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INTERMOUNTAIN WEST CLIMATE SUMMARY

A product of the Western Water Assessment

Issued July 29, 2011, Vol. 7, Issue 5

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July 2011 Summary

Temperature — *June temperatures were generally below average across Utah and Wyoming but above average across Colorado.*

Precipitation — *June precipitation was well below average in southern Colorado and Utah and average to above-average to the north.*

Hydrological Conditions — *As expected, the above-average to record snowpacks observed across the region in late spring delivered above-average runoff, with flooding in many locations. Reservoirs across the region filled or improved to levels not seen in several years.*

ENSO — *The La Ni–a event ended in May, and ENSO-neutral conditions are forecasted to continue through the summer season.*

Climate Forecasts — *For August and subsequent seasons, the CPC seasonal outlooks call for an enhanced probability of warmer conditions in the southern portions of the region, and an enhanced probability of wetter conditions in the northern and eastern portions of the region.*

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Feature Article

Examining Regional Climate Model (RCM) projections: What do they add to our picture of future climate in the region?

By Karen Cozzetto, Imtiaz Rangwala, and Jeff Lukas

(download pdf)

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Focus Article

There is no Focus Article this month.

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Recent Climate Conditions

Average temperatures for the month of June were near average across much of **Colorado**, with increases of about 2-4iF above average in the southeastern portion of the state. On the other hand, most of **Utah** and **Wyoming** experienced temperatures 2Ð4iF below average for the month (Figure RC-2). Temperatures ranged from an average of 70Ð75iF in southeastern **Colorado** to under 50iF in the mountains of central **Colorado** and in the Yellowstone region of northwestern **Wyoming** (Figure RC-1).

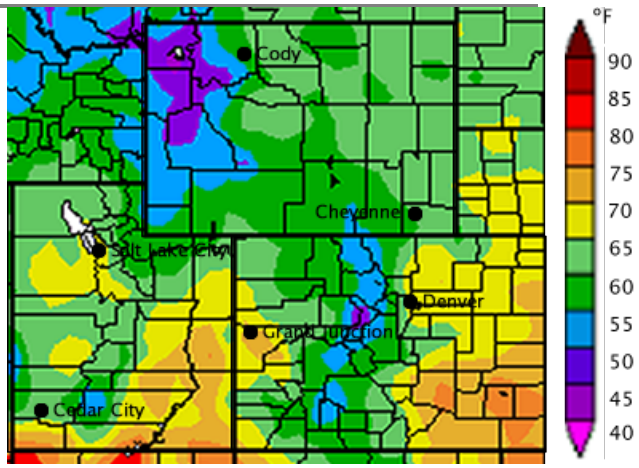

Figure RC-1. Average temperature for the month of June 2011 in iF. (Source: High Plains Regional Climate Center)

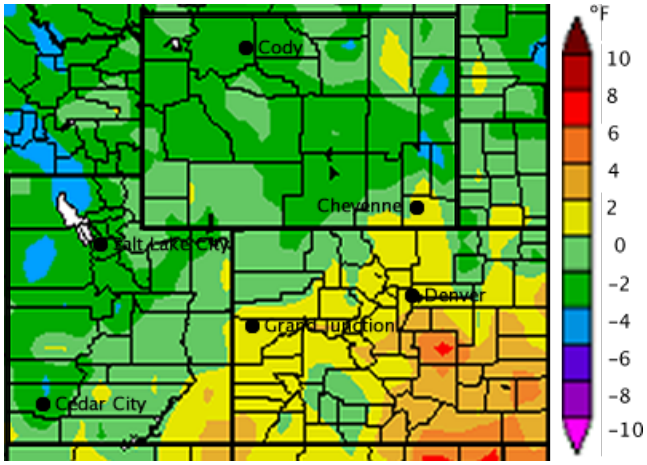

Figure RC-2. Departure from average temperature for the month of June 2011 in iF. (Source: High Plains Regional Climate Center)

Precipitation during June followed a northeast-southwest gradient, with less than 40 percent of average precipitation falling across much of **Utah** and southern **Colorado**, while areas of eastern **Utah**,and **Wyoming**, and the Medicine Bow mountains saw over 150 percent of average precipitation (Figure RC3 and RC-4a). For the water-year-to-date, most of **Utah**, northwestern **Colorado** and western **Wyoming** have received 150 percent or more of average precipitation, while southeastern **Colorado** has received less than 70 percent of average (Figure RC-4b).

