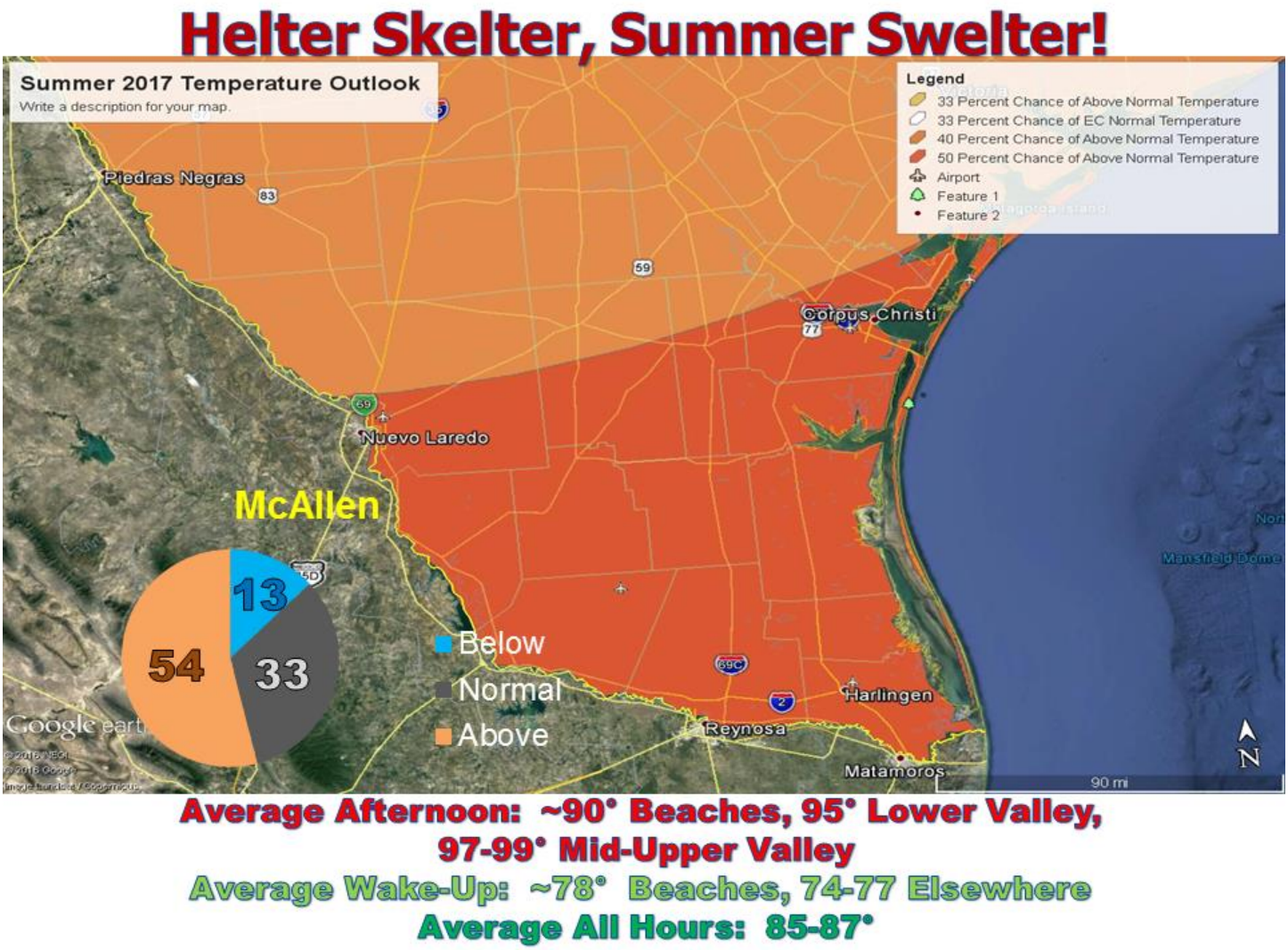
RGV Summer 2017 Outlook



Record 2017 Heat to Continue Through August

100° Days Along/West of McAllen-Edinburg Common Again; Rain and Tropical Forecast Highly Uncertain and Drought May Worsen

Overview

The heat goes on…and on…and on.

