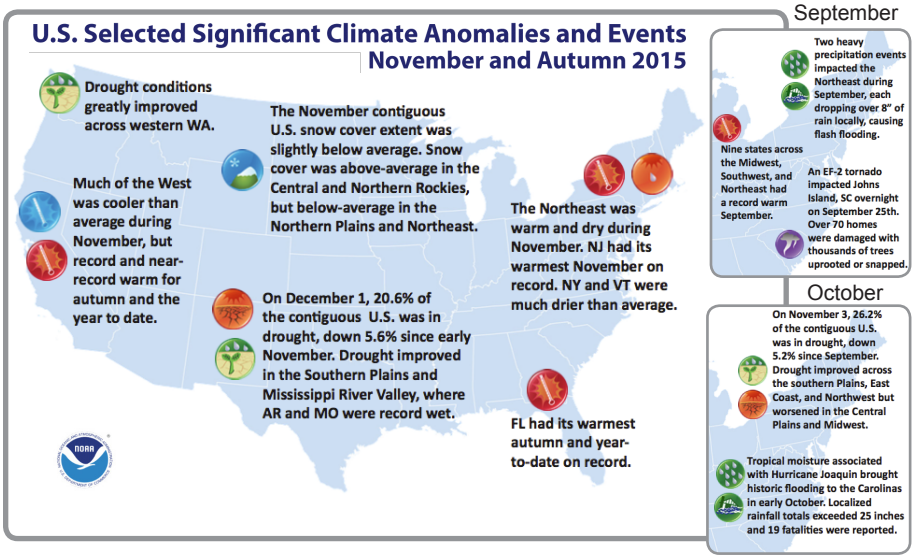
Quarterly Climate Impacts and Outlook

Eastern Region

December 2015

National - *Significant Events for September–November 2015*



The contiguous United States was record warm during autumn. The average temperature of 56.2°F was 3.3°F above the 20th century average. The U.S. had its second warmest September on record with an average temperature of 68.5°F, 3.7°F above average. The average temperature for October was 57.4°F, 3.3°F above average, which was fourth warmest. November's average temperature of 44.7°F, 3.0°F above average, was 13th warmest. Autumn contiguous U.S. precipitation was 8.32 inches, 1.44 inches above the 20th century average, making it the 15th wettest on record. September precipitation was 2.09 inches, 0.40 inches below average, while October precipitation was 2.75 inches, 0.59 inches above average. November precipitation was 3.30 inches, 1.07 inches above average, which was fourth wettest.

Highlights for the East

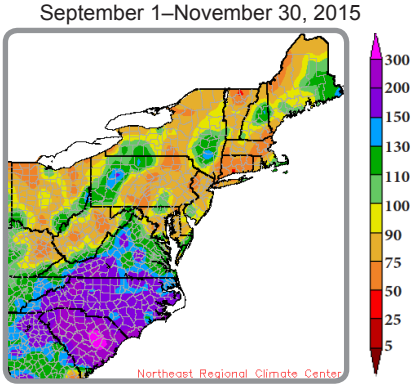
Extreme rainfall and record flooding occurred in South Carolina and parts of North Carolina in early October. Up to 27 inches of rain was reported in a five day period. Columbia, SC and Charleston, SC each had their all-time wettest 1-day, 2-day, and 3-day periods on record. In just the first three days, October 2015 became Charleston's wettest October and one of its all-time wettest months. Damage costs were estimated to be over a billion dollars in South Carolina and around $31 million in North Carolina. Less extreme flooding from rainfall was reported in other parts of the region. In addition, several straight days of strong onshore winds, large waves, and elevated tides along the Eastern Seaboard resulted in coastal flooding and moderate to severe beach erosion. The high tides exacerbated flooding from the heavy rain. See the Impacts section for more details.

South Carolina had a record-wet October and autumn, while several sites in the Carolinas were record-wet in November and also for autumn. Connecticut, Maine, Massachusetts, and Rhode Island had a record-warm September, as did seven Northeast cities. In November, New Jersey was record-warm, along with three Northeast cities. Five cities had a record-warm autumn.