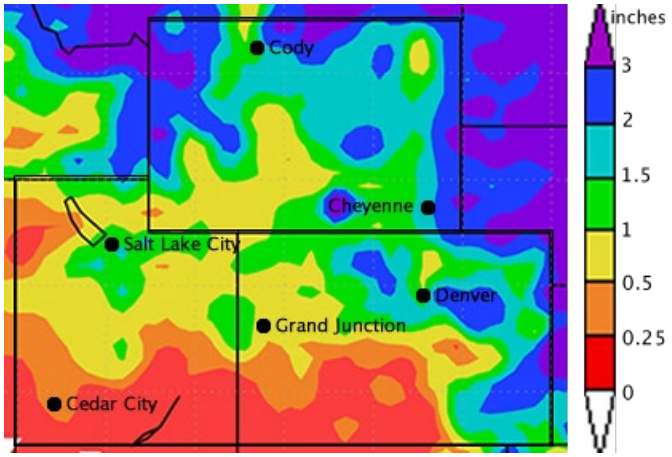

Figure RC-3. Precipitation for the month of June 2011 (inches). (Source: NOAA ESRL Physical Science Division)

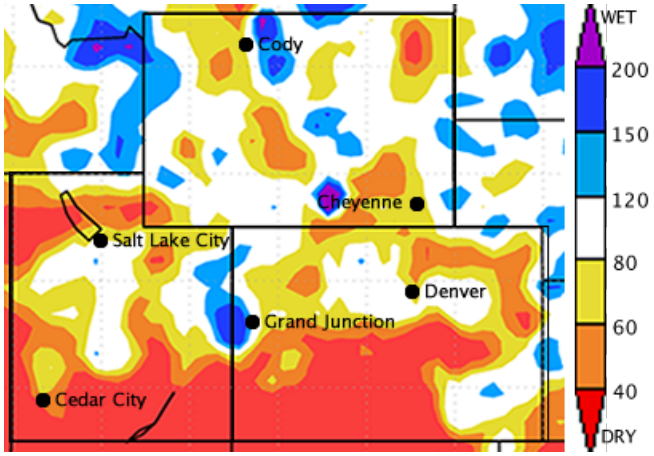

Figure RC-4a. Precipitation for the month of June 2011 as percent of average precipitation for June. (Source: NOAA ESRL Physical Science Division)

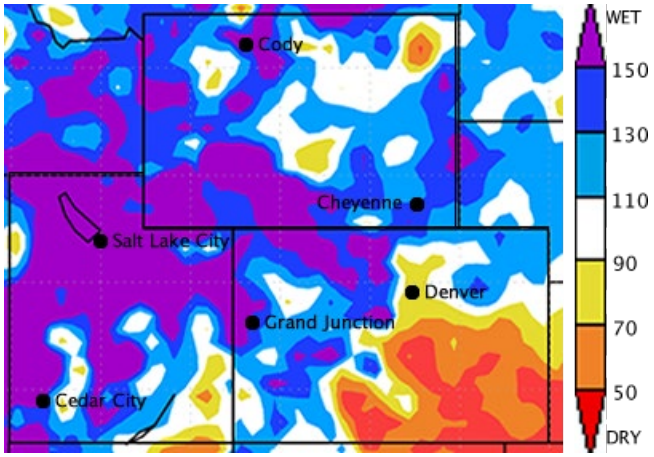

Figure RC-4b. Precipitation for water-year-to-date (October 2010ÐJune 2011) as percent of average precipitation for that period. (Source: NOAA ESRL Physical Science Division)

