

## Record RGV 2017 Heat Likely to Continue through Autumn

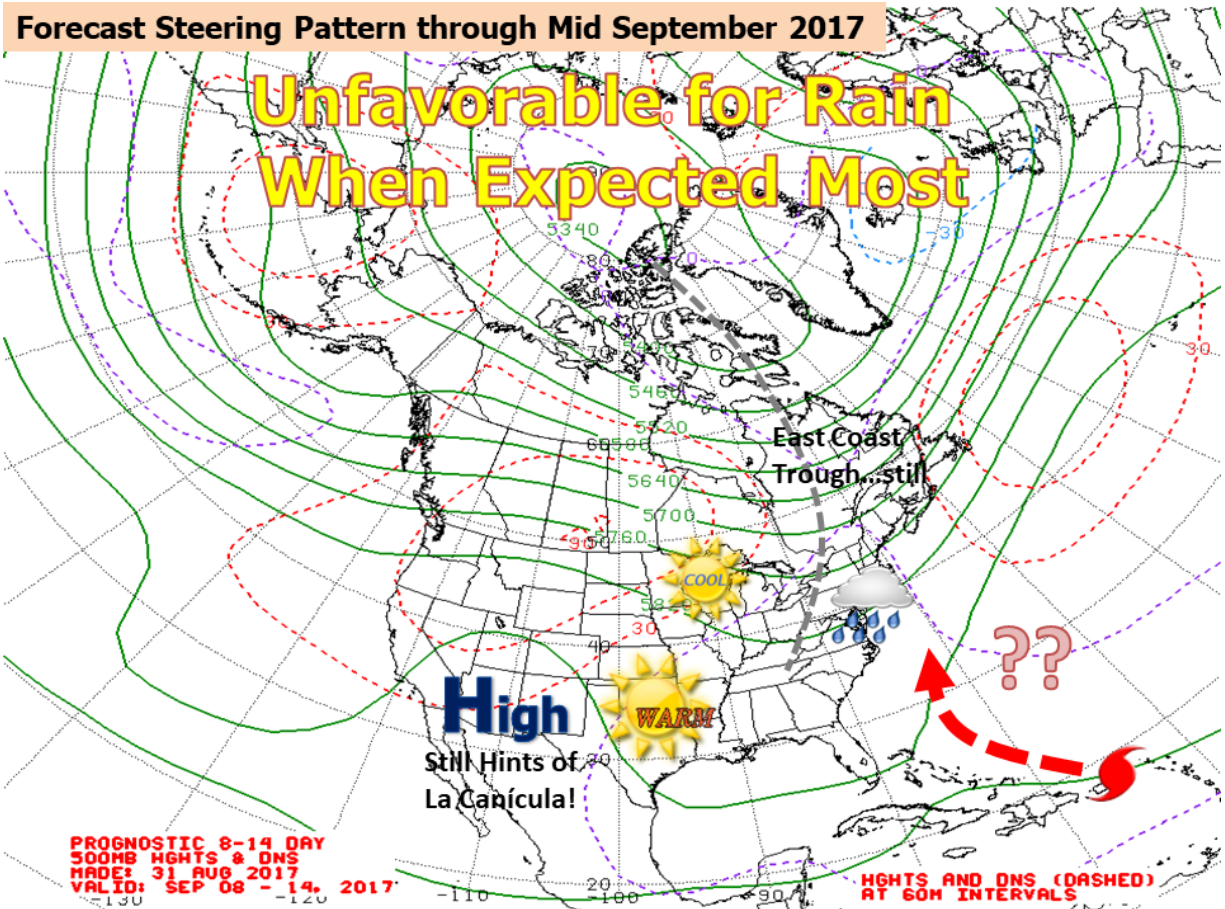
### Rainfall Still In Question; Indicators Suggest Drought and Wildfire Conditions May Worsen

#### **Overview**

August 2017 completed yet another hot and dry summer (June-August), as the Rio Grande Valley escaped – by a hair – the onslaught of [Hurricane Harvey](#) which made a direct hit on Rockport just 180 miles northeast of Brownsville on the 25<sup>th</sup>. The entire lower Valley ranked among the top 20 hottest, with McAllen/Miller (#2 at 90.1°F – records since 1961) and Harlingen (#3 at 86.9°F – records since 1912) leading the pack. While local thunderstorms in July and early August brought just enough rainfall to keep Harlingen and Brownsville from top rankings, McAllen missed the action, and its 0.92 inches ranked #2, finishing only behind 1996 (0.36) but only a few ticks ahead of 2016 (still ranked #6 with 1.33 inches). In summary, the [alternative summer forecast](#) (hot but also dry) ended up being the reality.

