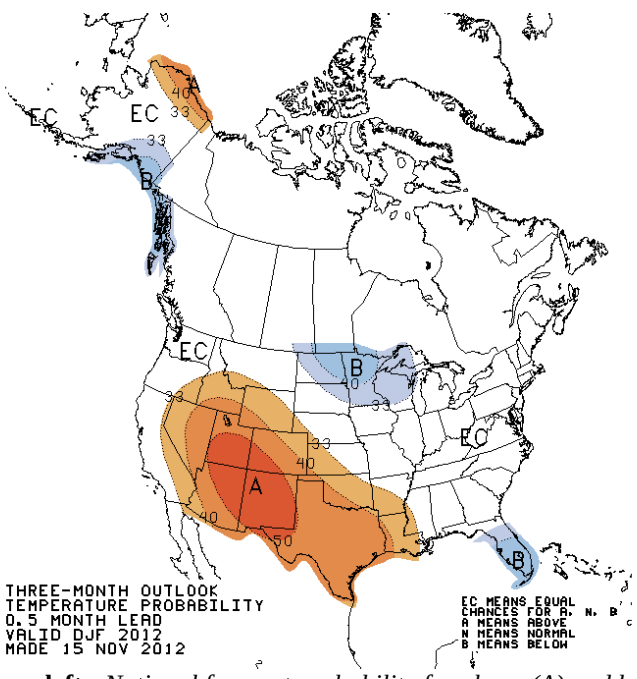
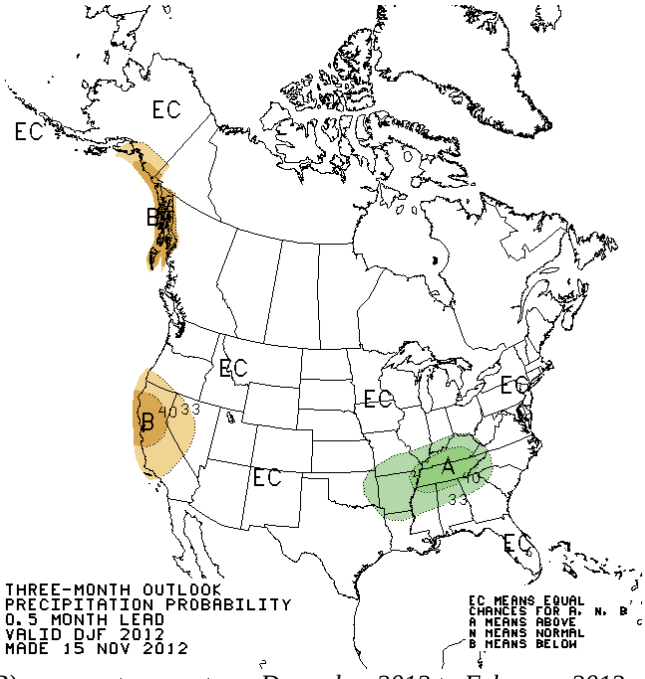




Above left*: National forecast probability for above (A) and below (B) average temperature, December 2012 to February 2013.*
Above right: *National forecast probability for above (A) and below (B) average precipitation, December 2012 to February 2013.*
EC=Equal chances (33.3 percent) of above, near average, or below average. Percentage values "weigh" the above or below average levels accordingly. For example, a 50% or higher above average probability might mean a 25% or less chance for near average and/ or below average conditions.