The 3-month SPI as of the end of June 2011 (Figure RC-5) indicates very dry conditions across southeastern **Colorado**. Almost all of **Wyoming** and **Utah**, however, was moderately to extremely wet for the same period, with near-normal conditions in eastern **Utah** and across much of **Colorado**. The 36-month SPI, on the other hand (Figure RC-6), shows near-normal conditions throughout most of the three-state region. Eastern and southeastern **Wyoming** was moderately to extremely wet over that period, with moderately wet conditions in northern **Utah** and northeast **Colorado**. The south-central portion of **Colorado** remained moderately dry.

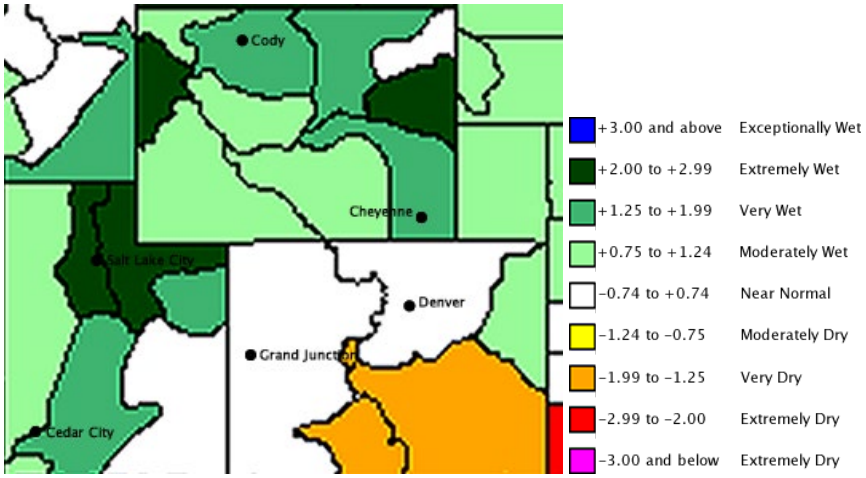

Figure RC-5. 3-month Intermountain West regional Standardized Precipitation Index as of the end of June 2011 (data from 4/01/11Ð 6/30/11). (Source: Western Regional Climate Center)

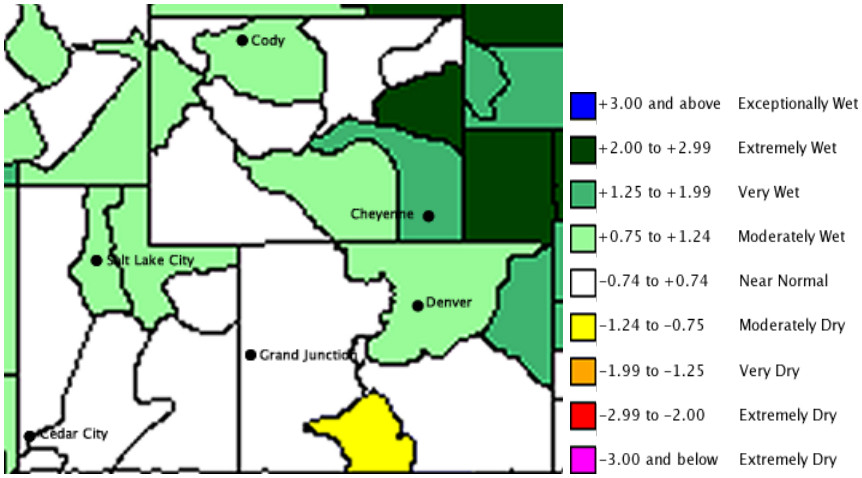

Figure RC-6. 36-month Intermountain West regional Standardized Precipitation Index as of the end of June 2011 (data from 07/01/08Ð6/30/11). (Source: Western Regional Climate Center)

The U.S. Drought Monitor for July 19 shows Extreme (D3) and Severe Drought (D2) conditions across most of southeastern **Colorado,** an extension of the large drought area covering much of New Mexico, Texas, and Oklahoma. The remainder of the three-state region, however, does not contain any drought areas, and only the far southeastern corner of **Utah** is abnormally dry at this time (Figure RC-7).

