North Carolina Drought Management Advisory Council

Annual Activities Report - 2010

Oct. 1, 2009 to Sept. 30, 2010

North Carolina Division of Water Resources
Department of Environment and Natural Resources

Contents

Illustrations

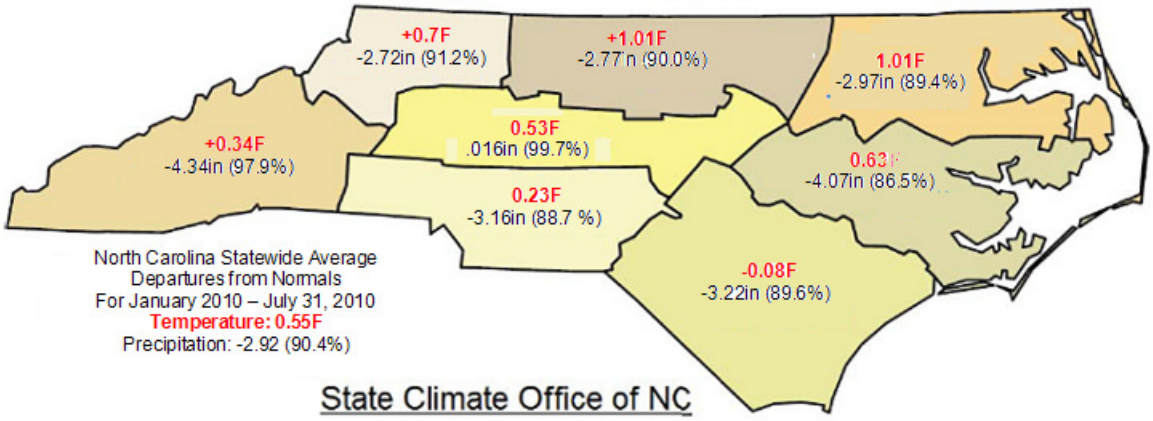
Introduction

This is the sixth annual report of the North Carolina Drought Management Advisory Council on the implementation of North Carolina General Statute 143-355.1, which created the council in 2003. The General Assembly amended the statute in 2004 adding a new section requiring an annual report (g) (2003-387, s. 2; 2004-195, s. 2.5). In accordance with statutory requirements, the council submits the report to the Secretary of the N.C. Department of Environment and Natural Resources, the Governor of North Carolina and the N.C. Environmental Review Commission by Oct. 1 every year. The report shall include a review of drought advisories issued by the council and any recommendations to improve coordination among local, state and federal agencies, public water systems and water users to improve the management and mitigation of the harmful effects of drought.

Drought Overview 2010

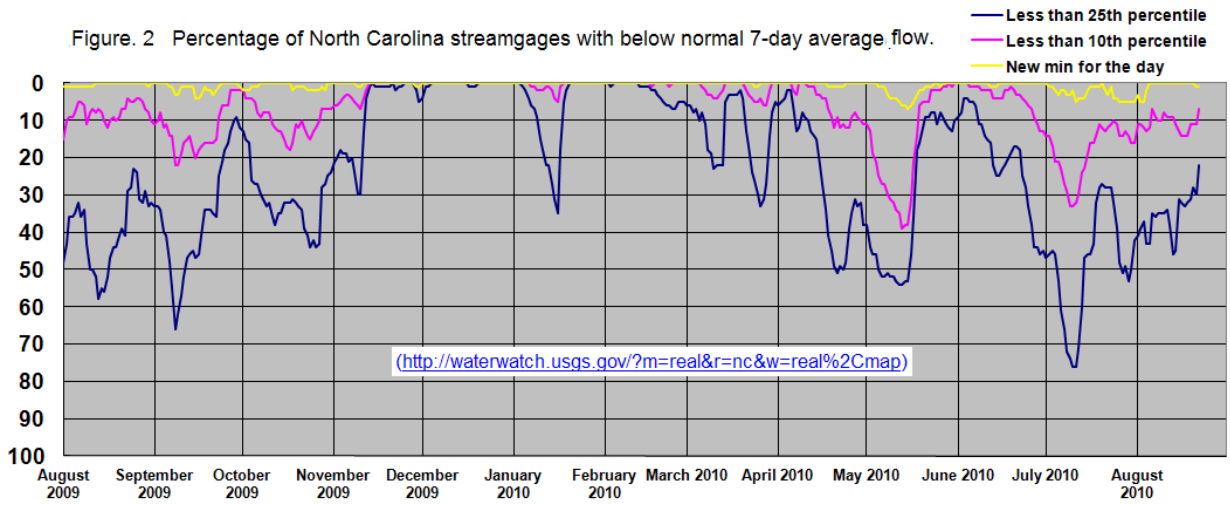
As is typical for most years in North Carolina, climate patterns between January 2010 and July 2010 included extremes in temperatures and precipitation. While the winter of 2010 was generally the wettest and the coldest in 30 years, temperatures in the late spring were above normal and rainfall was near normal. In parts of eastern North Carolina and the mountains, conditions were drier than normal during the late spring and summer. Moreover, extreme heat affected crops, animals and residents during the summer of 2010. Statewide, May-July of 2010 ranked as the 29th driest and warmest since records began in 1895. The period of January-July 2010 ranked as the 34th driest and 45th warmest on record. Summaries for specific locations for the period of January-July 2010 are below.

