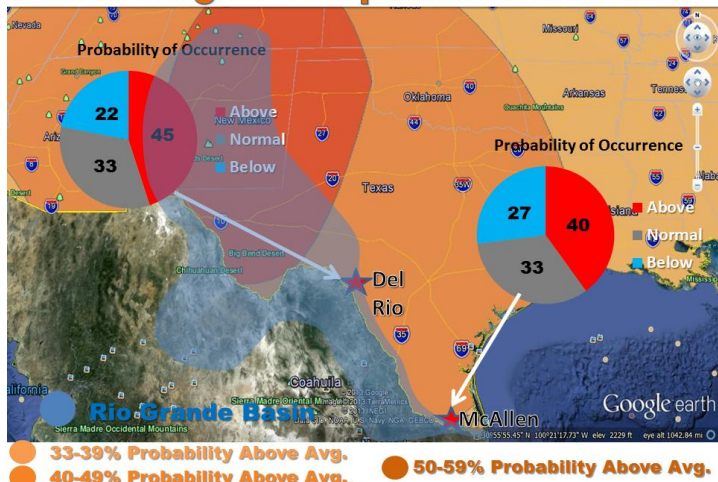
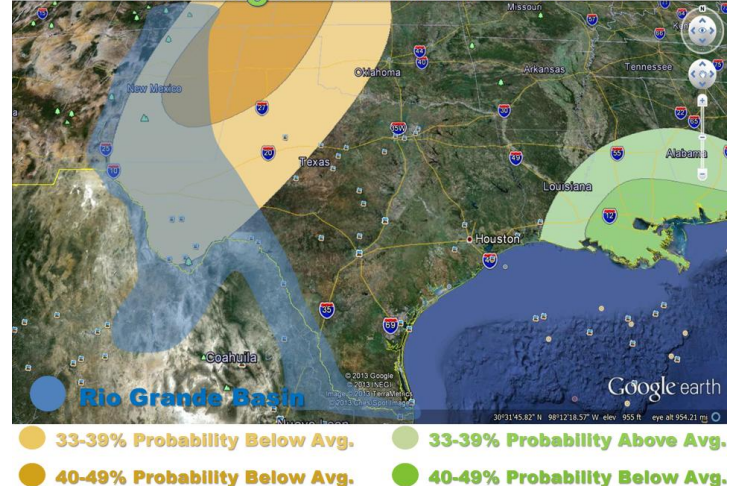


Summer 2013 Forecast

June-August Temperature Outlook



June-August Rainfall Outlook



Note: Pie charts indicate probability of above normal (red), normal (gray), and below normal (blue) temperatures. Average temperatures, generally defined as daytime high plus morning low divided by two, range from the upper 80s in the Lower Valley to around 90 in the Upper Valley and Rio Grande Plains. Typical June-August rainfall ranges from 5 to 8 inches.

Drought Likely to Remain Intense through Summer Searing Heat Expected; Tropical Cyclone Impacts in Doubt

After a [break from above normal temperatures in April](#), and a two and one half week period of periodic rain, frequent cloud cover, and refreshing north to northeast winds, the long-anticipated pattern of hot days, sultry nights, and persistent winds from the south arrived by mid-May. Along with the heat came limited moisture deep into the atmosphere as the advertised preview of “La Canícula” set up in the form of persistent atmospheric high pressure in northern Mexico.