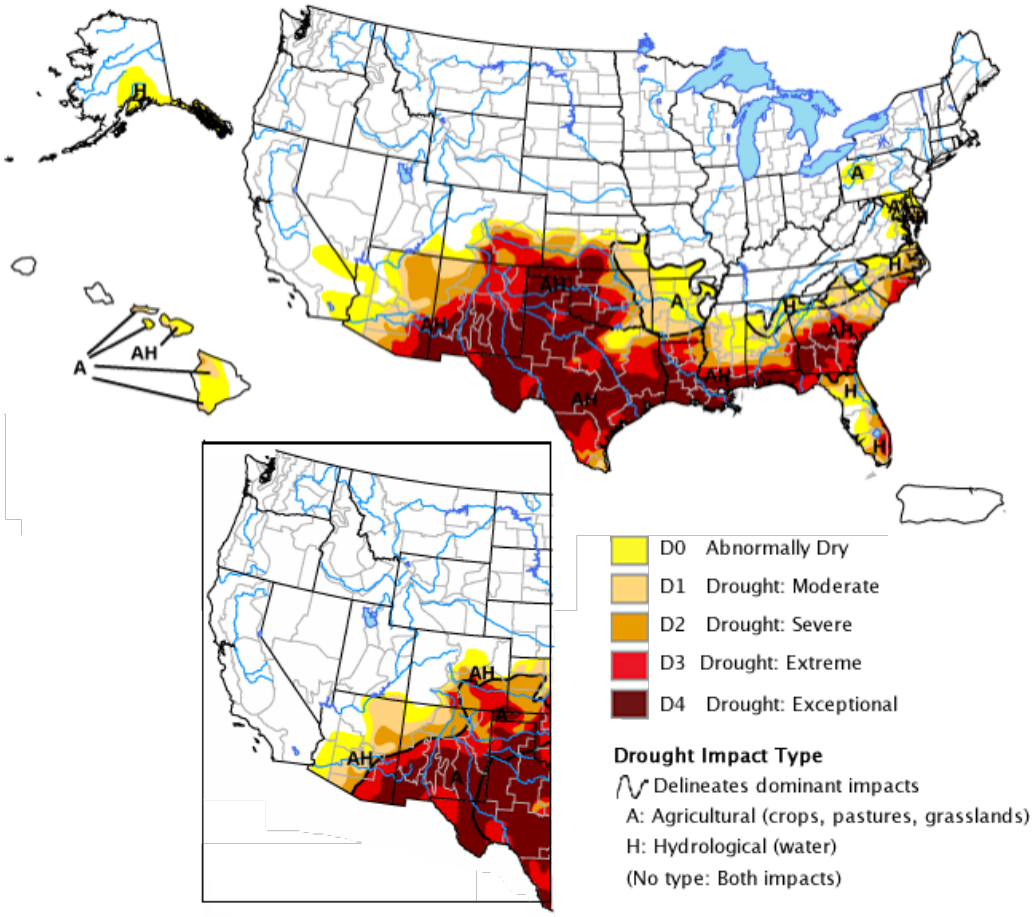

Figure RC-7. Drought Monitor from July 19, 2011 (full size) and June 14, 2011 (inset, lower left) for comparison. (Source: National Drought Mitigation Center)

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Intermountain West Snowpack and Streamflow

The very large snowpacks observed in late spring across the region finally melted out, after persisting well into July in many locations. The meltout was prolonged by intermittently cool weather at higher elevations in June, with some additional snow accumulation, and the absence of a very warm spell as occurred in early June 2010. Also, the overall impact of dust-on-snow appeared to be less than in 2009 and 2010, except perhaps in southern **Colorado** where spring accumulation was much less and the dust was exposed more often during the melt season.