Winter Weather Outlook: December to February

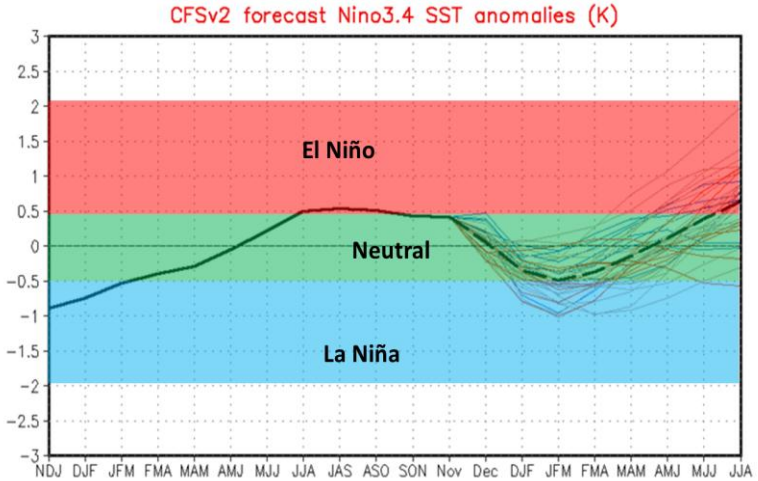
Dry Season Arrives; Outlook Favors Warmer than Average Temperatures

---

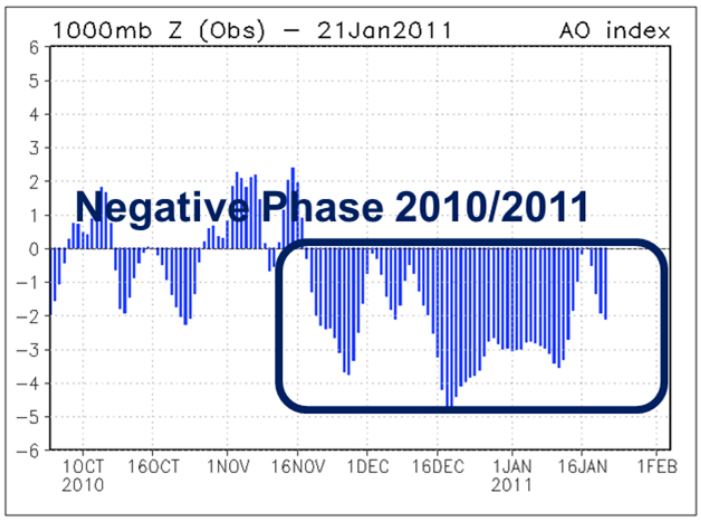
Drought to Persist then Worsen Next Spring

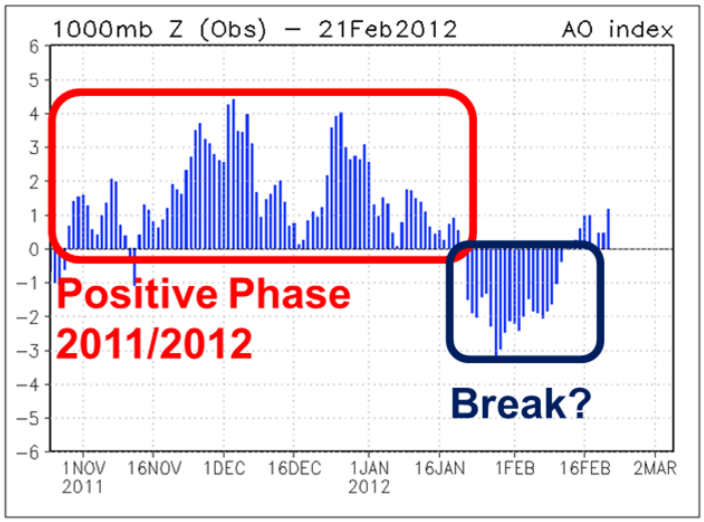
Overview

As the days continue to shorten and the northern hemisphere cools into late autumn and early winter, the forecast for the Rio Grande Valley is coming into focus. A brief flirtation with El Niño conditions at the end of summer (August), which, had the condition developed fully as winter approached, was dashed in October. Water temperatures in the east central tropical Pacific have cooled to or just below average. Long range forecasts by the Climate Forecast System trend neutral for winter, perhaps inching back into La Niña by the tail end of winter (February; trend at right). By removing a critical source of energy via the subtropical jet for welcome winter (December – February) rainfall (typically 2 to 4 inches of precipitation), the hope for any significant improvement to the two year drought has vanished. By mid November, reservoir pool levels (U.S. and Mexico combined) at Amistad International had fallen below 50% capacity; levels at Falcon had leveled off between 20 and 25% capacity – partly due to releases from Amistad, a couple hundred miles upstream. Such low capacities combined with an increasing likelihood of another warm to hot spring could spell significant water shortages – or worse – for growers, ranchers, and an increasing number of Rio Grande Valley residents in 2013.