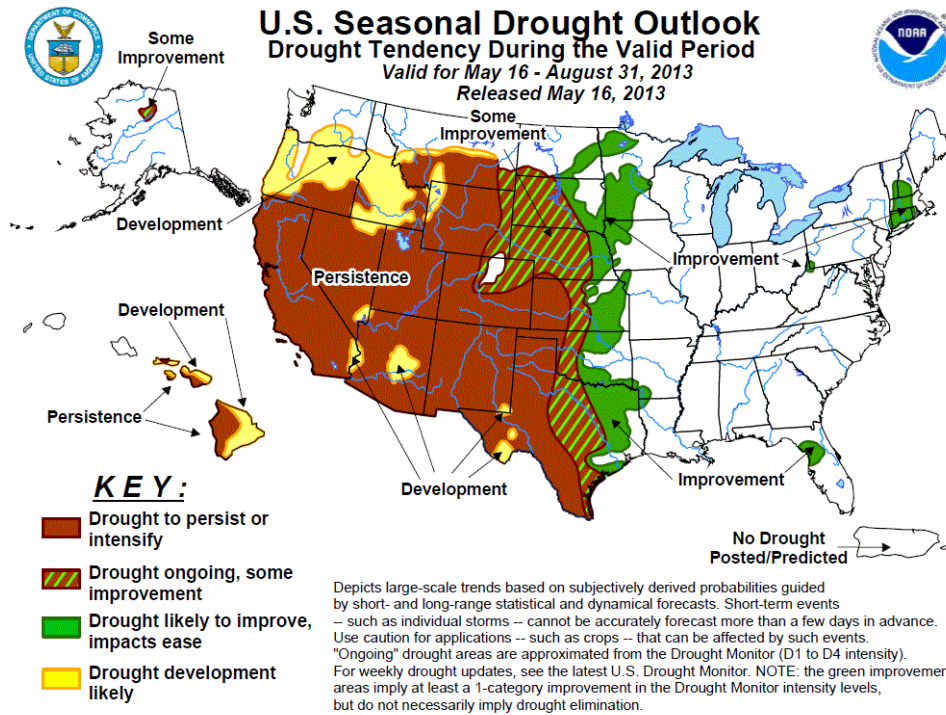
Long range temperature forecasts through summer continue to suggest persistence, and strengthening, of the “Canícula” pattern. July, which has been [exceedingly hot and dry](#) in three of the past four summers, is on track for a repeat in 2013.

Tropical Storms and Hurricanes, which have numbered 19 in each of the past three seasons, may well recurve along or east of the United States and Canadian Atlantic coast, or be pressed south into the Yucatan Peninsula-Bay of Campeche-Veracruz region and Central America from Nicaragua to Honduras and Guatemala. Note the similarity of the Atlantic Season storm tracks in [2010](#), [2011](#), and [2012](#).

The last time the northwestern Gulf was an open window for frequent tropical waves and cyclones was 2008, when Texas was impacted by Hurricanes Ike, Dolly, and Gustav, as well as several weaker waves. [2010's Hurricane Alex](#) was able to squeeze through a small “crack” in the largely closed northwestern Gulf window at the end of June, courtesy of a temporary pattern change combined with other puzzle pieces that provide necessary tropical moisture for a cyclone to develop and strengthen. Will the window remain closed again in 2013? Will a crack open and allow a cyclone to pass through and relieve the drought? Or will the pattern change sharply to open the window wide as the heart of the season (August and September) arrive? Read on for our thoughts.

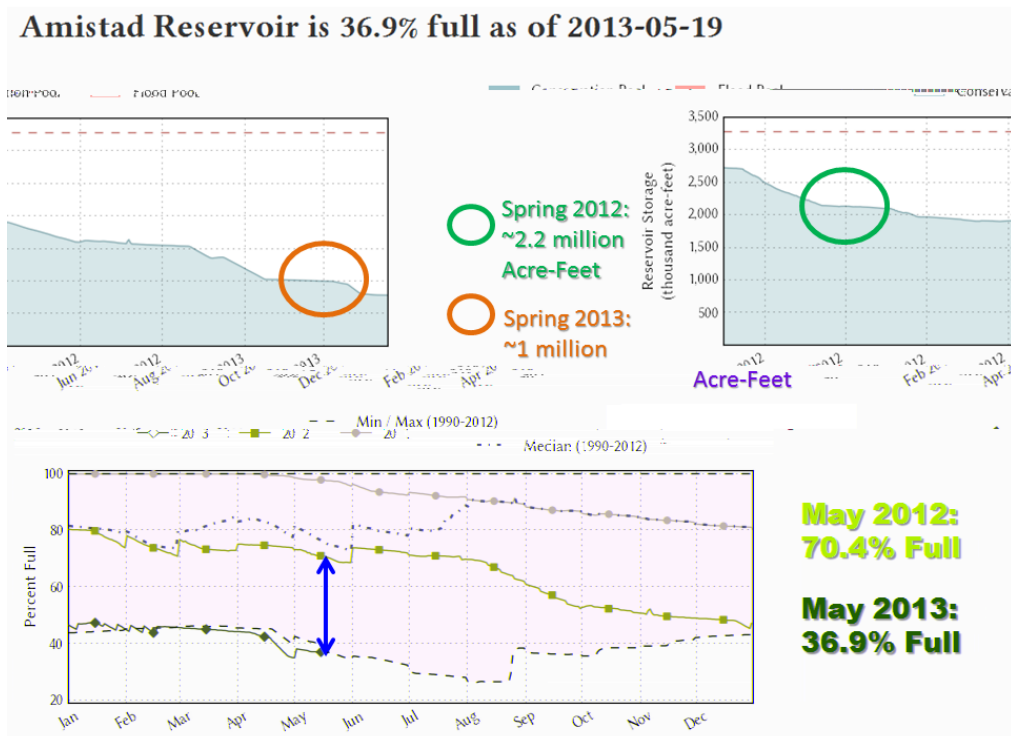
Record Drought Likely to Persist or Reintensify