The May 1 forecasts for spring and summer streamflow, which called for above-average to well-above-average flow in nearly all basins regionwide, generally verified as observed flow volumes through late July were consistently above average, and in many locations, daily flows were high-for-date during some or most of the runoff season. The observed inflows to Lake Powell for June ended up lower than the last forecast but were still well above average. Snowmelt-induced flooding occured in many locations across the region, particularly in northwest **Colorado** and northern **Utah**.

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Reservoir Supply

The above-average runoff volumes through June saw reservoir status improve regionwide, with even Lake Powell, which had been well below average during most of the past decade, climbing back up to 76% full and 93% of the

long-term average for the end of June (Figure RES-1). Across the region, reservoir levels are the highest since the early 2000s.

	Reservoir	Current storage (af)	Capacity (af)	% Full	Average on 6/30	% of Average
COLORADO	Dillon Reservoir	255,876	257,304	99%	249,000	103%
	Turquoise Lake	116,562	129,390	90%	116,562	100%
	Lake Granby	530,206	539,758	98%	432,954	122%
	Blue Mesa	828,044	829,500	100%	695,200	119%
	Pueblo	222,687	235,000	67%	160,500	139%
UTAH	Strawberry	1,110,300	1,106,500	100%	710,000	156%
	Utah Lake	1,060,000	870,900	124%	872,200	124%
	Bear Lake	985,900	1,302,000	76%	972,100	101%
	Lake Powell	18,388,080	24,322,000	76%	19,801,000	93%
WYOMING	Fontenelle	274,058	344,800	79%	271,100	101%
	Flaming Gorge	3,525,692	3,749,000	94%	3,235,000	109%
	Seminoe	935,129	1,017,273	92%	827,800	113%
	Boysen	794,635	741,594	107%	714,600	111%
	Buffalo Bill	626,204	644,126	97%	550,000	114%

Figure RES-1. All reservoir content data is from June 30, 2011. Percent of average ranges are color-coded as follows: green: >90%; light green: 60Ð89%; yellow: 40Ð59%; orange: 20Ð39%; red: 0Ð19%.

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ENSO Status and Forecast

The La Ni–a event of 2010-2011 ended in May with the warming of sea surface temperatures in the tropical Pacific, and ENSO-neutral conditions are currently being observed (Figure EN-1).