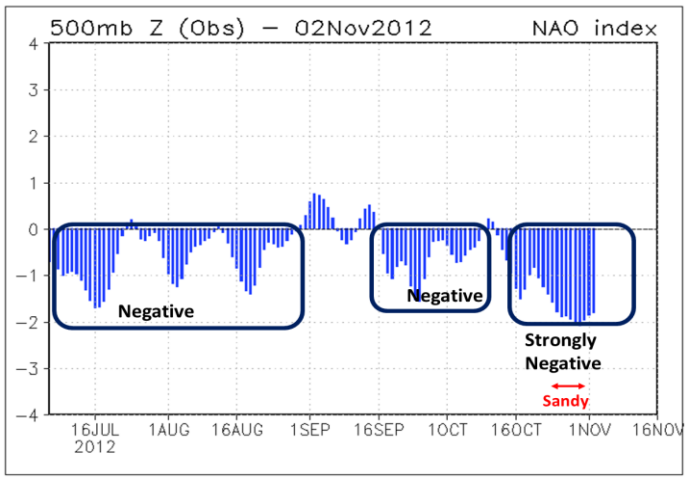


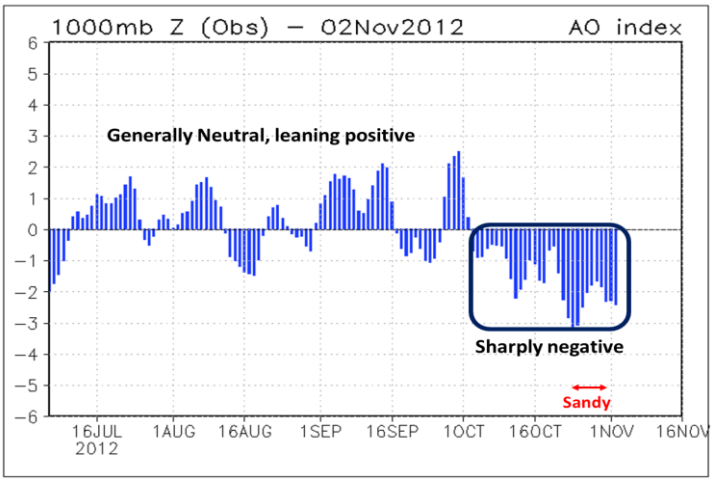
El Niño/Southern Oscillation (ENSO) is only one factor used to help predict seasonal weather. Intraseasonal teleconnections, defined as a "significant positive or negative correlation in the fluctuation of a field (such as pressure or temperature) at widely separate points" (Glossary of Meteorology, 2002), can help dictate the trend of a season, or longer. Two such teleconnections that have a known impact on winter weather are the Arctic Oscillation (AO) and its close "cousin", the North Atlantic Oscillation (NAO). Unfortunately, the predictability of the onset of a distinct phase of the AO/NAO is generally two weeks, sometimes four weeks, but almost never seasonally. Each of the past two winters featured similar phases of ENSO (La Niña), with nearly opposite phases of the North Atlantic Oscillation (below). The prolonged negative phase of the AO/NAO from late November 2010 through the end of January 2011 may have contributed to the arctic plunge which brought up to 60 hours of freezing temperature and a memorable ice storm to the Valley to begin February. The prolonged positive phase of the AO/NAO from late November 2011 through the end of January 2012 may have contributed to the warm and humid conditions that dominated the season.





