

#### Item 5.2: 2017 Summer Weather Outlook

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#### **Record Warm Winter = ?**



Prior to this past winter, 121 total historical winters.

Consider the top-third = 40 historical warm winters.

Where did the summer following a warm winter rank?

Texas: Warm winter → Hot summer 16 times Warm winter → Normal or Mild summer 24 times



### **The Oceans/ENSO Update**



- The oceans are the primary driver of weather patterns
- No clear El Niño or La Niña (Neutral Phase)
- The Gulf of Mexico did not drop below 73° this past winter



#### **Summer 2017 Temperature Outlook**

- Historical Matches: 2006, 2016, 2004, 2008
- Nothing to suggest hotter than last summer's mean temp
- 2016 (mean: 21<sup>st</sup> hottest, max: 53<sup>rd</sup> hottest)
- Increasing similarities to 2004. Better chance of cooler-than-forecast rather than strongly hotter
- Highly unlikely to approach the levels of 2011





### Repeat of 2011?

- Soil moisture and reservoir levels will impact summer temperatures
- Texas reservoirs are 86.4% full on 5/31/17. 76.5% full on 5/31/11 (and rapidly dropping)
- The Palmer Hydrological Drought Index, since the start of the current water year, ranks 97<sup>th</sup> (96 years were in worse drought, 25 years were in less drought). 2011 ranked 3<sup>rd</sup> only 1957 and 1918 were in a worst drought through April than 2011).
- Of the 30 "least drought" years, the average summer maximum temperature rank was 70<sup>th</sup> hottest. Only 2 of the 30 years had a summer that ranked top 20<sup>th</sup> hottest.
- Very likely too wet in 2017 to match the temperature extremes of 2011, but that doesn't mean summer 2017 can't be hotter than normal.







#### **Summer 2017 Precipitation Outlook**

- Precipitation forecasts are more challenging than temperature, due to the hitand-miss nature of precipitation
- Not likely as wet as last summer (4<sup>th</sup> wettest of the past 20 year)
- Lacking signals that suggest a widespread, dry summer; greater potential to be wetter than forecast rather than drier





# **Drought Update and Outlook**



160-140-120-100-80 -60 -40 -20 20 40 60 80 100 120 140 160

- The last widespread drought ended in early 2015.
- A strengthening El Niño under the influence of a PDO+ resulted in flooding rains in 2015 and 2016.
- 2015 and 2016 were the wettest consecutive years in Texas weather history.
- None of the 10 most extreme Texas droughts occurred during a PDO+ (we are currently in a PDO+).
- While a widespread, extreme hydrological drought is unlikely this summer, some regions could see deteriorating conditions.

# **2017 Hurricane Season Forecast**

- The historical years being applied to the 2017 Atlantic hurricane season are: 2004, 2006, 2008, 2016.
- The average from those historical years is my forecast: 14/7/4. 14 named storms, 7 hurricanes, 4 major hurricanes.
- 14/7/4 would be greater than an average season (avg = 12/6/3).
- Similar numbers to 2016 (15/7/3)
- Forecast for the Gulf is 3-4 named storms, which would also be similar to last year — but there is some upside potential.
- Increasing potential for the Atlantic Basin to experience a greater-than-average number of tropical storms and hurricanes rather than fewer-than-normal - unless El Niño becomes more of a factor than expected.



Hurricane Ike (2008) was the last hurricane to make landfall in Texas. If no landfall in 2017, would tie for the longest span (since 1900) minus a Texas landfall (average is 2.5 years).