The crystal ball, which includes a number of large scale forecast parameters, bodes poorly for overall drought improvement. **Only a Slow Moving Tropical Storm, Hurricane, or Series of Tropical Waves Can Relieve This Drought.** The latest National “Droughtlook” from NOAA’s Climate Prediction Center through the end of August (next page) hints at very slight improvements for the Lower Valley; this may be due to climatological proximity to Gulf coast sea breeze thunderstorms and outer impacts from distant tropical cyclones or waves. Otherwise, the entire Rio Grande Basin remains in “persistent” drought for the foreseeable future.



If the forecast is successful, the Valley's water supply will be in uncharted territory by summer's end. Three reasons contribute to this dire prediction:

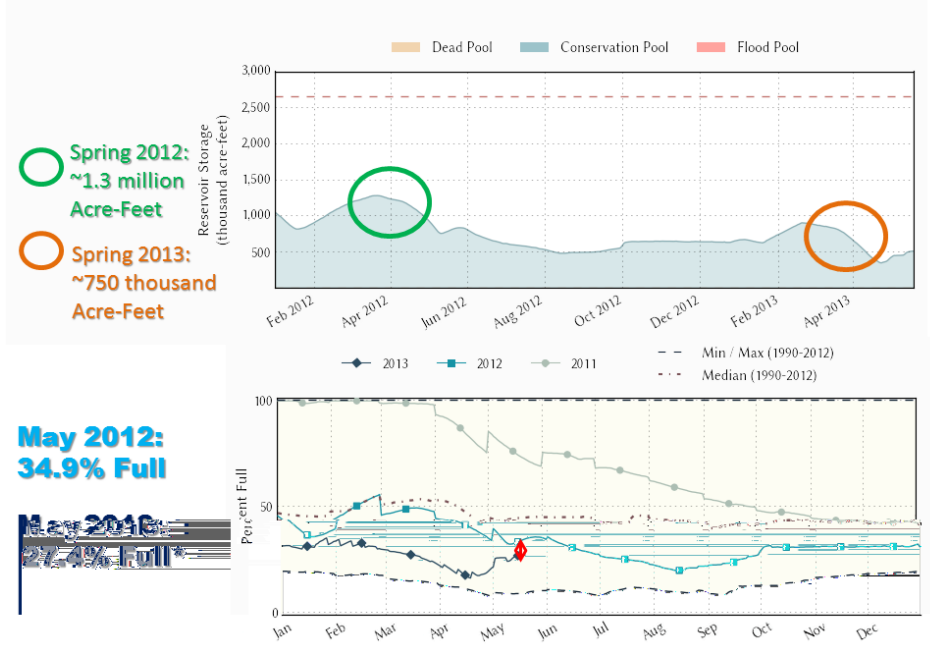
- Continued record low 24 to 30 month precipitation values for the Rio Grande Valley and Rio Grande Plains
- Highest population on record for both sides of the border (2.6 million+)
- An estimated potential crop and livestock economy surpassing \$1 billion at the end of 2012
- Near-record low lake levels at Amistad International Reservoir before peak summer evaporation begins. Amistad often releases water to keep a viable level at Falcon International Reservoir.