Though May 2017's departure from average settled back a hair, the departure was ***still*** 1 to 3°F above the 1981-2010 average, ranking among the top ten all-time in Brownsville and McAllen/Miller Airport and culminating in a super-sweaty and dangerous close to the month with three days in a row with heat index, or "feels like" temperatures, soaring to or above 111°F along the Rio Grande. Rain was limited, and severe drought briefly made an appearance in Greater Brownsville before a thunderstorm system crossed the entire Valley and dropped 1 to 2 inches of welcome rainfall, improving drought to moderate. But would the relief be short lived?

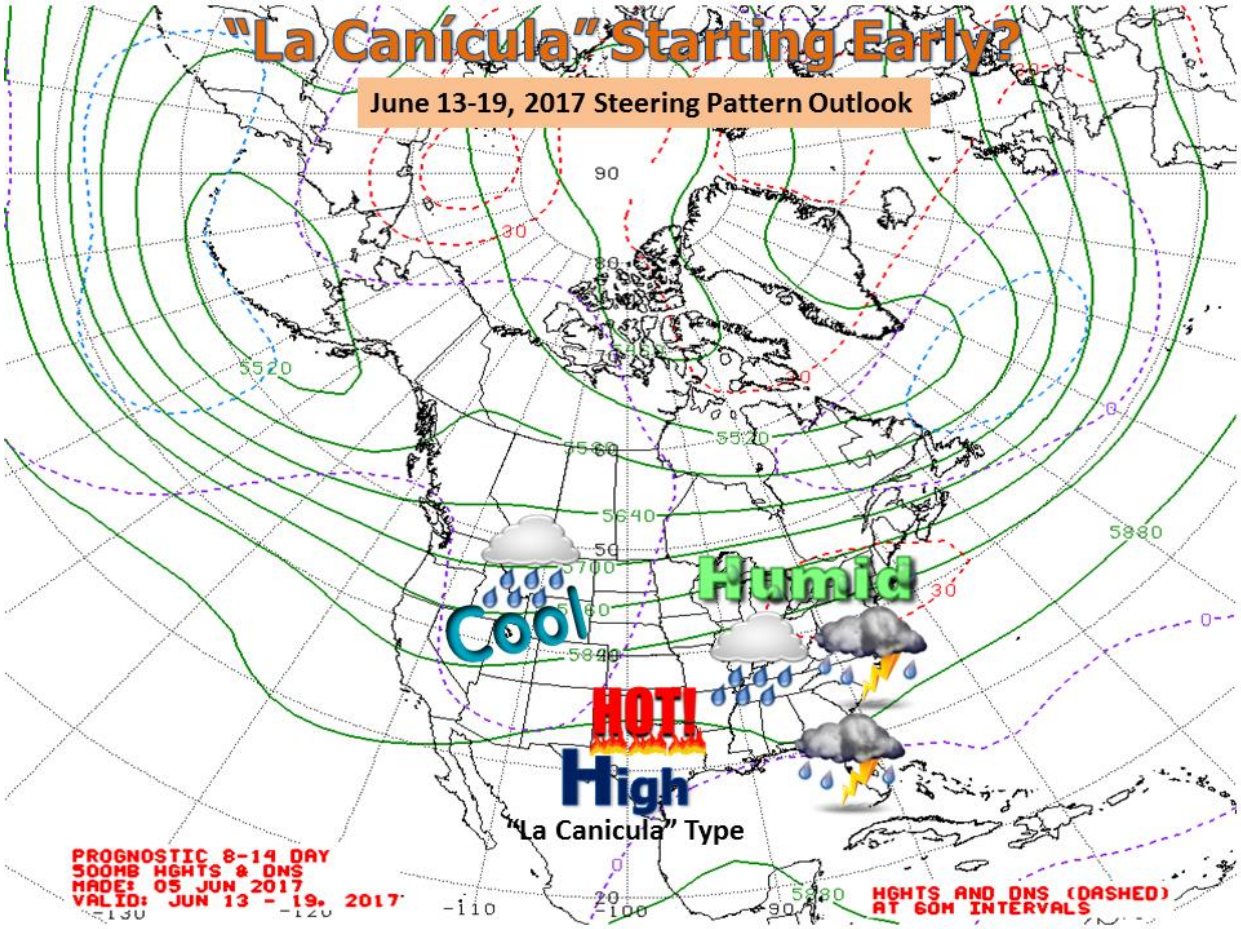
Rainfall forecasts (below) remain a difficult proposition. While the forecast *leans* with an edge for higher probabilities of above average vs. below average rainfall, there are early indicators that "La Canícula" – the pattern of the "dog days of summer" where atmospheric high pressure parks over northern Mexico and much of Texas, suppressing significant precipitation while allowing heat to build – may become an early fixture and carry deeper into summer or longer. This was the case in 2015 and 2016; a third consecutive year of