Figure 1. **Temperature** and Precipitation by climate division
Departures form Normal for January 2010 – July 31, 2010
based on preliminary data



Following the summer and early fall of 2009, streamflow conditions were below-normal in parts of eastern North Carolina. Streamflow conditions increased into the normal and above-normal ranges during the mid-fall season, which was followed by several substantial rainfall events. These rainfall events were attributed to an El Nino sea surface temperatures pattern in the Pacific Ocean. The events marked the start of a wet late 2009-early 2010 period that helped sustain streamflows in the normal and above-normal ranges through the winter and into early spring 2010 statewide.

During March and April, streamflows began to decline into the below-normal ranges. The United States Geological Survey, or USGS, stream gages across much of eastern North Carolina were in the below-normal ranges by mid-May. However, streamflow conditions near the end of May improved across much of North Carolina after late spring rains. Streamflows again slipped into the below-normal conditions beginning in late June, particularly across the northern Coastal Plain and mountains on the Tennessee border, where moderate drought conditions have been depicted. As of late August 2010, streamflow conditions across the northern Coastal Plain have declined to the well below-normal range at numerous USGS stream gages. Streamflow conditions in the mountains through August have been a mix of normal and below-normal conditions. Figure 2 is a graph showing the percentage of USGS Water Watch stream gages in North Carolina that are below normal since August 2009.