Above: Graphic showing steady, pronounced lake level drop at Amistad since winter 2012. Bottom chart shows current level (solid blue), below the prior 22 year low point. Double red arrow shows difference from 2012 levels to those in mid-May, 2013.

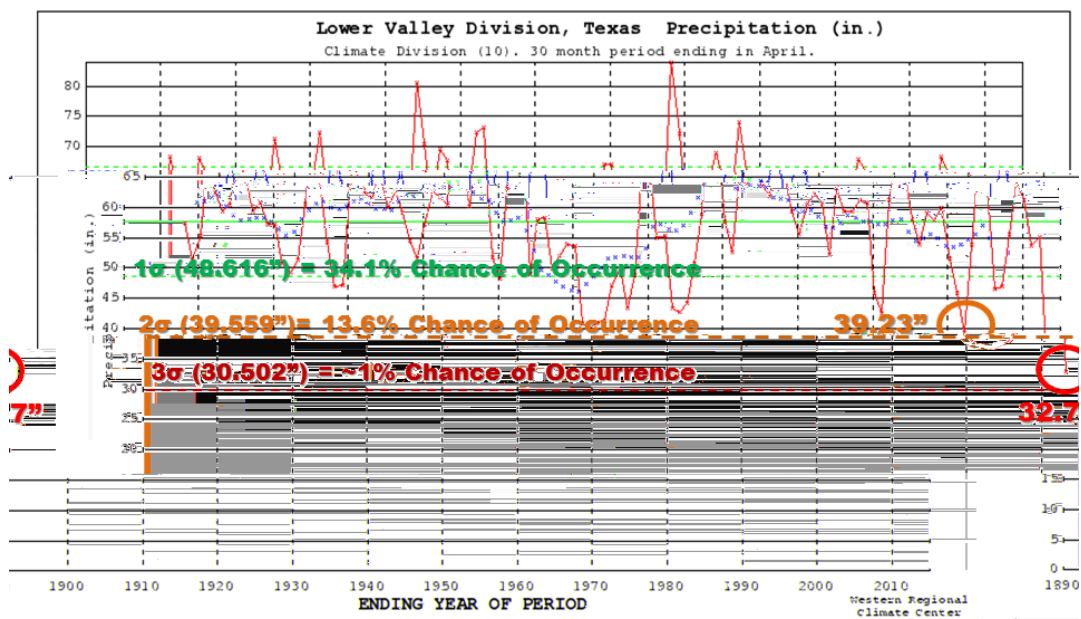
Falcon International Reservoir (right) fluctuated in late April and May for multiple reasons. Irrigation releases in late March and early April brought lake levels (Texas share) close to 15% of conservation. Releases from Amistad to replenish Falcon, combined with temporary relief from rainfall in the basin (Rio Salado area of Mexico) raised levels to 27% by mid-May. Unfortunately, Amistad has very little water to supply downstream, and heat, wind, and sun will begin to accelerate evaporation rates which will allow a steady fall to commence in late May and likely continue through August, barring a tropical cyclone or series of waves.

Falcon Reservoir is 27.4% full as of 2013-05-19



The chart below shows just how intense, and persistent, the drought has been for virtually all of the Valley's population (Cameron, Hidalgo, Willacy) since the spigot was turned off at the end of September, 2010. The data also filter out periodic, welcome rain events through the period (seven Valley-wide events have been recorded between September 2010 and May 2013). Despite [widespread 1 to 3 inches of rain to close April](#) and push monthly totals above the 30-year average, the 30-month total since November, 2010, indicated only 32.77 inches had fallen! Based on the nearly 120 years of data, the chance for values this low is between 1 and 2 percent.