How will the AO/NAO puzzle pieces evolve for the winter of 2012/2013? We wish we knew. The phase of the NAO has been predominantly negative since June, 2012; the AO has fluctuated between low index values of negative and positive phases, with a recent sharp negative drop that timed out with "Superstorm" Sandy along the U.S. east coast as October ended.

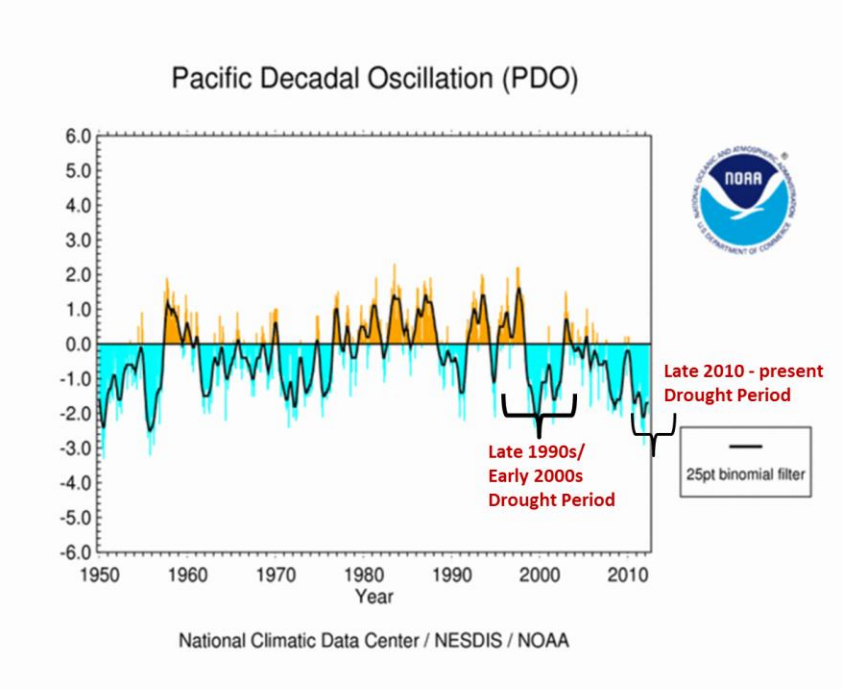




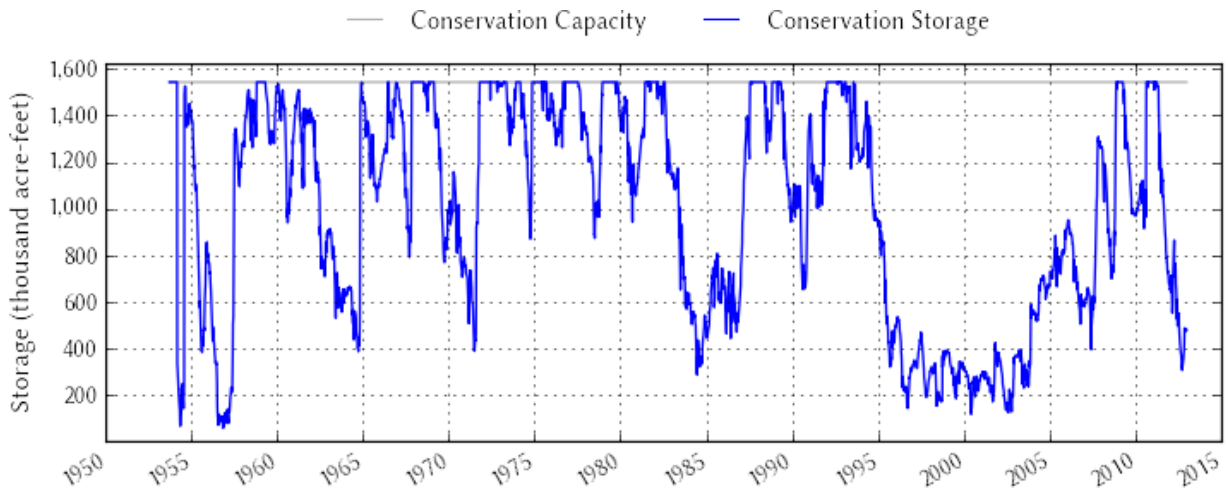
Pacific-Decadal Oscillation: What Role It Might Play