Regional - *Climate Overview for September–November 2015*

Temperature and Precipitation Anomalies

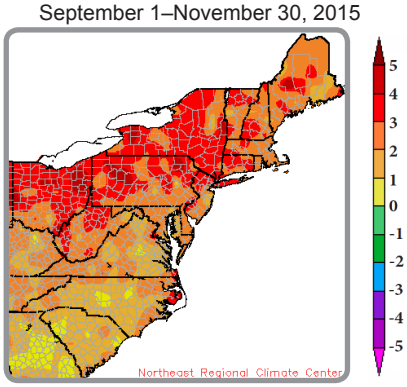
Percent of Normal Precipitation (%)
September 1–November 30, 2015



September precipitation was 115% of normal for the Eastern Region, with state amounts ranging from 81% to 142% of normal. The early-October deluge caused South Carolina to have a record-wet October (at 348% of normal) and the region to end the month at 136% of normal. Twelve states saw less than 75% of normal precipitation in November, but the Carolinas ranked the month among their top four wettest. Overall, the region saw 95% of normal. Autumn precipitation was near to below normal for thirteen states, with the region seeing 115% of normal. South Carolina was record-wet, while North Carolina had its second wettest autumn.

Normals based on 1981–2010

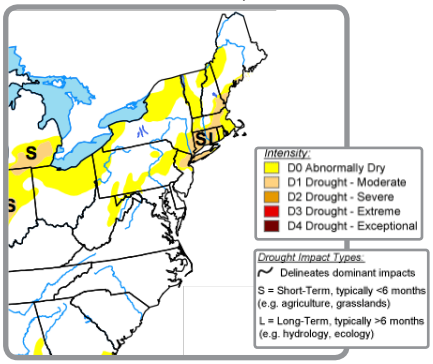
Departure from Normal Temperature (°F)
September 1–November 30, 2015



The Eastern Region had its third warmest September on record at 3.8°F above normal. Four states were record warm, and five others ranked this September among their top three warmest. The region's October average temperature was exactly normal, with most states within 1°F of normal. At 4.2°F above normal, the region had its third warmest November. New Jersey was record-warm, and eight additional states ranked this November among their top five warmest. With the mild September and warm November, autumn ranked as third warmest for the region at 2.6°F above normal. Eleven states had a top five warm autumn.

Drought in the East

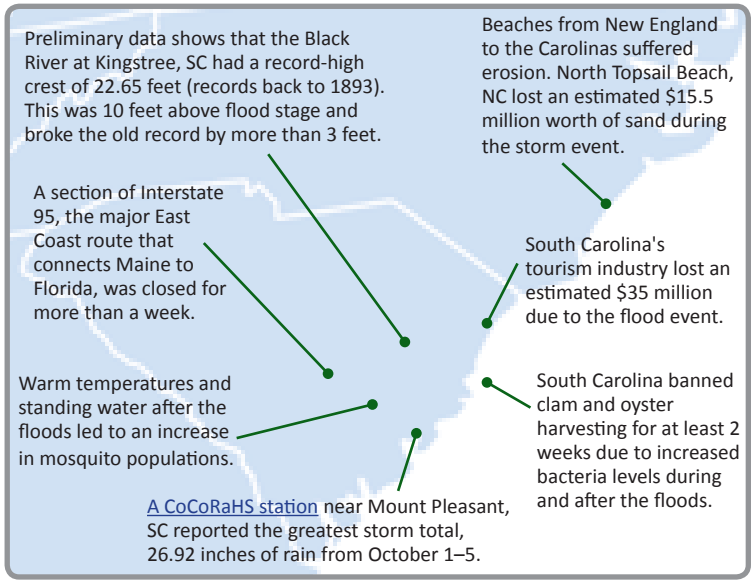
U.S. Drought Monitor
December 17, 2015



Dry conditions continued in the Carolinas and expanded in the Northeast during September. In late September, the USDA declared numerous counties across the region as disaster areas due to drought. Various crops were smaller in size due to lack of water, while falling water levels in reservoirs led to water restrictions. The early October rainfall erased almost all dryness in the Carolinas and helped ease dry conditions in the Northeast. For the rest of autumn, the main storm track was over the Carolinas (which is typical during a strong El Niño), keeping that area wet. The rest of the region generally saw near to below-normal precipitation. Dryness lingered in the Northeast through December.

Contacts: Ellen Mecray (Ellen.L.Mecray@noaa.gov)
Samantha Borisoff (sgh58@cornell.edu)

Regional - *Impacts and Updates for September–November 2015*



Recovery

Flooding caused devastating damage to homes, property, and businesses. Twenty-four South Carolina counties received a Federal Disaster Declaration. As of early December, more than 90,000 South Carolina residents had applied for FEMA aid totaling nearly $72 million. In addition, the USDA designated 29 South Carolina counties and 19 North Carolina counties as primary natural disaster areas.