The high ranked heat added to an already record hot 2017 (through spring), with temperatures 1.2°F above prior record through August 31 in McAllen (prior record: 80.7 in 2009) and nearly 2°F above the 80°F value at this time in 2016, when the calendar year record was shattered last. By August 31, McAllen/Miller Airport had reached 77 100°F afternoons for the calendar year; the first few days of September were likely to blow through the prior #2 of 78 days and the potential to near or exceed the 2016 record of 90 days was in sight. Brownsville, with enough influence from the Gulf especially in July, ranked 4<sup>th</sup> hottest through August 31 (records back to 1878) and Harlingen (back to 1912) was also quite possibly at #1 (78.8°F) as higher ranked years were missing 25 to 60 percent of data.

September, as always, will be **critical** for the future of the remainder of 2017 and possibly well into 2018. With average rainfall well above any month of the calendar year (4.5 to 6 inches), values falling well short of this could set an ominous stage for deteriorating drought conditions and increasing threat for wildfire growth later in autumn and winter where there are sufficient fuels to burn. Further into the future, spring agricultural issues may become relevant, particularly irrigation, based on a drier than average September. There were signs (see “pattern matters”, below) that the first half of September would be drier than average at a time when average daily rainfall soars to annual peaks. Beyond September, the potential for a “leaning” La Niña El Niño Southern Oscillation (ENSO) pattern was increasing – which, combined with what has been a persistently negative North Atlantic Oscillation this summer, could shut off much of the moisture that would help produce soaking rains in October and November.