The Pacific Decadal Oscillation (PDO) is often described as a long-lived El Niño-like pattern of Pacific climate variability (Zhang et al. 1997). As seen with the better-known El Niño/Southern Oscillation (ENSO), extremes in the PDO pattern are marked by widespread variations in the Pacific Basin and the North American climate. In

parallel with the ENSO phenomenon, the extreme phases of the PDO have been classified as being either warm or cool, as defined by ocean temperature anomalies in the northeast and tropical Pacific Ocean. When SSTs are anomalously cool in the interior North Pacific and warm along the Pacific Coast, and when sea level pressures are below average over the North Pacific, the PDO has a positive value. When the climate anomaly patterns are reversed, with warm SST anomalies in the interior and cool SST anomalies along the North American coast, or above average sea level pressures over the North Pacific, the PDO has a negative value (Courtesy of Mantua, 1999).



The PDO has trended negative since the turn of the century; in general, sharply negative values of the index have correlated with dry/drought conditions in South Texas. Above, a prolonged negative phase of the PDO at the turn of the century matched with drought conditions and low reservoir flows (below); a slight uptick in the PDO during mid-decade (2005-2007) matched with increasing rainfall and easing drought conditions. A return to a negative phase of the PDO, punctuated by a one-season rise (2009/2010 winter), matched closely with general dry conditions (late 2007-mid 2008; late 2010-present).



Above: *Conservation storage levels at Falcon International Reservoir since the mid 1950s.*

The Line on Winter 2012/2013

The forecast includes the following combinations: A trend toward the negative side of the neutral phase of ENSO – perhaps edging toward La Niña as early as February. The phase of the AO/NAO is anyone's guess, but long range trends hint at additional multi-week periods of the negative phase. The PDO should remain solidly negative through the winter months.

Such a combination is conducive to a few bouts of modified air from the Canadian prairies plunging down the east side of the Rockies between December 15th and February 15th, punctuating an otherwise mild to warm winter across the Valley. Temperatures, which average from 70 to 75°F during the afternoon and upper 40s to 50s each morning from December through February, may frequently break 80°F during the afternoon and fail to drop below 65°F overnight across the Valley. Should the national forecast of a warmer and somewhat drier

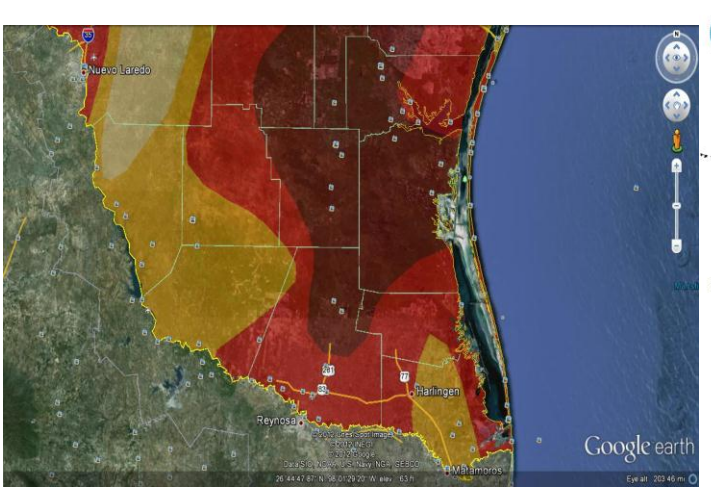
than average winter verify for the southern and central Great Plains into the Rockies, snow pack could be limited and allow some modification of Canadian air masses. A few agricultural freezes may occur, with a small chance for a “hard” freeze (temperatures below 28°F for several hours). A killing freeze, similar to those around Christmas 1983 and again in 1989 (temperatures well into the 20s or 10s for a day or more) is highly unlikely.