Record Drought Continued in April 2013

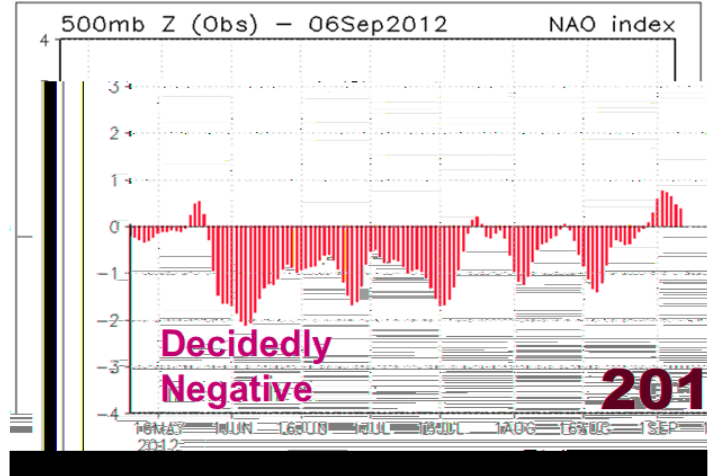
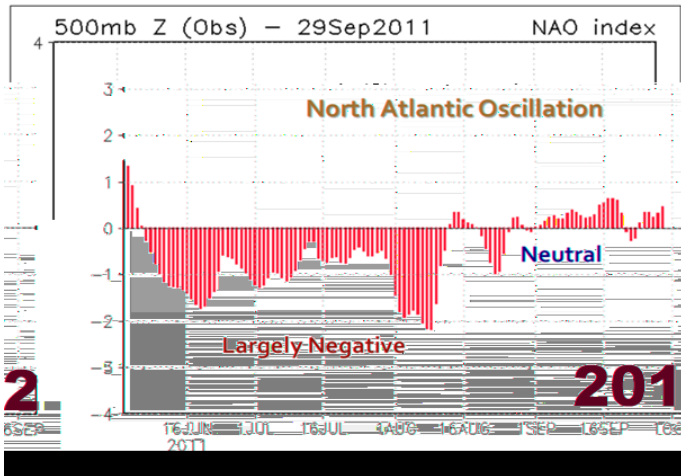


Nov. 2010-April 2013 was 6.56" below the prior record (1999-2002)

Blame it on NAO: Negative Phase the New Summer Normal?

Past articles have described the puzzle pieces that define a summer season for the Rio Grande Valley. Many look to El Niño/Southern Oscillation (ENSO) to improve seasonal predictability, particularly in winter (rainy vs. dry, warm vs. cool) and summer (more tropical cyclones vs. fewer). The reality of impact goes well beyond ENSO in any summer but perhaps more this year, as the [ENSO phase is squarely forecast to remain neutral](#). Neutral phase ENSO adds little information to the forecast season, other than not to impact the effectiveness of the very warm waters in the Main Development Region.

We've noticed something else the past few years: A persistent and sometimes pronounced negative phase of the [Arctic Oscillation \(AO\) and North Atlantic Oscillation \(NAO\)](#) from June to late August in 2011 and 2012. Summertime negative AO/NAO phases have tended negative since 2009 and may correlate with the overall tropical cyclone tracks.

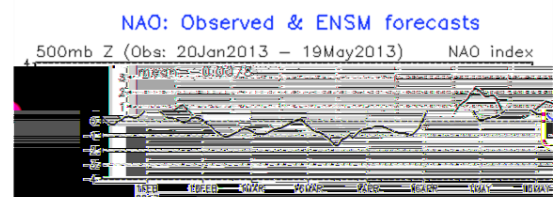
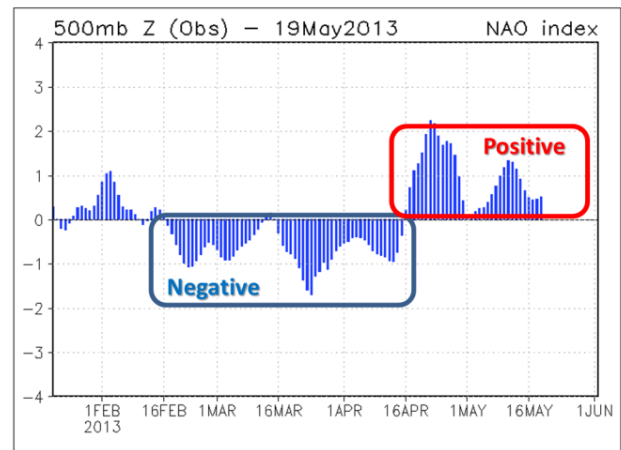