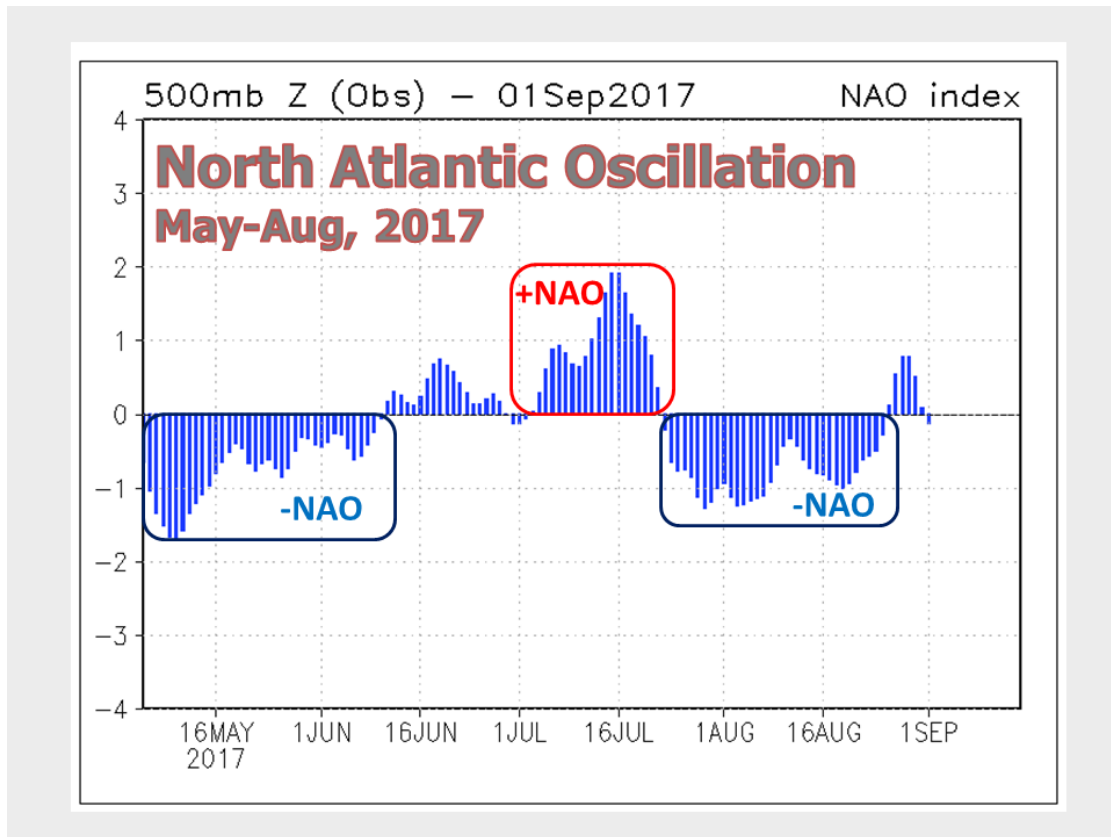
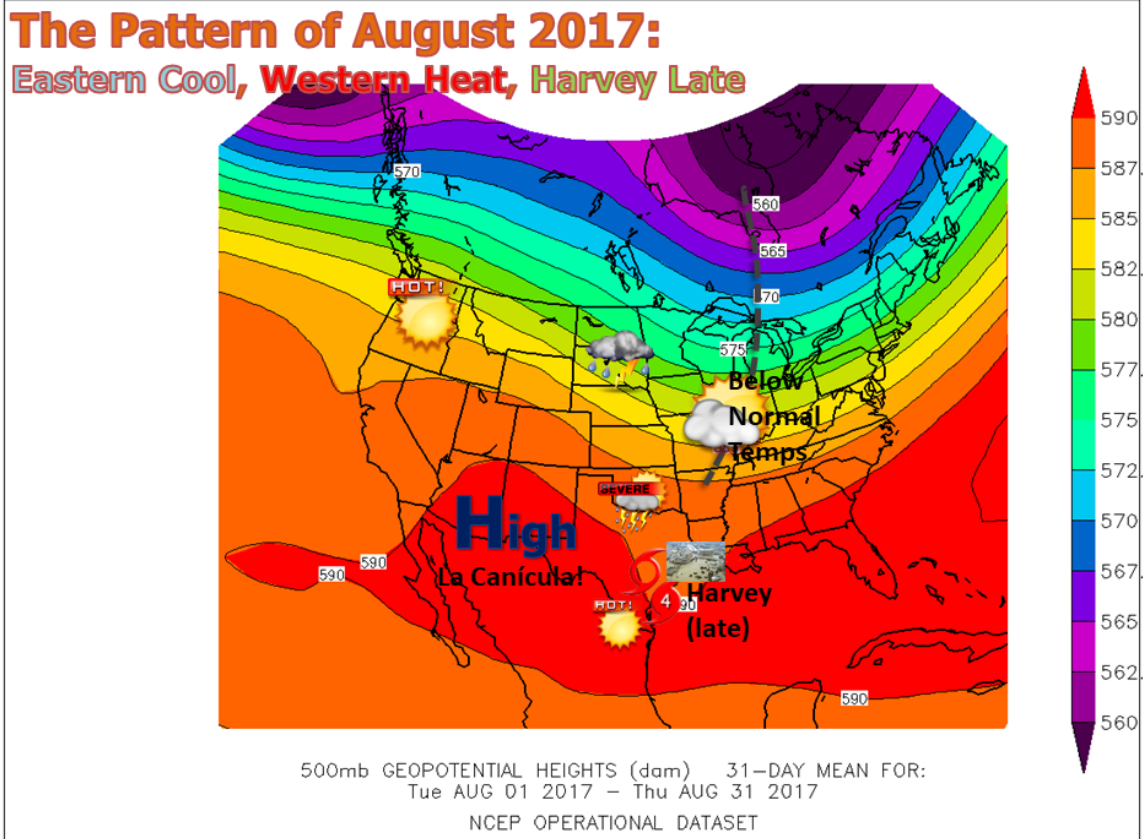


**Above:** New verse, same as the first? Forecast through mid September (from Weather Prediction Center) that would continue to favor hot and relatively dry conditions for South Texas/RGV in 2017 during the wettest part of the calendar year.