prolonged “Canícula” would ensure a record warm 2017 for many, breaking the record set – in 2016. The expected heat practically guarantees the McAllen metro region will see at least 60 days of 100°F maximum temperatures. While too soon to predict whether the 2016 record of 90 days will be threatened, it is worth noting as of this writing that McAllen/Miller had already reached 10 days as of June 5th; another 60 is almost guaranteed between June and August with the probability of above average sitting at 54% for the city this summer.

Despite the late flourish of rain to close May, it was too little too late as the populated Lower RGV still ended up at 25 to 75 percent of average (the ranchlands did much better). Should Canícula be the dominant pattern of summer, rainfall – which typically does lull in July through mid-August – would only reach average by one of two methods: 1) A break in the pattern that favors easterly waves or other tropical moisture feeds, which can dump a summer’s worth of rainfall in a day or two, or 2) a nearby or direct strike from a tropical cyclone. Recent summers, as well as a developing pattern in mid-June (below) that matches Canícula, suggest that this may indeed be the case – and ***below*** average rainfall may rule summer 2017.

A Little Rain *Might* Fall

Average Rainfall: 6 to 7 Inches, Valley-Wide



What to Watch For: Summer Heat, Worsening Drought?
Overall, for the first half of summer at least, the following situations are expected to predominate:

- *Heat.* All systems are "go" for another stronger than average Canícula period. This period in any year is from July 3 through August 11, and may well expand on both sides of the calendar to cover much of June as well as the first two thirds of August. This would ensure McAllen sees at least 25 days of 100°F or more in July, and a good chance for that number in August – with June seeing 10 to 15 days. This would end summer with nearly 70 days for the city, ranking it among the top five years on record with 100°F days. Heat Index, or "feels like" temperatures, would consequently be higher – though the drier atmosphere would keep them in check and generally ranging from 103 to 109°F. (Valley danger typically begins at around 111°F). While temperatures will be a little lower near the coast, a typical afternoon may see Harlingen top out at 98°F and Brownsville at 95°F – in all cases, 2 to 3 degrees above average by day. Sultry mornings in the upper 70s to around 80 would be some 3 to 4 degrees above average – similar to long periods during the summers of 2015 and 2016.

- *Drought.* Addition heat with little to no rainfall increases the stress on Valley/Brush Country grasses, trees, and brush. Spring rains across the Upper Valley and Brush Country have kept drought at bay, and it will take more time and persistent dry weather to worsen conditions to at least abnormally dry. Across the Lower and Mid Valley, however, conditions began summer 2017 as abnormally dry to moderate drought, including nearly all of the heavily populated areas. A dry, hot summer would ensure expansion of moderate to severe drought, with the future status then resting heavily on whether September plays out as "normal" (wettest month of the year)

- *Tropics Watch.* The seasonal Atlantic Basin forecast is slightly above average – with a 45% chance for an above average number of cyclones (11 to 17 vs. 12), hurricanes (5 to 9 vs. 6), and major hurricanes (2 to 4 vs. 2). However, western Gulf action requires the following elements, or "puzzle pieces" to fall into place:

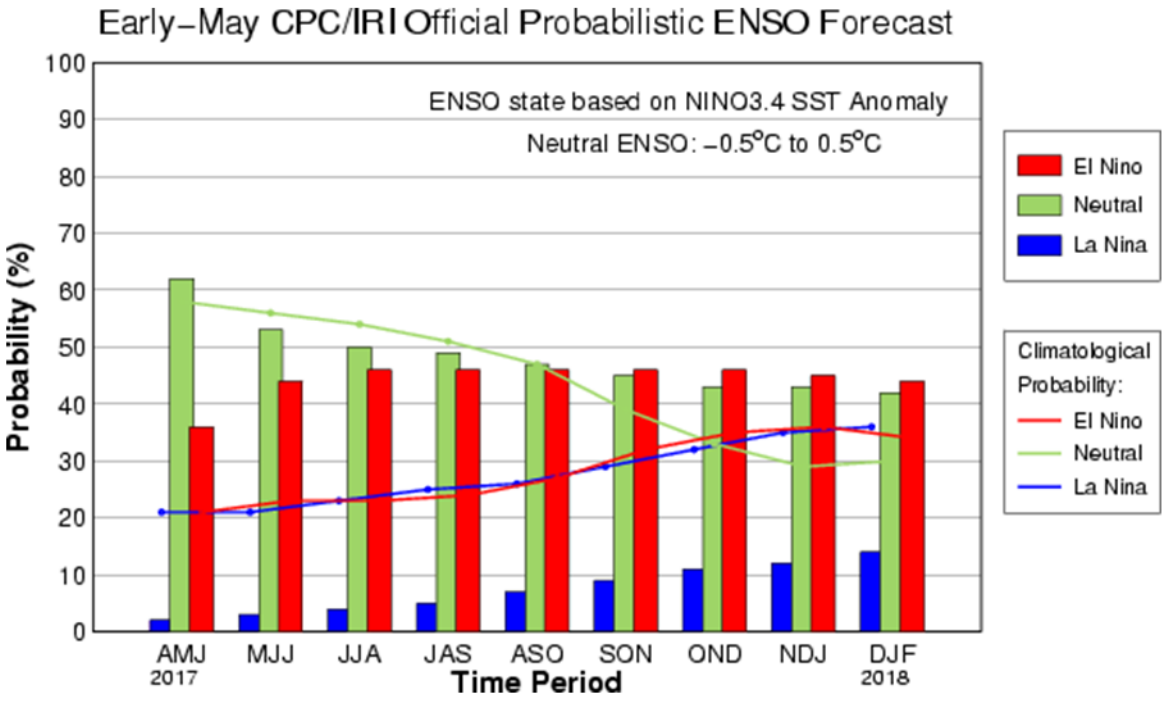
- *Pattern.* Canícula locks down the western Gulf by providing subsidence (dry air) and a steering pattern that brings any cyclone moving west from the Caribbean on a westward track into central America, the Yucatan, or Veracruz. Canícula will have to break in August to allow any cyclones to nudge into the southwest or western Gulf and make a direct or nearby strike. September is typically the best month for deep tropical moisture and a favorable steering pattern.
- *Wind Shear.* Early season Gulf and Caribbean wind shear, as of this writing, remained hostile. The evolution of wind shear through summer is unknown, though a strong Canícula ridge can be part of a pattern that favors upper level troughing to the east, with an increase amount of wind shear that can remain in the tropics and subtropics, including much of the Caribbean and western Atlantic.
- *Moisture.* Wind shear dominance can also come with a dearth of moisture. And, there's always to unknown about the strength of Sarahan Desert dust storms (and movement) from east to west which can add more dry air into the mix across the eastern through central tropical Atlantic, reducing the ability of African waves to develop particularly from late July through August.
- *Sea Surface Temperature.* This is one element that is expected to be "high octane gasoline" for any tropical engines that develop and move across the favored areas of the Gulf, Caribbean, and western Atlantic. Time will tell.