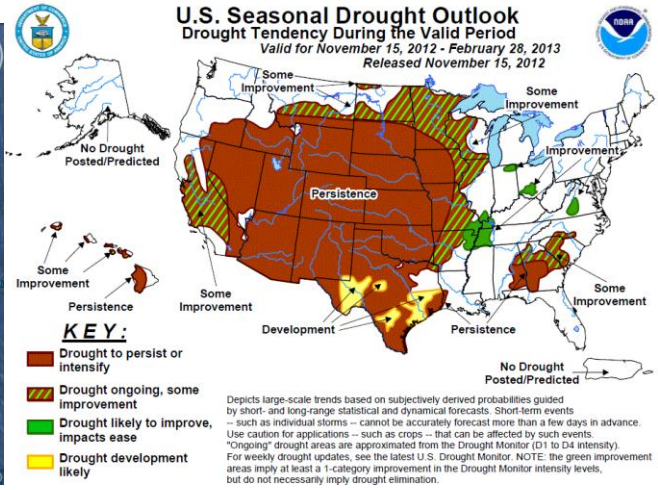
Note: A switch to a more persistent, positive phase of the AO/NAO (which occurred through the winter and early spring of 2012) would suggest only a marginal freeze across the growing areas of the Rio Grande Valley, at most.

Examples of three possible weather patterns, and their outcomes, are shown in the three images below. Click on each image for a larger version that can be saved or printed.

Three weather patterns for the winter 2012/2013. **Left:** *Expected prevailing pattern, indicating high pressure centered across the southeast U.S., with moist flow from the southeast bringing modified tropical air across the Valley.* **Center:** *Expected pattern change with winter cold fronts. Cool to chilly, damp conditions with periods of light rain or drizzle last up to three days.* **Right:** *Should the negative phase of the AO/NAO win the day from December to February, one or two modified arctic air masses will reach the Valley. In a dry situation, daytime temperatures will rebound from freezing conditions in the morning. In a moist situation, temperatures may only rise a few degrees above freezing. If an upper level disturbance gets into the mix, freezing or frozen precipitation would occur.* ***The potential for freezing or frozen precipitation is very low.***

For either phase of the AO/NAO, the expectation for a warmer than average December through February period with typically low precipitation totals is now expected to maintain the current drought levels, which generally range from Severe (D2) to Exceptional (D4) (below, left, as of November 6th-13th). Hope has vanished for any notable improvement through winter 2012/2013 for the Rio Grande Valley (below, right).





An Early Look at Spring 2013

Long range trends are suggesting continued above average temperature, and a “lean” toward slightly below average rainfall during the tail end of the dry season (March through April), with better chances for below average precipitation into May. Similar to 2012, afternoon temperatures would begin pushing above 90°F in March, and more consistently during April, as the sun angle increases and days lengthen. With reservoir

levels likely to begin next spring well below 50% of capacity, water shortages and potential rationing in some areas becomes a distinct threat.

It is not possible to determine the potential for severe weather next spring – damaging hail and windstorms, isolated tornadoes, localized floods – in November, 2012.

Dry grasses and brush combined with persistent south winds would maintain at least an elevated threat for rapid growth of wildfires, particularly across the Upper Valley and ranchlands. While long range forecasts have improved over the decades, there remains uncertainty, especially for intra-seasonal events that could change outcomes for the better, or worse.

We advise the general population to prepare for another warm to hot and breezy spring 2013, with Extreme to Exceptional coverage gradually spreading into the Upper Valley and Ranchlands. Stay tuned.

Keep Updated

You can find national updates of the weekly, bi-weekly, monthly, seasonal, and beyond temperature and precipitation forecasts here. As the season evolves – especially if significant trends develop in one direction (warmer or wetter) or another (colder or drier). Check our El Niño/La Niña page for local updates should ENSO trend in one direction more sharply than currently forecast, and the RGV Drought page for updates.