A summertime negative phase of the AO and NAO has less direct impact on the weather than in winter. Still, a “shadow effect” appears to produce occasional upper level troughs along or near the U.S. east coast, which can bring impacts including damaging wind and hail storms to the mid-Atlantic and Northeast, searing heat waves along the southern edge of the trough, and a few more cooling fronts with modified Canadian air masses. One key impact is the ability of the trough to steer many tropical cyclones clear of the U.S. East Coast, which occurred in 2010, 2011, and 2012. To the west of the trough, atmospheric high pressure will shift from northern Mexico into the southern Great Plains of Oklahoma, and sometimes extend well north into the Great Plains and Mississippi Valley. Such a northward extension contributed to near record drought and [billions of dollars in crop production loss in 2012](#).

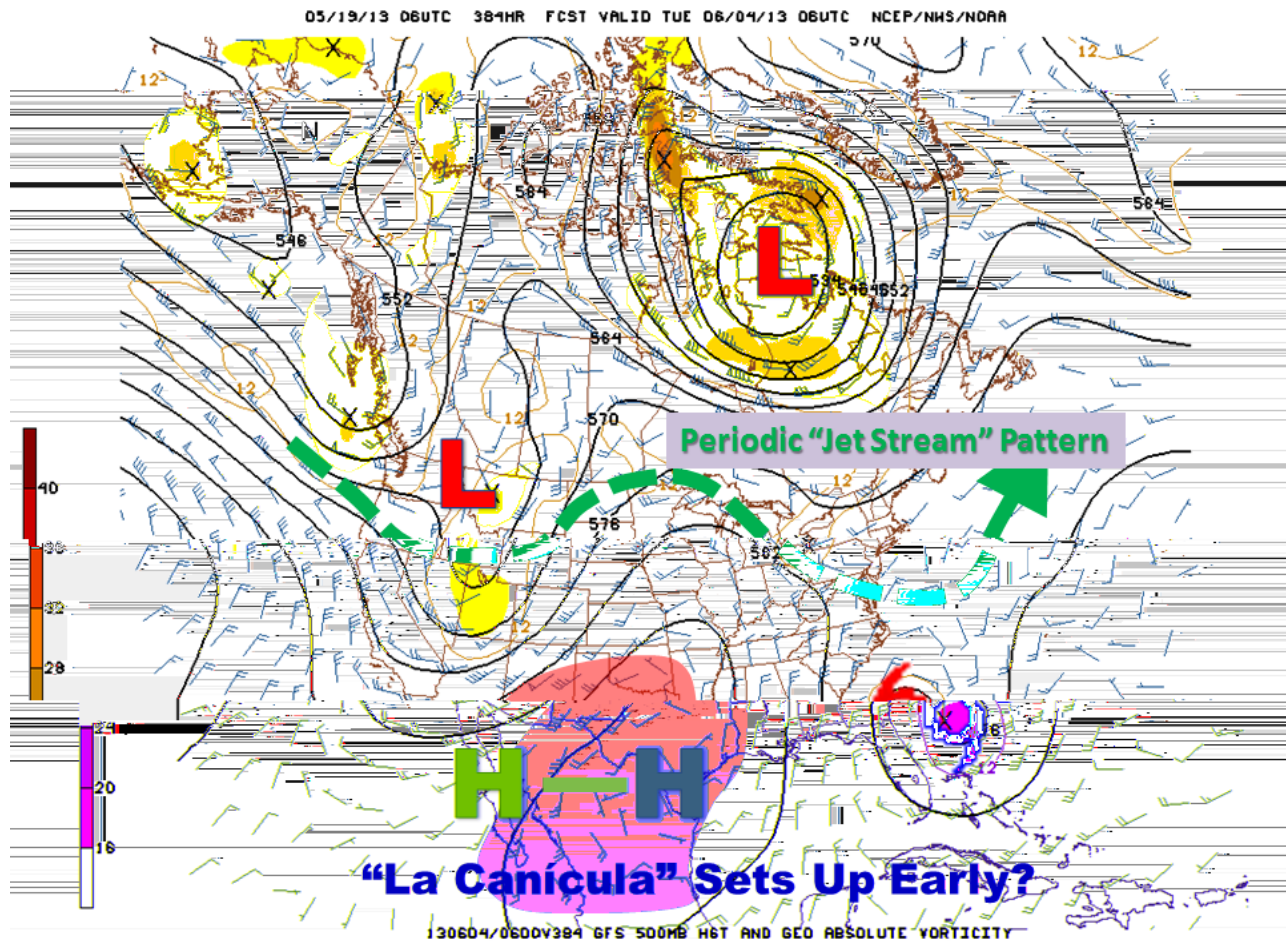
What's Next?

