

# The Recent La Niña Winter of 2010/2011

**COLD . . . .** The United States, east of the Rockies, endured a remarkably cold winter (Dec. 2010–Feb. 2011), with most states and counties reporting colder than normal conditions (blue tones on **map A**, right). Only two states—Nevada and Maine—reported above-average temperatures. Georgia (at  $-3.9^{\circ}\text{F}$  below normal) and Florida reported the greatest departures from their average winter temperatures. The averages are for the 1970–2000 period. In the western states, the month of February was unusually cold, and several cities in California and Montana reported their coldest February temperatures in over 30 years. Early in the month, extreme cold descended upon the US-Mexico border; El Paso, Texas reported that 15,000 pipes froze and broke, causing \$50 million in damages.

The atmospheric circulation was active over the lower 48 states of the US, with numerous waves in the jet stream, and strong low-pressure centers causing intense snowstorms and outbreaks of cold Arctic air behind them. The jet stream moved west-to-east over the midsection of the country or somewhat farther north. Snow cover attained its greatest extent, 71 percent of the nation, by January 12, and on February 10, all states except Florida reported some snow. For North America, the extent of snow cover was the 8<sup>th</sup> largest for the month of February in the 45-year record.

**& DRY . . . . .** The active storm track over the middle of the United States divided the country into wet and dry halves. The precipitation pattern evident on **map B** at center right is how La Niña typically manifests itself in the winter in the United States—wet in the north, quite dry along the Gulf Coast. To the south of the storm track, where yellow and orange predominate, the winter was the third driest on record for the South climatic region, and the ninth driest for the Southeast region. Dry conditions were very pronounced in Louisiana, Mississippi, Alabama, and North Carolina.

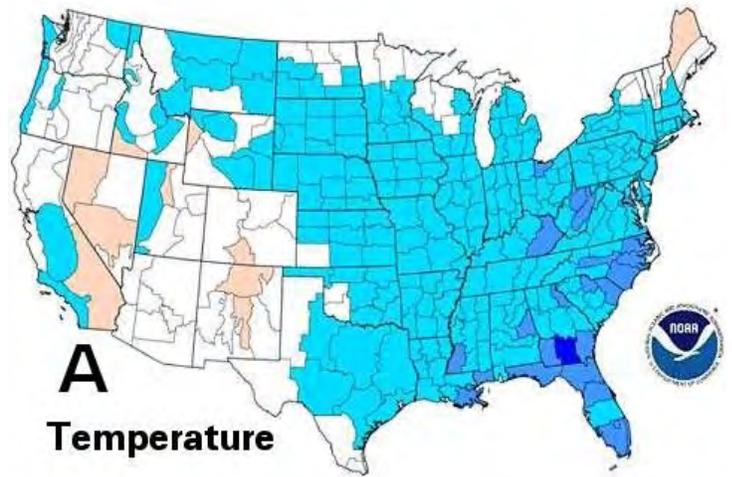
The winter was wet and snowy for the North Central region (green on the same map), underneath and north of the active storm track. For December-to-February, South Dakota experienced its fourth wettest period on record; Montana, its ninth.

## **INFLUENCE of LA NIÑA & OTHER PATTERNS**

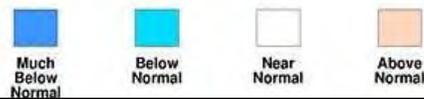
La Nina has a strong influence on the lower 48 U.S. states during the winter months. It tends to bring dry conditions to the southern tier of states from the Southwest to the Southeast, and wet conditions to the Ohio Valley and the northern tier of states. It also is associated with warmer-than-normal temperatures over most of the US, something NOT seen in the past winter. Another constant pattern this winter was a broad ridge

*(Continued on page 2, 1st column)*

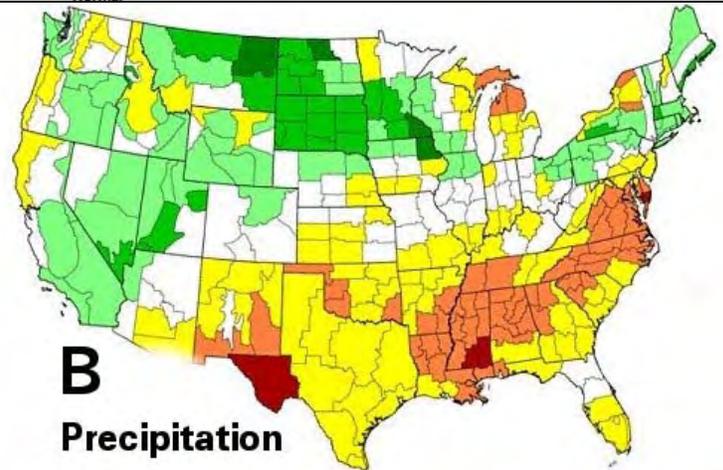
## Dec. 2010—Feb. 2011 Climate Anomalies:



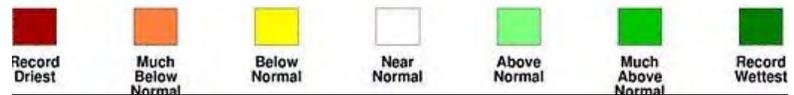
**A**  
**Temperature**



Source: NOAA-National Climatic Data Center



**B**  
**Precipitation**



## Forecast for Rest of Spring:

### *La Niña to End!*

The three-month outlook for temperature in April, May and June of 2011 (**map C** on page 2) may not be well received by the stoic residents of the north central states. This region endured a winter that was colder and wetter (and snowier) than normal, as the two maps at the bottom of this page show. The upper Midwest had a particularly snowy winter. The US Climate Prediction Center projects the northern Midwest will have a cooler-than-normal Spring in the blue zone from Minnesota to Washington. Along the US-Canadian border west of Lake Superior, such an outcome is 60% likely. Meanwhile, April through June will be warmer than normal for the tier of states from South Carolina to California.

*(Continued on page 2, column 2)*

*(The Recent Winter, Continued from page 1)*

over the far West, and a broad trough East of the Mississippi. This pattern tends to be dry for most of the country, except on the West coast which tends to be wet. It also tends to be cold near the trough, which was true this winter. For the full story we must look at other climate oscillations; in each month a different oscillation had a stronger influence.

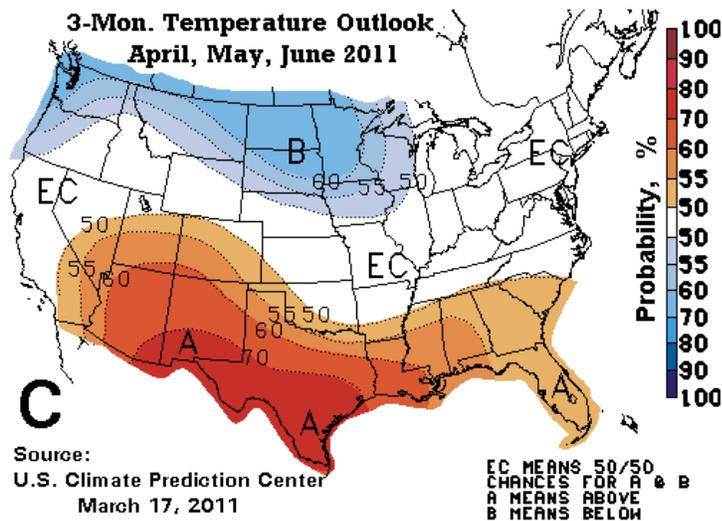
In December, the Arctic Oscillation was strongly negative. That reinforced dry conditions in the southeast and much below-normal temperatures in the US east of the Rockies.

With the broad ridge in the far Western states, a “pineapple express” of airborne moisture lashed the Pacific coast with relentless rainfall, in December.

In January, the Pacific-North America (PNA) pattern was positive, which is associated with a colder-than-normal Southeast and a warmer-than-normal West coast. Both of these indeed happened. The Mississippi valley and the East also tend to be dry in a positive PNA pattern, and indeed they were dry.

By mid-February, the PNA pattern flipped and became negative. The Southeast, which had been unusually chilly, rather suddenly warmed up. The Pacific Northwest cooled down. Wet and often snowy conditions were the rule in the Ohio Valley, Great Lakes, and the northern High Plains. The combined influence of La Niña and the negative PNA favored some record-breaking snowstorms in these regions, and caused the “Lower 48” to have above-average snow cover in February.

This winter was a great example of a curious climatic factoid: a region can be drier than normal and yet have well-above-normal snow cover, as long as its temperatures are below normal. A lot of snow—9 inches, say, melts down into not much water: 0.9 inch, often less. Where both rain and snow fall during a typical winter, the rain contributes the most to the seasonal precipitation total, the snow contributes less—but it is the snow that is remembered.



*(Forecast for Spring 2011, continued from page 1)*

Confidence in this is quite high – over 70% likely - in most of the Rio Grande valley along the US border with Mexico.

In fact, the entire Rio Grande basin, plus the Gulf Coast as far east as New Orleans, are also projected to be dry, with 60% likelihood (relevant map not shown). Only North Dakota and bordering areas are expected to be wetter than normal through June. Except for the areas just mentioned, precipitation will be “normal,” neither unusually wet nor dry, in most of the nation.

A moderately strong La Niña, which continues as we write this, is responsible for the pattern of cool north / warm south / dry Gulf Coast, that is forecast into June. However, signs of a transition are in the air, and the Climate Prediction Center and most climate modeling centers predict that the current La Niña will end by June 30.

A neutral period will ensue during summer in the Northern Hemisphere. After summer is over, confidence about the phase of the El Niño–Southern Oscillation (ENSO) is very low; there is uncertainty about the direction that ENSO will take.