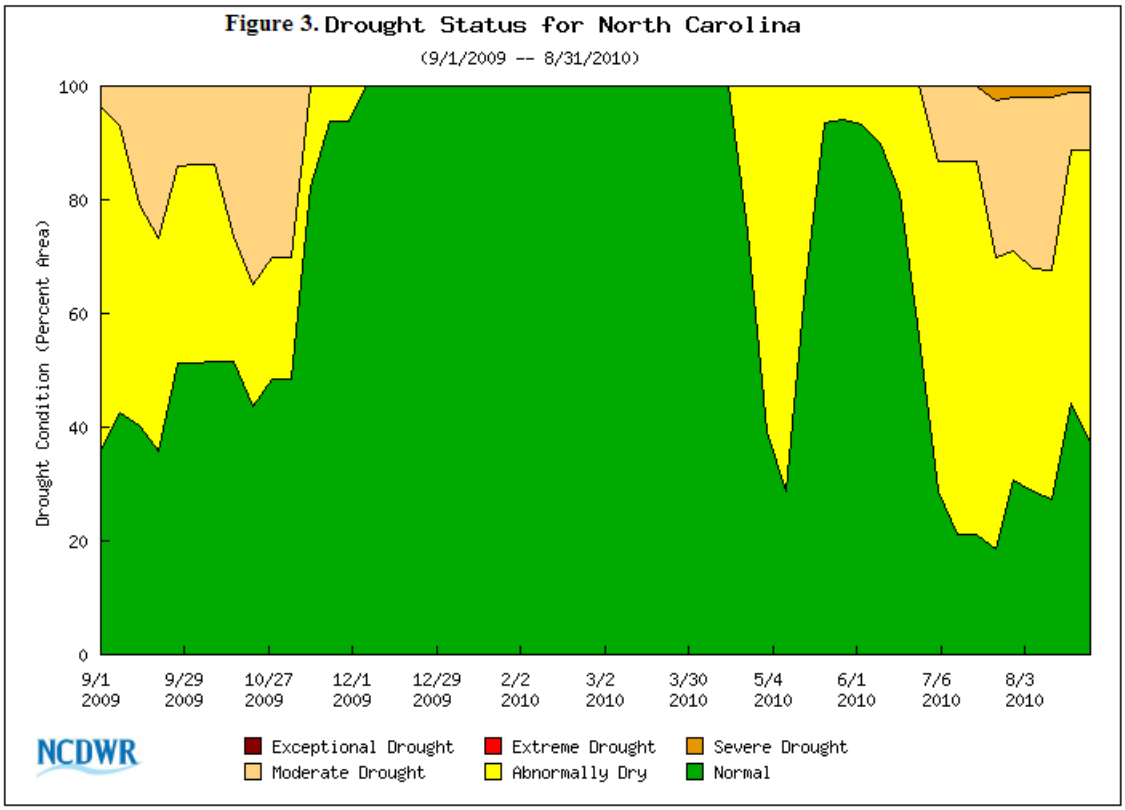


Groundwater conditions this year, at the 17 USGS observation wells, were generally in the normal ranges for the mountains and Piedmont regions with below-normal conditions dominant in the Coastal Plain. The link that displays these conditions can be found on the N.C. Climate Response Network website at http://groundwaterwatch.usgs.gov/StateMapsNet.asp?ncd=crn&sc=37. A wet 2009 fall season caused an increase in groundwater levels. These levels remained in the normal and above-normal ranges during the winter of 2009-2010 at many of the wells in the Piedmont and mountains. While water levels at these wells have recently been declining, which is typical with the seasonal patterns that occur during the warmer months, the levels at the mountains and Piedmont observations wells have generally remained in the normal ranges. Water levels at the observation wells in the Coastal Plain increased during the 2009 fall season and remained in the normal ranges during the winter. However, water levels in the Coastal Plain began to rapidly decrease due to the lack of rainfall during the spring and summer. Since spring of 2010, below-normal water levels have been predominant across much of the Coastal Plain.

Lack of rainfall brought back abnormally dry conditions to parts of central and southeastern North Carolina – the first time since December 2009 that any part of the Tar Heel State has experienced dry conditions. The April 27, 2010 U.S. Drought Monitor map for North Carolina showed that 26 counties in the Sandhills, the Wilmington area and parts of the Triangle and Triad were abnormally dry. These conditions were due to rainfall deficits and below average streamflows and groundwater levels in the region. Normal conditions prevailed in the rest of the state, according to the map on the council's drought website at http://www.ncdrought.org.

On July 6, 2010, moderate drought conditions resurfaced in parts of North Carolina for the first time since November 2009. The July 6 drought map indicated that 18 counties in the western and northeastern portions of the state had reached moderate drought status, the least severe of the four drought categories. Officials say the worsening conditions were driven by a lack of rainfall that hurt crops and impacted farmers in parts of North Carolina.

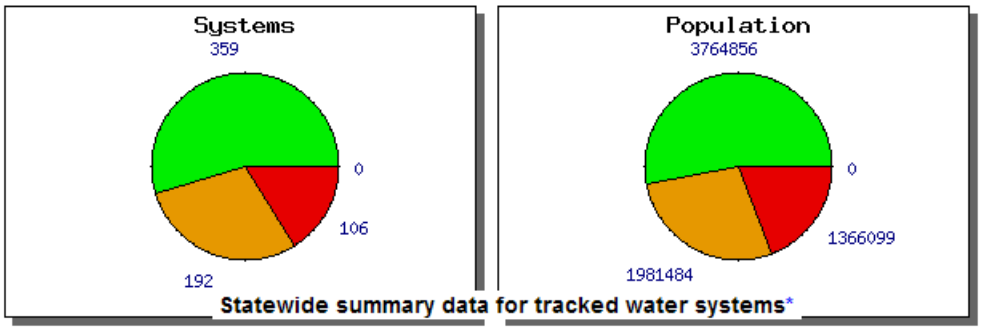
Figure 3 is a display of the drought conditions in North Carolina for the period Sept. 1, 2009 to Aug. 31, 2010.