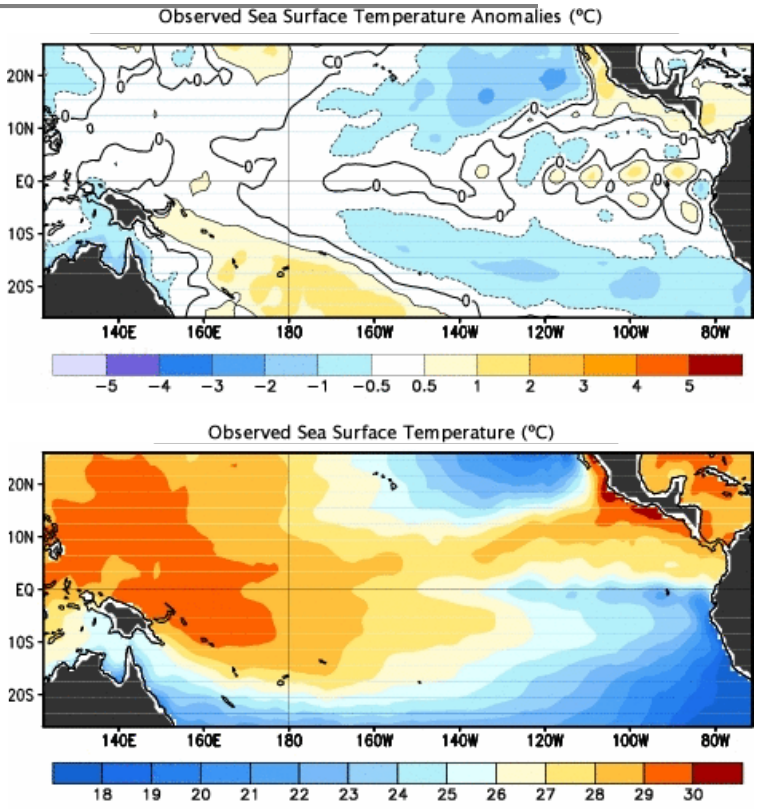

Figure EN-1. Observed SST (lower) and the observed SST anomalies (upper) in the Pacific Ocean. The Ni–o 3.4 region encompasses the area between 120iWÐ170iW and 5iNÐ5iS. The graphics represent the 7-day average

centered on July 13, 2011. (Source: NOAA Climate Prediction Center)

Model forecasts of SST anomalies (Figure EN-2) reflect a strong consensus that ENSO-neutral conditions will continue through the summer period (JulyÐSeptember). Through the end of 2011, the ensemble of forecasts also point to the continuation of neutral conditions, though with some chance of the emergence of El Ni–o conditions or the re-establishment of La Ni–a conditions.

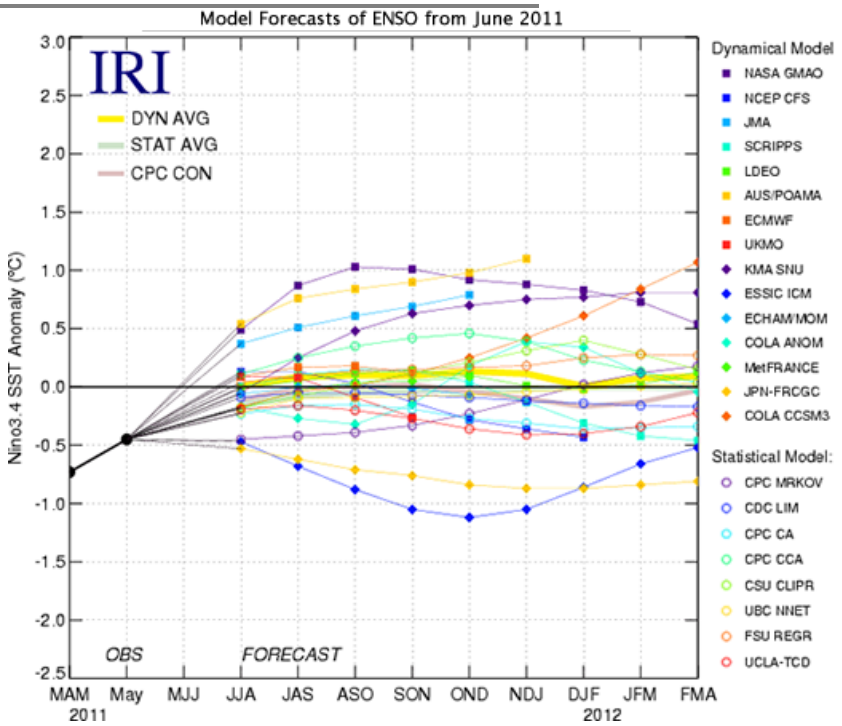

Figure EN-2. Forecasts made by dynamical and statistical models for sea surface temperatures (SST) in the Ni–o 3.4 region for nine overlapping 3-month periods from JulyÐSeptember 2011 to MarchÐMay 2012 (released July 20, 2011). (Source: International Research Institute (IRI) for Climate and Society)

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Temperature Outlook
August–December 2011 (Released July 21, 2011)

The latest temperature outlooks from the NOAA Climate Prediction Center indicate an enhanced probability of warmer-than-average temperatures in parts or all of **Utah** and **Colorado** in August 2011 and subsequent seasons through December (Figures TEMP-1 through TEMP-4). Northern **Wyoming**, conversely, is indicated to have an enhanced probability of colder-than-average temperatures in August and the AugustÐOctober season.