Teleconnections: El Niño Struggling to Launch

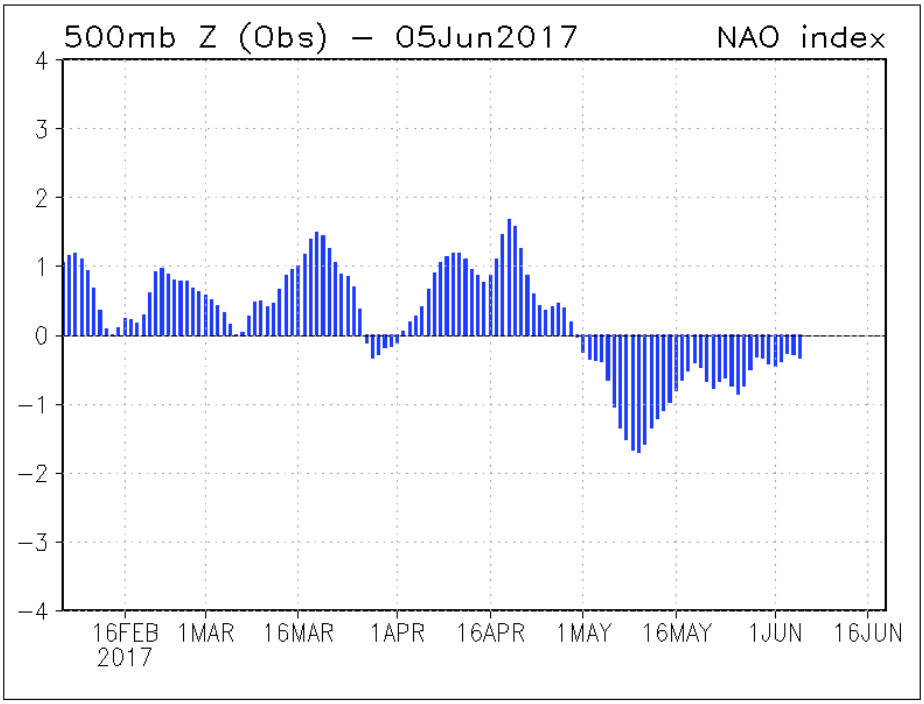
El Niño/Southern Oscillation (ENSO), which had been on a fairly quick move toward a warming eastern tropical Pacific, slid back into neutral leaning positive territory in April and remained there through May. Historically, spring warm surges have the potential to be "false positives" – and the neutral ENSO phase can last longer than expected, which is likely the case in summer and into fall of 2017. As shown below, by the end of the June-August period, the probability of El Niño and Neutral are tied, implying that monthly Oceanic Niño Index (ONI) values for July would lean positive but remain neutral. There is uncertainty whether this would influence the probability of a dominant summer La Canícula, but a continued positive lean neutral along with other teleconnections such as phase of the North Atlantic Oscillation (NAO) could be enough to lean forward with a three month hot, and relatively dry, summer.

Other teleconnections contribute to the summer forecast. Almost identical to mid spring 2016, the North Atlantic Oscillation (NAO) ended a four month period of persistent positive (+NAO) phase on May 1, and negative phase (-NAO) has dominated into early June. While the predictability of NAO remains about two weeks, should the –NAO persist into summer, recent correlations with hot, dry south Texas summers may be the result once again in 2017. Conversely, a +NAO switch during the summer, along with a neutral ENSO (if that is the actual case) could favor a stronger Bermuda/southeast U.S. upper level ridge and a less influential "Canícula" ridge – possibly opening the door for tropical/easterly waves later this summer and perhaps as early as late July which would bring more rain and lower temperatures due to cloud cover (and the rain). This outcome is looking more unlikely as summer gets underway in 2017.

The Pacific-Decadal Oscillation (PDO) increased a bit by April, marking the 40th consecutive positive phase triad which began at the start of 2014. There is limited correlation between the PDO and late spring/summer conditions in south Texas – in fact, cooler than average eastern Pacific (non-tropical) waters have prevailed since April. For summer, this may keep Pacific disturbances rolling into the central California coast through the Pacific Northwest which would aid rainfall and cooler temperatures in those regions, but could also strengthen a flatter Canicula ridge along the U.S./Mexico border. Something to keep an eye on through the summer.



Above: Probabilistic ENSO forecast through winter 2018, showing neutral conditions and weak El Niño "tied" for the most likely outcome through summer and fall 2017.



Phase of the North Atlantic Oscillation, February through early June, 2017. Note the dominance of the positive phase (+NAO, above zero) through April, then a six week period of negative phase (-NAO) in May and early June. Forecasts through the first half of June suggested a continuation of a weak -NAO; unknown is whether it would continue through summer.

Pattern Matters

Given all these factors, we expect the U.S. steering pattern for summer to *lean* toward the "La Canícula" pattern shown on page 3 above. The questions that remain to be answered include the following:

- How far might any Pacific (mid latitude) troughs "dig" into the southwest U.S., even in July and August? Should any of these tap deep tropical moisture the Canícula ridge could conceivably break down and

allow moisture to be lifted into storms moving from tropical Mexico into northern Mexico and south Texas/Rio Grande Valley. This type of pattern "break" would be quite rare or unusual.

- Will a Bermuda High develop by late summer and potentially reduce the impact of any Canícula ridge, allowing a window to open that allows tropical moisture, tropical waves, or cyclones to enter the western Gulf and cause impacts to the Rio Grande Valley?