The NAO showed took a decidedly negative turn from late February through mid-April, and may have contributed to the ability of Canadian air masses to reach deep into Texas and northern Mexico, which finished off multi-year streaks of above average monthly temperatures for the Rio Grande Valley in April. The shift to a positive phase to close April and begin May *could* have aided the periodic rains, but more needs to be researched to draw a conclusion.

Unfortunately, AO/NAO phases are near impossible to forecast beyond two to three weeks out. The ensemble forecast at lower right describes a return to neutral/negative NAO phase headed into June. The million dollar question – literally – remains: Will June-August 2013's AO/NAO look like those above? Past seasons, as well as one peer reviewed study that suggests a [correlation between accelerating arctic sea ice](#) and a more frequent negative AO/NAO phase, suggest the answer is yes.



Time will tell. Should the negative phase win the summer, the weather pattern ***might*** have a general look to it, as shown below (based on a *deterministic* forecast for early June).



One possible pattern outcome for summer 2013: “La Canicula” High pressure oscillates between the Southern Plains and Sonora, Mexico. A shadow east coast trough would tend to “pick up” and recurve tropical cyclone along or well east of the U.S.; Canicula would effectively lock the door for any northward progression of west moving cyclones at low latitudes.

Comprehensive Water Management is Crucial

This drought will end, in time. But long term climate models and continued rapid population growth across the Valley on both sides of the border urge the area to embark on long term water management plans. Such plans will be devised at higher levels of government. In real time, the water crisis will continue and could worsen in many communities. Water conservation is paramount, and doing your part can ensure that there’s enough water to make it through what could be a difficult summer. The following conservation tips can help your family and community this summer and beyond.

Water Conservation

- o Take fewer and shorter showers.
- o Install low-flow toilets, faucets, and shower heads.
- o Recycle used household water for plant irrigation rather than turning on the spigot.
- o Repair leaky faucets, showers, or other plumbing.
- o Check appliances, such as dishwashers and clothes washers, for water efficiency.
- o Let your grass grow to better accept condensation from dew, and irrigate infrequently.
- o Wash cars seldom.
- o Consider rain barrels (cisterns) to collect whatever falls this spring. . Check out how on page 3 of the [Winter 2013 Coastal Breeze](#) web letter.
- o You may also want to collect condensate water from air conditioning units. Consider becoming drought tolerant. [Xeriscape](#) or landscape with drought-hardy plants.
- o Read more Texas water conservation tips [here](#).

Energy Conservation

Hot, dry weather is typically a drain on electricity. We're all in this together; the energy you save can save you and your community money – or more – during exceptional drought.

- o Check your walls, foundation, and roof for air leaks.
- o Service your heating, ventilation, and air conditioning (HVAC) units to ensure they are not using excessive energy.
- o Set your thermostat to a higher temperature when you're not home
- o Install or use an attic fan to improve ventilation
- o Read more Texas energy conservation tips [here](#).