The increased odds of warm temperatures in the southern and southwestern US indicated in these forecasts reflects both the continuation of the long-term trend towards warmer temperatures in the region and the typical pattern in fall seen following La Ni–a conditions.

The August 2011 temperature forecast will be updated on July 31st on the CPC web page. This Òzero-leadÓ monthly update will incorporate information from the short-range numerical weather prediction models and the latest monthly predictions from the Climate Forecast System models. The Seasonal Outlooks are updated on the third Thursday of the month, and the next one will be issued on August 19th.

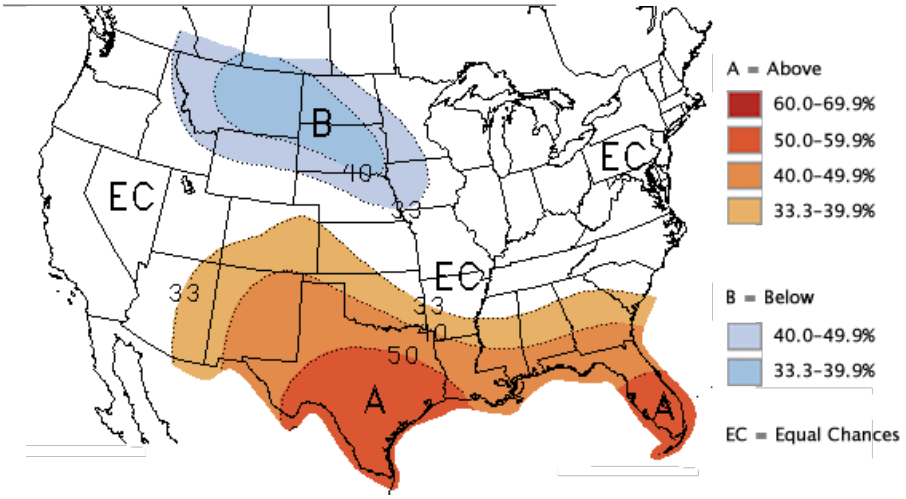

Figure TEMP-1. Long-lead national temperature forecast for August 2011. (Source: NOAA Climate Prediction Center)

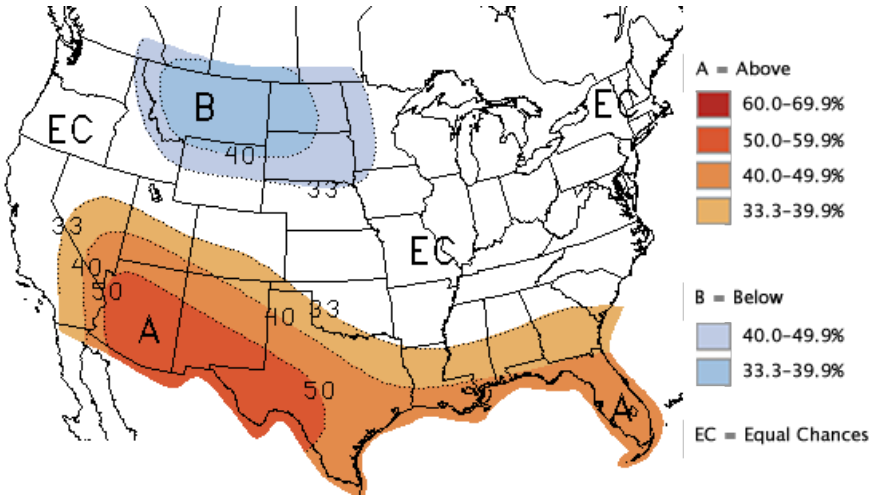

Figure TEMP-2. Long-lead national temperature forecast for AugustÐOctober 2011. (Source: NOAA Climate Prediction Center)