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# Forecasting Wind Medium-to-long-range



#### Medium Range (8-15 days)

200 MB = 40,000FT (Jet Stream) 500 MB = 18,000FT (Mid-level of Atmosphere)



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#### Medium-Range (8-15 days)

#### 200 MB = 40,000 FT (Jet Stream)500 MB = 18,000FT (Mid-level of Atmosphere)



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# Long-Range (15-120 days) Wind Forecasts

YEAR	JUNE	YEAR	JULY	YEAR	AUG		YEAR	SEP
2008	14.76242	2016	<b>12.8861</b>	2002	11.58969		2000	10.69465
2014	14.71716	2008	12.57912	2000	11.1966		2014	10.37118
2011	14.65714	2000	11.78119	2016	11.08044		2009	10.19726
1998	13.46764	1998	11.72136	2014	11.01388		2013	10.18795
2010	13.25487	2011	11.70002	2009	10.95546		2015	10.18647
2013	13.16493	2014	11.58065	2012	10.87956		2002	10.16657
2009	12.52396	2015	11.57476	2007	10.82375		2012	10.01461
2012	12.33561	2001	11.55052	2011	10.8052		2016	9.98648
2002	12.2134	1997	11.53505	2001	10.67856		1998	9.860607
2000	12.14381	2012	11.4821	1998	10.40078		2001	9.819269
2001	11.87236	2002	11.46823	2015	10.35215		2010	9.675651
1999	11.5619	2013	11.21661	1999	10.26484		2011	9.608783
2015	11.467	1999	11.13944	1997	10.18555		1997	9.600017
2005	11.32031	2010	11.11803	2013	9.979991		1999	9.515976
2004	11.0542	2009	10.57292	2010	9.777244		2007	9.43058
1997	10.97075	2003	10.07007	2003	9.686427		2003	9.389687
2016	10.77381	2006	9.792262	2008	9.680231		2004	9.012334
2007	10.54458	2005	9.702384	2004	8.97769		2005	8.917787
2006	10.38212	2004	9.446435	2005	8.963759		2006	8.846952
2003	10.30205	2007	9.372381	2006	8.773447		2008	8.510356

West Texas heat (above-normal) drives wind

(Average wind speeds at peak load hours)

Less after First 11 days











### Long-Range (15-120 days) Wind Forecasts

JUN-SEP MX T RANK YEAR YEAR JUN-SEP PCPN 1997 10.57284 2014 11.92072 13 13 1998 11.3626 2011 11.69279 1 1 1999 10.62054 2000 11.45406 5 2 17 2000 11.45406 11.38303 2008 14 2001 10.98018 1998 11.3626 2 6 2002 11.35947 2002 11.35947 15 15 2003 9.862057 2016 11.18171 7 17 2004 9.622665 2012 11.17797 4 8 2005 9.726059 2013 11.13737 7 12 2006 9.448696 2009 11.0624 11 11 2007 10.04282 2001 10.98018 10 8 2008 11.38303 2010 10.95645 3 18 5 11.0624 2015 10.89509 3 2009 2010 10.95645 1999 10.62054 13 4 2011 11.69279 1997 10.57284 16 10 2012 11.17797 2007 10.04282 19 20 2013 11.13737 2003 9.862057 18 16 2014 11.92072 2005 9.726059 9 5 2015 10.89509 9.622665 20 19 2004 2016 11.18171 2006 9.448696 12 7 1= hottest 1 = driest 20= mildest 20 = wettest

#### (Max Temp)/Precipitation

Summer 2016 ranked as the 7<sup>th</sup> most windy of the past 20 years (a bit more than average).



(Average wind speeds

at peak load hours)

### **Wind Forecast Conclusions**

#### Medium-Range Forecasts (8-14 days)

- Examine computer models for location of high and low pressure.
  - High pressure influence at all levels of atmosphere over TX
  - Trough building in from West
  - Position of High will assist in determining rough percentage of installed capacity.

#### Long-Range Forecasts (1-3 months)

- Apply monthly and seasonal temperature forecasts to wind.
  - Below-normal temperature pattern (summer only?) correlates to potential for less wind
  - Above-normal temperature pattern correlates to potential for more wind
  - May be another, stronger correlation with the greatest, above-normal temperature over West TX = more wind





This summer's temperature forecast would suggest normal or below-normal wind for the season as a whole. Medium or short-range forecasts for daily wind forecasts