The potential – and perhaps likelihood – of a "flat" Canícula ridge for long stretches of summer would ensure searing heat with modest humidity from mid-June through mid-August. Should deeper than average troughs move onto the U.S. Pacific coast from central California through the Pacific Northwest, a lighter version of the Valley Wind Machine would rear itself more often than in typical summers – but also contribute to the low rainfall and heat, similar to how July and August 2009 evolved. A nearly identical pattern to mid summer 2009 would occur if a prolonged –NAO setup and aided a persistent eastern U.S. upper level trough – which helped to lock in the Canícula ridge then and produce the hottest July on record for many locations – a record which stands as of June 2017.

Outlook: Summer 2017

Remainder of June and July should continue to see the heat build, with 100° days along and west of US 281/IH 69C becoming the norm by mid to late month. Should the trends of a weak El Niño or neutral/negative lean remains established, and neutral to –NAO join up, Canícula will set up shop with an upper level ridge becoming established over west Texas/New Mexico extending into northern Mexico. If neutral ENSO and some type of +NAO prevail, the potential for the Bermuda ridge to dominate increases. This is looking more unlikely through July – so expect temperatures to range from 1 to 4°F above the already swelting summer values, and drought conditions will worsen incrementally and potentially spread from the Lower and Mid Valley out the Upper Valley and ranchlands by month's end.

August may begin where July left off, but uncertainty develops by mid-month as it typically does when trying to forecast teleconnections and combine with the ability of the tropics to maximize moisture availability. For now, the "lean" is to remain dry, with increasing uncertainty on whether Canícula shifts to a Bermuda high at some point and opens the door for deeper tropical moisture in any form. That situation would favor the second half of the month.

Preparedness, Awareness

Though the forecast is clarifying regarding a predominant hot and dry June through early August, the uncertainty to close August as well as the expectation for a slightly above average Atlantic tropical cyclone season makes it the perfect time to revisit, reassess, and restock hurricane/tropical supply "stay" and "go" plans and kits, make your home or community #hurricanestrong, and purchase wind and flood insurance well in advance of any possible strike. Take advantage of the expected quiet period for the first half of summer, at least.

- ***Heat and Hydration.*** The close of April (29) featured oppressive heat and humidity, including "feels like" temperatures between 107 and 116 – a rare day even in July. The atmosphere can still produce unusually warm/humid conditions in May (i.e. when strong surface low pressure systems move through the southern Even dry heat following wind shift lines ("fronts") requires plenty of water to replenish lost moisture for people and pets, and whether the actual or feels like temperature surpasses 100°F, residents should continue to acclimate for periods of heat that are above the average at times through the period. For heat safety tips, check our local heat awareness page and the NWS national page.

- ***Drought Severity.*** This could be a spring to require two important "-ations" of the Valley's complicated water use system: Those include [smart] **irrigation** and **conservation**. The persistent extreme to exceptional drought of 2011 to 2013 demonstrated to the Rio Grande Valley that one year's feast (the 2010 record **wet** water year, defined as October through September, rainfall) can become the next year's famine (2011 record **dry** water year). September 2016's drier (and hotter) than average result, followed by a much warmer and generally drier than average winter (December 2016 – February 2017) set the stage for the most irrigation water needs since 2013 for large and small crop growers alike. Residents can begin

conserving water immediately, to be ready in case spring rains fail to materialize and the return of El Niño in summer potentially puts the damper on deep tropical moisture and cyclones.

Drought Severity Classification

			Ranges				
Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: ▪ short-term dryness slowing planting, growth of crops or pastures Coming out of drought: ▪ some lingering water deficits ▪ pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	▪ Some damage to crops, pastures ▪ Streams, reservoirs, or wells low, some water shortages developing or imminent ▪ Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	▪ Crop or pasture losses likely ▪ Water shortages common ▪ Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	▪ Major crop/pasture losses ▪ Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	▪ Exceptional and widespread crop/pasture losses ▪ Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

- ***All Things Tropical!*** Become hurricane ready in June and July! We prefer May, of course, since the Atlantic Hurricane Season is underway as of this writing. But the "quiet" forecast allows you time to address your plans and make adjustments.
  - **Become HurricaneStrong Today!**
  - **Adjust Your Plans at http://hurricanes.gov/prepare**
  - **Are you insured? Start your coverage at http://twia.org**
  - **How about for floods? Floods can inundate *anyone*** in the Valley. Insurance is less expensive outside of a designated flood zone, but no less important. Learn more at http://floodsmart.gov
  - **Check out more with our hurricane guides, in English and Spanish.**