The Division of Water Resources, or DWR, and Public Water Supply Section, or PWSS, maintain a website that tracks local water conservation measures, for more than 600 public water systems statewide. The measures are outlined in Figure 4. This online database provides a consistent way to document and track drought-related impacts on public water supply systems. This website can be found at http://www.ncwater.org/Drought_Monitoring/reporting/displaystate.php.

Figure 4. Water Conservation level status, Statewide

	Systems		Population	
Status	Number	Percent	Number	Percent
Not Restricted	359	54.64	3,764,856	52.93
Voluntary Conservation	192	29.22	1,981,484	27.86
Mandatory Conservation	106	16.13	1,366,099	19.21
Emergency	0	0.00	0	0.00
Total	657		7,112,439	



The 2009-2010 growing season was a difficult one for farmers. Harvest of soybeans and cotton and the planting of small grains were delayed in late 2009 due to wet conditions, which were the result of a long, cold winter with abnormal amounts of snow and precipitation. Wet conditions continued until April 2010 when things began to dry out and farmers were able to get into the fields. It did not take long for soil moisture to be depleted. By May, the lack of rainfall and hot temperatures led the N.C. Drought Management Advisory Council to designate 26 counties in central and southeastern North Carolina as abnormally dry. Most row crops have seen a decrease in yield in 2010 compared to 2009. The only crops that have done well under these conditions have been fruits. Grapes, peaches and apples have all benefited from the ideal growing conditions of a wet fall and spring and a dry summer.

Since October 2009 to present, drought conditions have not adversely impacted forest resources statewide. There were approximately 2,800 fires that burned more than 10,500 acres and threatened more than 2,600 homes. Thanks to ground and aerial firefighting resources, only six homes were lost to wildfires. However, personnel with the N.C. Division of Forest Resources have noticed an increase in tree mortality from the Ips Engraver beetle. The mortality is usually limited to a single tree or small groups of trees and may be due to the above normal temperatures and the reintroduction of drought since July 2010.

Drought Response Activities ---- January to August 2010

Council Meetings

The Drought Management Advisory Council is required by law to meet at least once each calendar year to identify agency representatives that will maintain appropriate agency readiness and participation. The last council meeting was conducted during the Drought Management Tools Workshop on April 1 at N.C. State University in Raleigh. The event started with the annual meeting of the council.

Items on the council's meeting agenda included a drought assessment and forecast reports about the seasonal drought outlook and the impact of drought on streamflow and groundwater levels, lake and reservoir levels, agriculture, forestry and public water systems and special reports about drought preparedness and response. Participants included 80 representatives and members of the N.C. Drought Management Advisory Council and the news media. This was the only meeting of the N.C. Drought Management Advisory Council during this reporting period.

Drought Management Tools Workshop

The National Drought Mitigation Center chose North Carolina to host its annual drought informational workshop. Officials with the center wanted to acknowledge the council for its hard work and learn from the council's experiences. In addition, attendees heard from officials representing the state and federal departments of agriculture, the National Drought Mitigation Center and the State Climate Office of North Carolina. The event was geared toward national, state and local leaders, public water supply officials and the agricultural community.

The N.C. Drought Management Advisory Council members were recognized for their efforts during the workshop. The workshop showcased North Carolina's response to the state's record-breaking drought of 2007-08 and the tools cities, towns and the nation's farmers can use to respond to future droughts.

The workshop followed the N.C. Drought Management Advisory Council's annual meeting and was hosted by the U.S. Department of Agriculture's Risk Management Agency, the National Drought Mitigation Center, the University of Nebraska-Lincoln Computer Science and Engineering Department, the N.C. Department of Environment and Natural Resources, the State Climate Office of North Carolina, N.C. State University and the N.C. Department of Agriculture and Consumer Services.

Press Releases and Public Information

From October 1, 2009 to present, five press releases were sent out and various interviews with news media were made on drought conditions and advisories.

Drought conditions in North Carolina are updated weekly. A Technical Drought Advisory Team, a sub-group of the N.C. Drought Management Advisory Council, participates each Tuesday in an audio-video telecom to gather and feed information to the U. S. Drought Monitor author about local drought conditions in North Carolina. The team consists of a group of experts on climate, weather, geology, water supply, forestry and agriculture. The members report each week on the impact of rainfall on streams, groundwater, reservoirs, wildfire activity and crops. Based on the team's discussion, the council makes a recommendation to the U.S. Drought Monitor about how the state's drought map should look for that week. The U.S. Drought Monitor uses the state's recommendation when it releases the final drought map each Thursday. To see or download a copy of the current drought map, go to the state's official drought website at www.ncdrought.org.