**Pattern Matters**

**Canícula Sustenance and western U.S. Atmospheric High Pressure Looking More Likely**

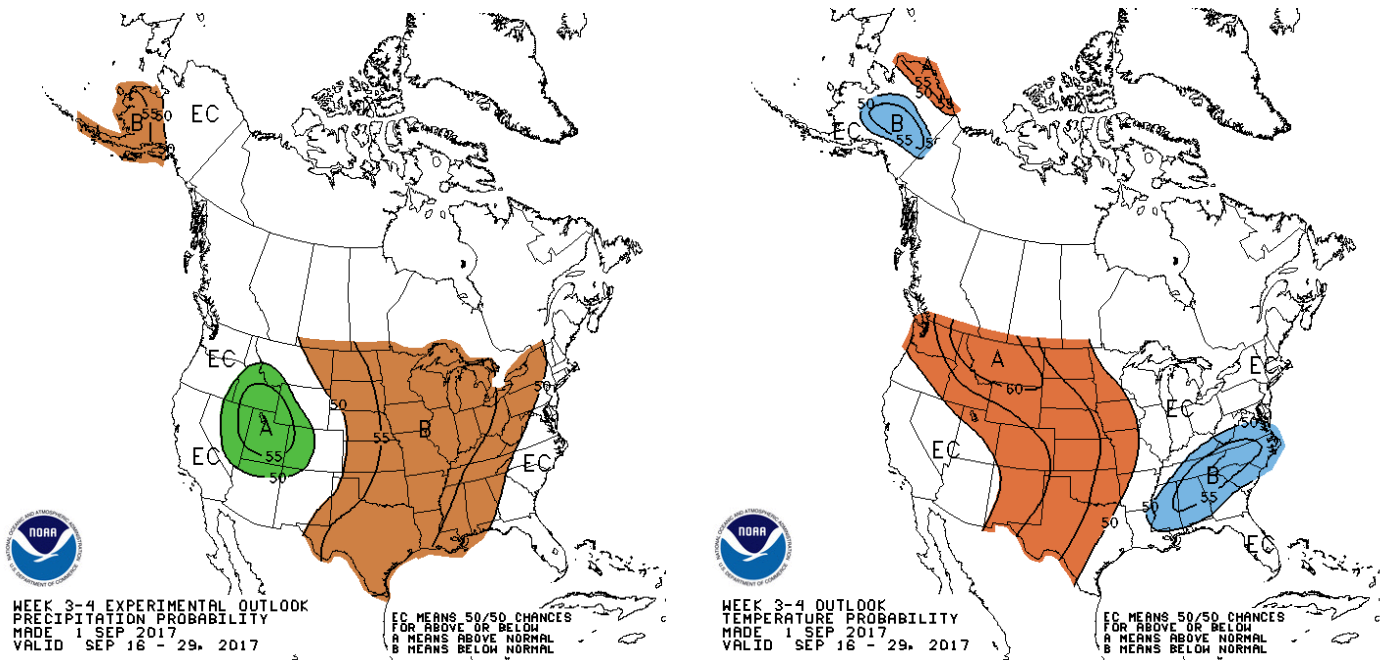
Sometimes, persistence is the best forecast. La Canícula held through summer of 2017 while the ever-persistent eastern U.S. trough widened into the central and northern Plains and Midwest, bringing refreshingly cool temperatures to the nation’s heartland and east coast. For the east coast, summer will be remembered as pleasant overall, with enough rain to keep the land green and lush despite some pockets of flooding. What cooled the east super-heated the Pacific Northwest, with Canícula keeping Deep South Texas hot. Harvey altered the pattern during the last week of the month and dramatically changed rainfall outcomes in just a few days. For September, there is increasing evidence that the persistent summer pattern of frequent refreshing fronts in the east and hot and dry across the west, with the dry air often nosing into south Texas, may be the dominant pattern (above). An interesting feature that may have influenced the pattern in August (below) was the generally negative phase of the North Atlantic Oscillation (-NAO); should this persist through September, there are even better odds on a warmer and drier than average outcome by month’s end.



**Above:** Phases of the NAO through summer 2017. Though there are other factors at play, in general, periods of  $-NAO$  favored above to much above normal temperatures and low rainfall; the period of  $+NAO$  in July may have contributed to a closer to “normal” month, at least for temperatures



- Dry and warm to hot air would be dominant underneath the ridge, including the Rio Grande Valley, which would suppress rainfall to perhaps one-half to one-third of average, area-wide. This would imply 1 to 3 inches vs. the normal 4 to 6 inches – not counting local storms that could bring near or above average totals in very small pockets
- Tropical moisture, waves, and cyclones would generally be shunted into Central America and southern Mexico for most of September (i.e. Veracruz rather than Tamaulipas)
- One cannot rule out a Pacific cyclone in October that gets embedded in atmospheric southwesterly flow, but a persistence of Canícula would tend to block off the chances of such an atmospheric river forming.



