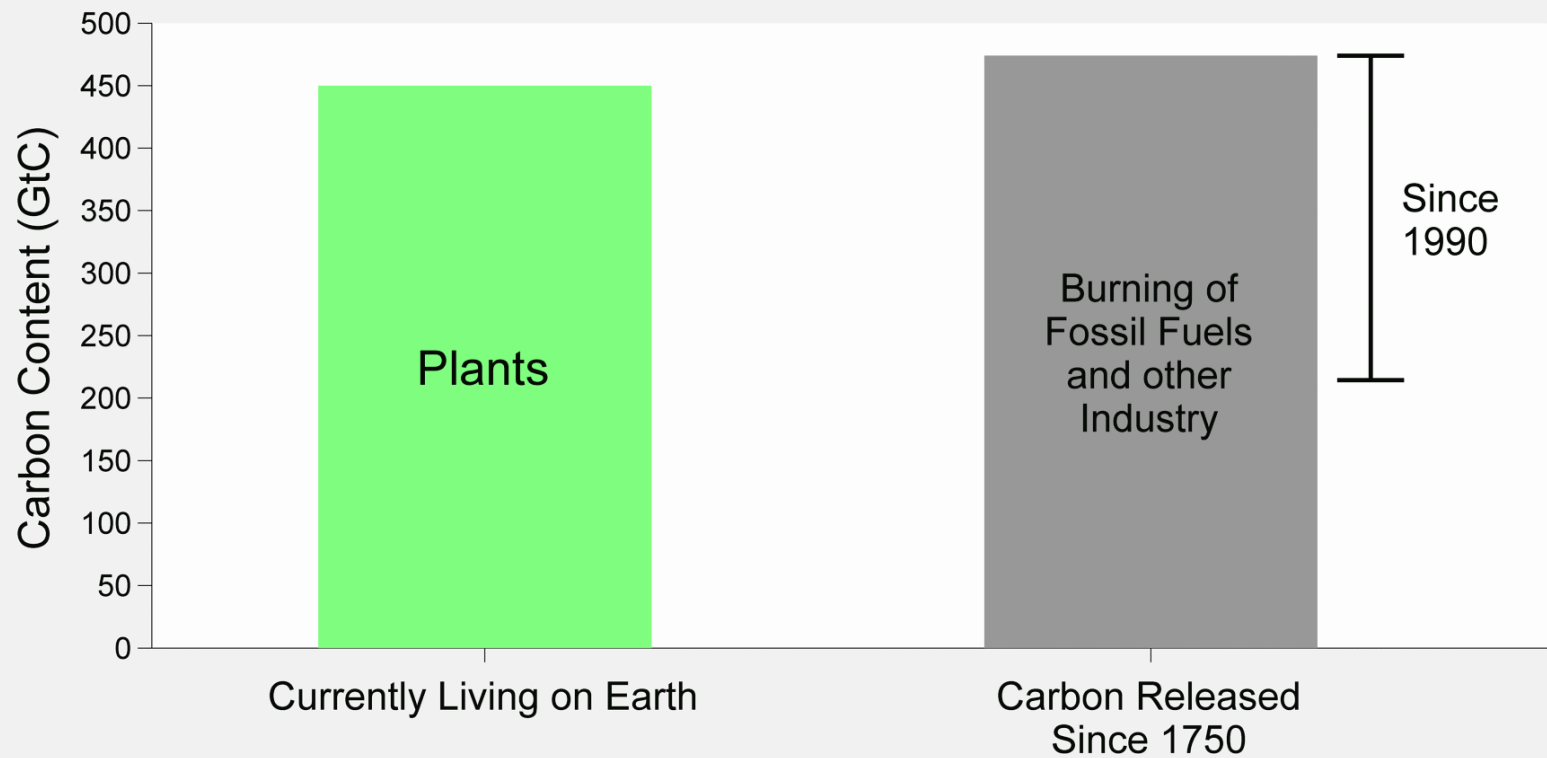


Global temperature anomalies averaged and adjusted to early industrial baseline (1881-1910)
Source: NASA GISS, NOAA NCEI, ESRL

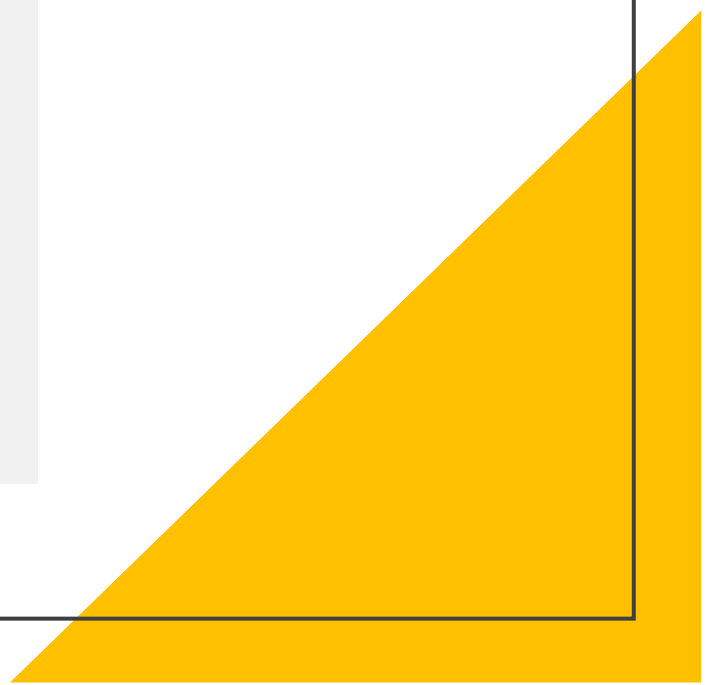
CLIMATE  CENTRAL

Ocean Has
Absorbed 90%
of
Anthropogenic
Heat





Bar-On, Phillips, and Milo (2018) "The biomass distribution on Earth". PNAS.
Friedlingstein et al. (2022) "Global Carbon Budget 2022". Earth System Science Data.
Current best estimates are used; however, both sides of this plot have large uncertainties.




CURRENTLY AT: 416 PPM

CARBON DIOXIDE CLIMB

Daily Update



Source: Luthi et al (2008) (cdiac.ornl.gov) & NOAA ESRL (esrl.noaa.gov)

- 
- “United we stand, divided we fall”
 - -Patrick Henry, 1799
 - Matthew 12:25 “Every kingdom divided against itself is brought to desolation”
- 