At the river basin level, there are weekly conference calls to coordinate releases from reservoirs and hydroelectric power generation to conserve as much water as possible and balance upstream and downstream needs. The U.S. Army Corps of Engineers and the utility companies, owners of the biggest reservoirs, are working together in this effort.

Critical Local Government Drought Response Projects

One of the most critical drought-related activities in response to the 2007 drought is identifying and helping North Carolina communities most at-risk of not having enough water during a drought. The following is a list of the most practical, short-term projects underway. These projects are intended to supply an expedient, supplemental water source to these at-risk communities.

Staff with the state Public Water Supply Section and the N.C. Division of Water Resources regularly communicate with water systems identified in 2007 that were identified as Tier 1 systems, or those considered most vulnerable to drought. Systems remain at their highest tier-level until a water resource is online, or operating, that is capable of providing an emergency water supply to minimize the system's vulnerability to drought. To see more detailed information about the Tier 1 systems go to www.ncwater.org/Drought_Monitoring/reporting/weekstatust123.php.

Tier--1 Drought Response Project Updates by the Public Water Supply Section

- Bessemer City identified the need for an interconnection with Gastonia. Bessemer City decided that it had higher needs for other infrastructure funding and has not pursued this interconnection with the city of Gastonia.

- Boone is pursuing a new raw water intake on the New River. This project is ongoing. Boone completed a water system interconnection with Appalachian State University in 2009.

- Blowing Rock is pursuing a water system interconnection with Boone. Construction is in progress.

- Hendersonville is pursuing a new water intake on French Broad River. Permitting for this project is underway.

- King identified the need for a water system interconnection with Winston-Salem. This project is still ongoing.

- Lenoir is pursuing a new water intake on Lake Rhodhiss. This project is ongoing.

- Marshall identified a critical need for new groundwater wells and water line replacements. Work is underway on the repair and the replacement of the waterlines.

- Mars Hill initiated a water system interconnection with Weaverville. This project is near completion.

- Robbinsville identified the need for new groundwater wells. This project is ongoing.

- Tryon/Columbus/Saluda – Water system interconnections and upgrades for these communities are underway.

- North Wilkesboro's plan for a water system interconnection with Wilkesboro is underway.

- Yadkinville – No activity by the town has been reported during this reporting cycle.

Outreach and Educational Activities

- DENR is in the process of developing a Water Efficiency Education and Outreach Program Toolkit for local governments. The toolkit will include a step-by-step approach to implement and maintain a water efficiency education and outreach program, case studies, sample policies, posters, brochures and fact sheets.

- DENR staff members continue to make available a wide range of educational and water conservation materials for educators, children and adults on the website at www.savewaternc.org.

The Division of Environmental Assistance and Outreach, or DEAO, provides technical assistance and training in water efficiency for the institutional and municipal sectors. Activities for 2010 included:

- Hosting three 1-hour webinars on water efficiency techniques and technologies: http://savewaternc.org/waterwebinars.asp.

- Producing water efficiency videos for the new savewaternc.org YouTube channel: http://www.youtube.com/user/savewaternc.

- Development of water efficiency document collections for hospitality, irrigation and cooling towers in P2 INFOHOUSE at http://www.p2pays.org/infohouse/.

- Economy, Energy, and Environment (E3) in central North Carolina – outreach and assistance to industrial and commercial entities including water efficiency.

- In 2010, DEAO worked with the Public Water Supply Section to establish guidance for public water systems on meeting the water conservation and efficiency consumer education program requirements for state loans and grants.

- DEAO coordinates and manages the DENR Environmental Stewardship Initiative, a voluntary three-tiered approach for the regulated community in North Carolina that encourages and rewards superior environmental performance. Each year, members must set environmental goals and report progress towards those goals. In 2010, Environmental Stewardship Initiative member facilities reported a use reduction of more than 1.4 billion gallons during 2009. These are permanent and ongoing reductions from water efficiency programs.