**Above:** Second half of September 2017 Climate Prediction Center forecast for rainfall (left) and temperature (right). This is based on an extension of the steering pattern forecast through September 14<sup>th</sup> on page 2.

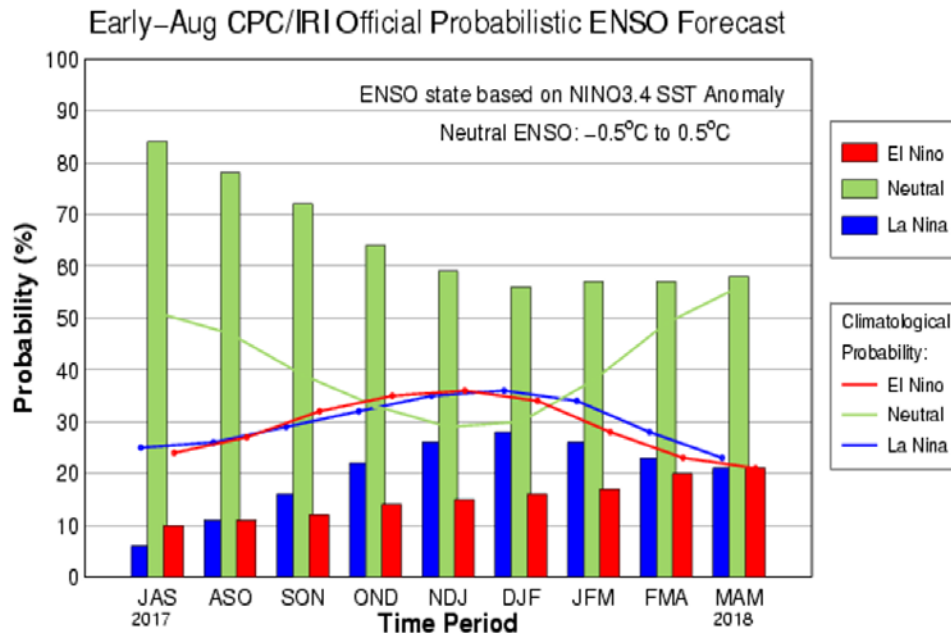
### **The Wildcard: September and the Tropics**

On the 1<sup>st</sup> of the month, long term predictions were beginning to hint at a fading potential for a Rio Grande Valley or nearby landfall (described above). Was catastrophic Hurricane Harvey the only lion to roar in Texas? The month had just begun as of this writing, and even if the first half follows the generally dry and less-hot forecast, uncertainty remained even though the experimental extended forecast through the rest of the month brought warm and continued dry conditions to the region. As Harvey showed so critically, the “nightmare” scenario of a southwest Gulf spin-up monster exists through September – and it only takes a week or less of the pattern puzzle pieces to fit together just right, even if those pieces are as small/difficult as a complicated jigsaw puzzle. That would include an outside opportunity for another eastern Atlantic cyclone to thread the needle – just as Beulah did in September 1967, after the initial wave formed in Africa in August and became a cyclone east of the Leeward Islands on September 5<sup>th</sup> – 15 days before its undulating path would find the Mouth of the Rio Grande.

### **Teleconnections: ENSO Parked in Neutral, Leaning La Niña?**

Through the end of August, ENSO landed solidly in neutral, with monthly averages hovering near the oceanic Niño Index (ONI) value of zero. As autumn settles in, the predictions vary a bit, with the U.S. Climate Forecast System forecasting a weak La Niña by the end of autumn into winter, while consensus models are in good agreement with ONI values on the slightly negative side of zero. Eastern tropical Pacific water temperatures have been sliding into the cooler than average zone, but how much cooler they can get remains indeterminate as of this writing. Either way, the opportunity for El Niño has nearly vanished – and it may take other teleconnections such as the NAO (above) as well as the Pacific Decadal Oscillation (PDO) and Madden-Julian Oscillation (MJO) to shed some light. The PDO, which in positive mode can enhance El Niño and combine with a +NAO to potentially drive stronger subtropical jet stream waves across the southwest U.S. in the late autumn

and beyond – fell to near zero July, its lowest value since early 2014. A combination of neutral/leaning negative ENSO, a negative NAO, and a neutral to negative PDO almost surely would result in dry conditions through November. Temperatures – shown at the top of the article – would tend to lean above average in such a case but perhaps not as much as in the past couple of years. Time will tell.