Atmospheric Conditions

A front stalled off the coast of the Carolinas, while a low pressure system over the Southeast tapped into moisture from the Atlantic and Hurricane Joaquin and directed it towards the Carolinas. The front and low were kept in place by high pressure to the north, which reinforced the strong onshore flow of moisture. The stalled front provided a focal point for thunderstorm development, with the storms dumping heavy rain on the same locations for several days. Above-average sea surface temperatures may have increased the amount of moisture in the air.

Transportation

At the peak of the flood event in South Carolina, nearly 550 state-maintained bridges and roads were closed, including several major interstates. Two weeks later, around 180 were still closed, with officials predicting it could be months before all repairs are made. Railways were also damaged.

Agriculture & Forestry

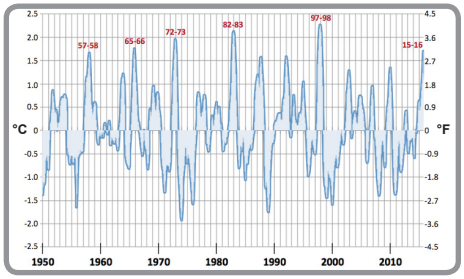
Over the course of a few days, farmers in the Carolinas went from dealing with drought to recovering from heavy rain and flooding. Peanuts, cotton, fall vegetables, and soybeans were severely impacted, with the South Carolina agriculture officials estimating crop losses of nearly $600 million. In addition, South Carolina's forestry industry estimated losses of at least $65 million.

Waterways

Seventeen South Carolina waterways had record-high water levels and/or stream flows, with another 15 waterways having a top 5 greatest level or flow. Aging infrastructure contributed to the failure of 36 dams across the state. A breach of the Columbia Canal led to a boil water advisory for 375,000 of the city's water customers, with up to 40,000 without water service. Around 850 water rescues were performed in South Carolina.

Regional - *Outlook for Winter 2015–16*

El Niño

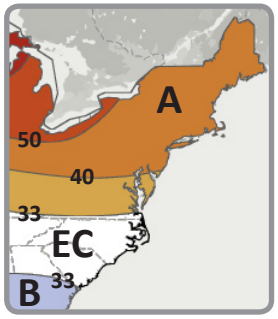


Atmospheric and oceanic observations through November reflect a strong El Niño. The graph above shows warm and cold periods of sea surface temperatures in the Niño 3.4 region of the central Pacific. When comparing these, this El Niño ranks as one of the strongest on record. El Niño conditions will persist into early 2016 before weakening and transitioning to ENSO-neutral conditions by late spring or early summer.

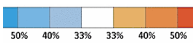
During an El Niño winter, the Pacific jet stream runs across the southern United States. This pattern brings above-normal precipitation and below-normal temperatures to southern parts of the Eastern Region. As storms often move up the coast during El Niño winters, the Eastern Seaboard generally experiences above-normal precipitation. The dry winter conditions that characterize Ohio commonly extend eastward into western New York and Pennsylvania, with warmer temperatures extending into the Northeast during strong El Niños. For more information, see the Eastern Region El Niño Impacts and Outlook.

Precipitation and Temperature

Valid for January–March 2016

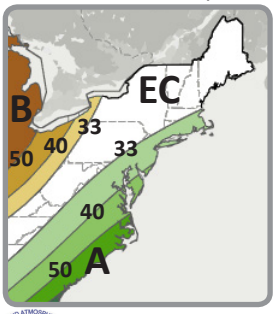


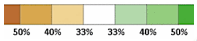
A: Above-normal
B: Below- normal
EC: Equal chances of above-, near, or below-normal
#: Probability of above- or below-normal



The Climate Prediction Center is forecasting an increased chance of above-normal temperatures for January–March for the Northeast, Ohio, and most of Virginia. Equal chances of above-, near-, or below-normal temperatures were for the Carolinas.

An increased chance of below-normal precipitation is forecast for the Ohio Valley from January–March, while an increased chance of above-normal precipitation is forecast for coastal areas from the Carolinas to Massachusetts. Equal chances were forecast elsewhere.





Eastern Region Partners

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Northeast Regional Climate Center
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www.drought.gov

Carolinas Integrated Sciences and Assessments
www.cisa.sc.edu

Consortium on Climate Risk in the Urban Northeast
www.ccrun.org

Cooperative Institute for North Atlantic Research
www.cinar.org

Eastern Region State Climatologists
www.stateclimate.org

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