N.C. Drought Management Advisory Council Website

The N.C. Drought Management Advisory Council's website, www.ncdrought.org, presents the drought map for North Carolina that is released on Thursday of each week by the U.S. Drought Monitor. The drought conditions depicted are valid for 8 a.m. eastern time for the preceding Tuesday. North Carolina is fortunate because it has the N.C. Drought Management Advisory Council to work closely with the U.S. Drought Monitor to adjust designations weekly to better reflect North Carolina's local conditions. This map is defined as the official drought map nationally and for North Carolina.

The N.C. Drought Management Advisory Council issues necessary official drought advisories each Thursday based on the drought classifications in the official map. This information provides water users with a reliable basis for managing and calling for drought response actions in their regions. The list of counties under drought advisories are updated and released each week on the website to reflect local drought classifications on the U.S. Drought Monitor's map for North Carolina.

The N.C. Drought Management Advisory Council website also has tabs that link to available resources for drought information, some with real-time data about current conditions, news, drought contacts, information and drought education, drought monitor archives, and water conservation tips.

The site includes time lapse animation of the weekly U.S. Drought Monitor maps for North Carolina since January 2000. Viewers can also see drought classifications nationwide, statewide, county-wide or by river basin. This drought monitor history can be found at http://www.ncdrought.org/archive/index.php.

Improving Coordination and Drought Depiction

Water Resources Information

The N.C. Division of Water Resources continues to work with the N.C. State Climate Office, the U.S. Army Corps of Engineers, the N.C. Ground Water Management Section, the U.S. Geological Survey and the Tennessee Valley Authority to improve and expand a water resources information, storage, analysis and retrieval system. This program provides an archive of historical and near real-time data about hydrology, including stream flow, groundwater and reservoir data. It also provides weather and climate conditions and water use data in North Carolina. Data products are now available for public use at

http://www.ncwater.org/wrisars/index.php. Drought products can be found at http://mapserver.ncwater.org/DM/.

River Basin Drought Management Plans

As part of the relicensing of hydropower projects in the Catawba-Wateree and Yadkin-Pee Dee river basins, procedures were established for adjusting operations during periods of low-inflow to conserve the limited water supply. The low-inflow protocols provide trigger points and procedures for how the projects will be operated, and water withdrawal reduction measures and goals for other water users during periods of low-inflow. During the 2007 drought, the low-inflow protocols in these basins were tested and resulted in significantly improved water management when compared to similar drought periods of the past.

The N.C. Division of Water Resources is working with the U.S. Army Corps of Engineers and other stakeholders to develop a drought management plan for the Falls Lake Reservoir. When completed, this plan will be incorporated into the recently completed Neuse River Basin Hydrologic Model. The drought management plan for the Jordan Lake Reservoir is included in the existing Cape Fear River Basin Hydrologic Model. The Cape Fear model is scheduled to be updated in the near future. The incorporation of the drought management plans into the hydrologic models should result in model results that more closely reflect reservoir operations and storage and downstream flows during drought periods.

Drought Indicator Wells

Drought indicator wells are a network of wells that monitor the effects of droughts and other climate variability on groundwater levels in the aquifers, or water table. The N.C. Division of Water Resources' goal is to increase the number and geographic distribution of drought indicator wells. The division has 48 actively monitored wells in the network and has a short-term goal of adding two wells to the network this fiscal year. The long-term goal is to have at least 60 monitored drought indicator wells. This will provide a much more complete assessment of possible or actual drought conditions in each of the major river basins of the state. More information about drought indicator wells can be found at http://www.ncwater.org/Data_and_Modeling/Ground_Water_Databases/Drought_Indicator_Wells/.