Above: Probabilistic ENSO forecast through early spring 2018(MAM), showing neutral conditions as the most likely outcome through winter (DJF) with an uptick in La Niña potential as well.

### What to Watch For: Warm to Hot Early, Worsening Drought. Rain??

Overall, for autumn, and likely into October the following situations are expected to predominate:

- Heat.** On September 1, McAllen/Miller reached  $100^{\circ}\text{F}$  for the 78<sup>th</sup> time in 2017. The record of 90 days (2016) remains in reach, but an early month cool-down may slow the trend at first. However, signs of La Canícula's persistence may be enough to push monthly averages just above average (generally, low to mid 90s by day and low to mid 70s by morning) but somewhat cooler nights may average things out toward zero. A drier than average October pattern would favor a good share or even a majority of  $90^{\circ}\text{F}$  afternoons as was the case in 2016, even as lower humidity days may set in if drying fronts can continue. November may also be above average again in 2017, with several  $90^{\circ}\text{F}+$  afternoons – but the oppressive heat should be seasonally faded away by then.
- Drought.** Additional heat with little to no rainfall increases the stress on Valley/Brush Country grasses, trees, and brush. August maintained a sizable area of moderate drought in Hidalgo County (D1 level) with waxing and waning abnormally dry areas that favored the Lower Valley. As mentioned earlier, September's ultimate rainfall will be critical to the future of drought, and the tendency is now favorable for a slow worsening in many areas by month's end, especially if an early September dry front slices through the region and kills off – for a week or longer – deep tropical moisture. Even "normal" conditions in drying October and dry November could worsen drought, particularly with low humidity and warmer than average temperatures. Severe (D2) conditions could expand into several areas by as early as late September, and more likely in October and November with moderate conditions expanding in a ribbon around the severe areas
- Tropics Watch.** The seasonal Atlantic Basin forecast increased based on the jackrabbit start of Tropical Storms in June through early August, with a final forecast of 14 to 19 named cyclones, 5 to 9 hurricanes, and 2 to 5 majors. As of September 1, there were nine named storms, four hurricanes, and two majors – all on track for the seasonal forecast. And while the Accumulated Cyclone Energy Index

(ACE) was rising steadily thanks to Harvey and especially Irma, the steering pattern will ultimately determine what, if any, impacts are experienced in the Rio Grande Valley into early October, when the season effectively closes down here. Another “Veracruz” is quite possible – and as always, the ability of pockets of wind shear and dry air to disrupt cyclones can be an issue as we get deeper into autumn.

## Outlook: Late Summer/Early Fall 2017

**September** remains a wild card, but is beginning to lean to the dry side when compared with average. Sea breeze thunderstorms enhanced by a plume of moisture through the 5<sup>th</sup> may get the month started on the right track, but an early season drying front may cut that moisture off and keep it cut off for a week or longer. Should this occur, the monthly average of 4.5 to 6 inches of rain would be cut down by one-half or more, with 1 to 3 inches, area-wide, more likely; a similar value to that of 2016. Any lower than this and the stage will be set for more rapidly worsening drought for the second half of the month.

**October** hints at a developing “cool” phase of ENSO – or neutral leaning cool. Such a pattern would tend to favor a “shadow” La Niña (southwest US ridge receding into northwest Mexico) that would keep, or return (if September sees a break) the dry and generally warm to hot pattern to the Rio Grande Valley once again. One thing to watch is the westward extent of the ridge. An extension toward Nevada and the Sierra mountains of California could allow intrusion of cooler air to push southeast around the ridge, with a mid to late October front of note (sharp temperature change and the end of the persistent humidity) which could bring temperatures back toward average (low to mid 80s by the end of the month).

**November** would typically follow October’s lead, at least early on. The question for the latter half of the month depends on how other teleconnections – NAO, Pacific-North American (PNA), and PDO fit together. Negative phases of the NAO combined with positive phases of PNA would tend to sharpen both the western U.S. ridge and eastern U.S. trough; the position of these features would determine if cool to cold Canadian air masses could reach the Valley on or before Thanksgiving week. Such a transition could bring overall temperatures back toward average on the whole, which is generally mornings in the 50s to lower 60s and afternoons in the mid-70s to around 80.

### Preparedness, Awareness

The forecast is confident for a continued warm to hot September into early October, and leaning more forward into dry versus wet weather for the same period. Still, Harvey and Beulah remind us that September *still* may have a trick up its sleeve for the last half of the month, even if the prospects appear to be fading. It’s never too late to finish up revisiting, reassessing, and restocking 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.

- **Drought Severity.** Autumn could remain dry – and a lot may hinge on September (discussed above at length). With ENSO hinting at leaning toward negative values (lean toward the drier La Niña in fall and winter), it may become an autumn to revisit 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 at any time to be ready in case September rains fail to materialize and tropical waves or cyclones stay away for yet another year. At the end of August, pool levels at Falcon International Reservoir had remained low - 26.1% (Texas share), and while Amistad remained well in gear (74.3% Texas share), how much water would be “shared” downstream is a decision that is unknown as of this writing.

## Drought Severity Classification

Category	Description	Possible Impacts	Ranges				
			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: <ul style="list-style-type: none"> <li>short-term dryness slowing planting, growth of crops or pastures</li> </ul> Coming out of drought: <ul style="list-style-type: none"> <li>some lingering water deficits</li> <li>pastures or crops not fully recovered</li> </ul>	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	<ul style="list-style-type: none"> <li>Some damage to crops, pastures</li> <li>Streams, reservoirs, or wells low, some water shortages developing or imminent</li> <li>Voluntary water-use restrictions requested</li> </ul>	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	<ul style="list-style-type: none"> <li>Crop or pasture losses likely</li> <li>Water shortages common</li> <li>Water restrictions imposed</li> </ul>	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	<ul style="list-style-type: none"> <li>Major crop/pasture losses</li> <li>Widespread water shortages or restrictions</li> </ul>	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	<ul style="list-style-type: none"> <li>Exceptional and widespread crop/pasture losses</li> <li>Shortages of water in reservoirs, streams, and wells creating water emergencies</li> </ul>	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

- Wildfire Danger.** The dry and hot August, and continued abnormally dry to moderate drought conditions – as well as very dry near surface subsoils (described by the Keetch-Byram Drought Index) set the stage for how critical the rainfall in September will be. With expectations for possibly one-third to one-half of the monthly average, limited (but still some) brush and grass growth could be countered by dangerous spread conditions in October and November, should dry ‘northers come through and offer opportunity for rapid growth/spread of fire and/or erratic behavior of fires that start. There were a few minor wildfires in July and August, and that number could conceivably increase in September and especially October the rains don’t come in earnest – soon - and La Canícula dominates as it did through June and July. Remember to be [Firewise](#), anytime! [Only you can prevent wildfires](#).
- All Things Tropical!** Until the “all clear” is sounded for the Texas tropical season – typically by October 10 – it remains imperative to remain hurricane ready! Harvey proved that our “bonus time” ran out in late August – even though the Valley received a glancing blow. This is the 50<sup>th</sup> Anniversary of Hurricane Beulah (September 20<sup>th</sup> landfall) in the Rio Grande Valley, so no better time to get serious about preparing than now – using the Valley’s storm of record to recall the difficulties for Valley residents at a time when the population was about 25% of what it is today, and when infrastructure and land use was far different as well (the ability to recover from devastating floods and winds may be much more involved in 2017).
  - **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](#).**
- Flooding Rains.** A Texas meteorologist once stated nearly a century ago: “Texas is a state of drought, broken by the occasional devastating flood.” We saw this statewide in 2015, just four years after a record dry water and calendar year (2011) – where dozens drowned and billions of dollars in property damage was noted. Willacy County became “Lake Willacy” that October. And, a rogue thunderstorm “system” could quickly drop a September’s worth of rainfall in just a few hours (4.5 to 6 inches) on your community. What can you do anytime it’s dry:
  - Clean out drainage ditches and canals of brush and debris. This is a very common reason for flooding that can be mitigated against
  - Wet and dry-proof your home. Learn more at [http://flash.org/peril\\_flood.php](http://flash.org/peril_flood.php) and <http://ready.gov/floods>
  - Know your roads had have alternate routes ready should flooding develop in your community
  - Keep a first aid and flood safety kit in your vehicle

- Purchase flood insurance, even if you're not in a designated flood zone! Remember, it takes 30 days to activate flood insurance – so waiting until August may be too late. <http://floodsmart.gov>