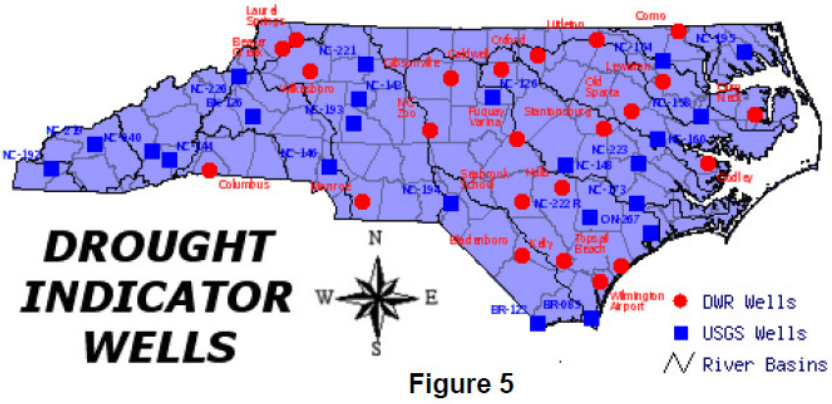
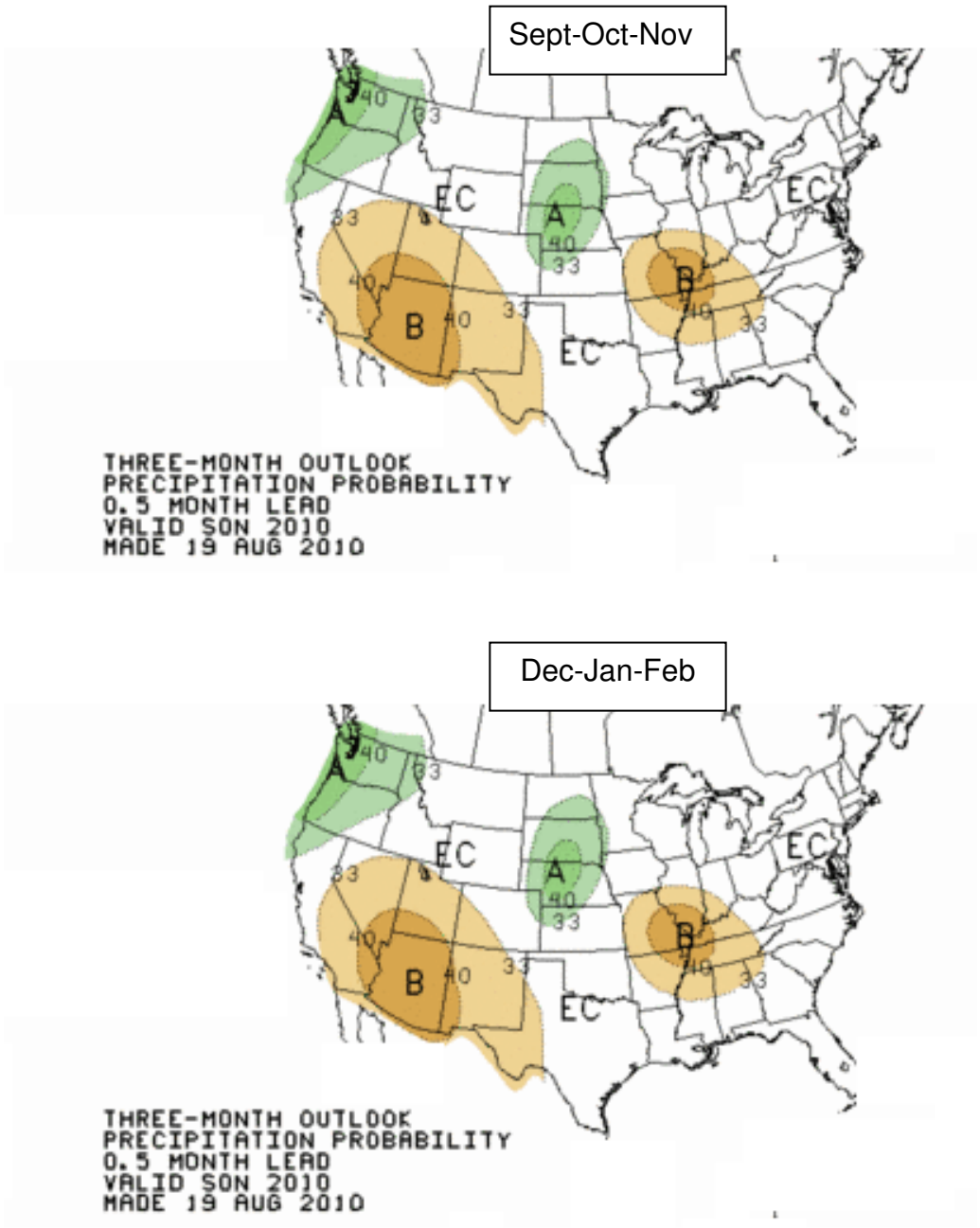


Figure 5

Figure 6. Six-Month Precipitation Outlook Beginning September 2010



EC = means 50/50
A= chances above normal
B= chances below normal