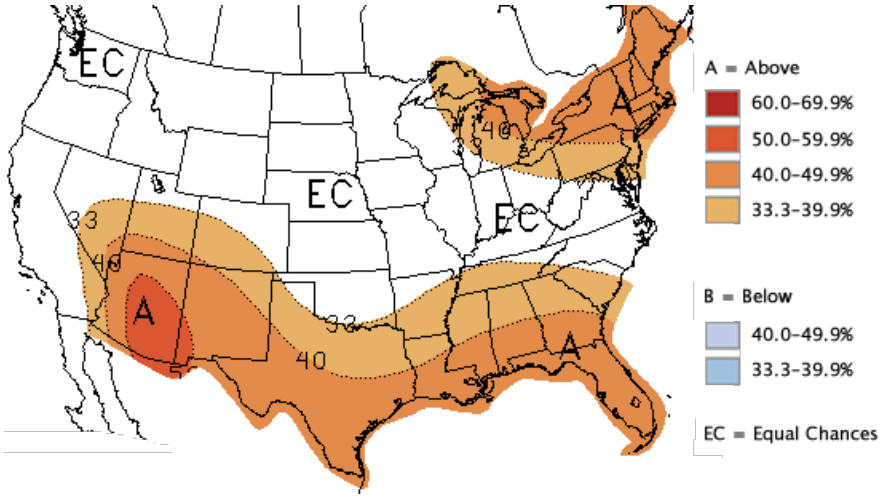

Figure TEMP-3. Long-lead national temperature forecast for SeptemberÐNovember 2011. (Source: NOAA Climate Prediction Center)

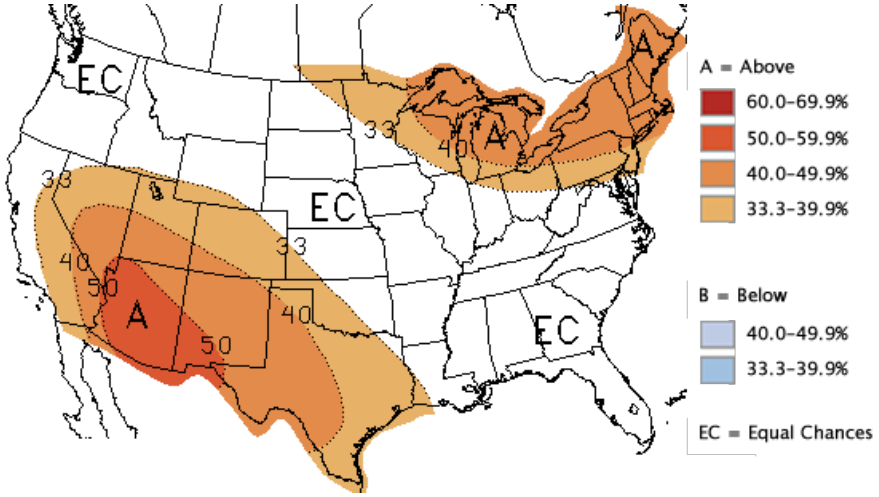

Figure TEMP-4. Long-lead national temperature forecast for OctoberÐDecember 2011. (Source: NOAA Climate Prediction Center)

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Precipitation Outlook
August–December 2011 (Released on July 21, 2011)

The CPC precipitation outlooks for August 2011 and the subsequent seasons (Figures PPT-1 through PPT-4) indicate an enhanced probability of above-average precipitation over the northern and eastern portions of the region, including parts of **Wyoming** and **Colorado**. These seasonal precipitation forecasts are based on the Climate Forecast System models, ENSO composites, and precipitation trends.

The August 2011 precipitation forecast will be updated on July 31st on the CPC web page. This Òzero-leadÓ monthly update will incorporate information from the short range numerical weather prediction models and the latest monthly predictions from the Climate Forecast System models. The Seasonal Outlooks are updated on the third Thursday of the month, and the next one will be issued on August 19th.

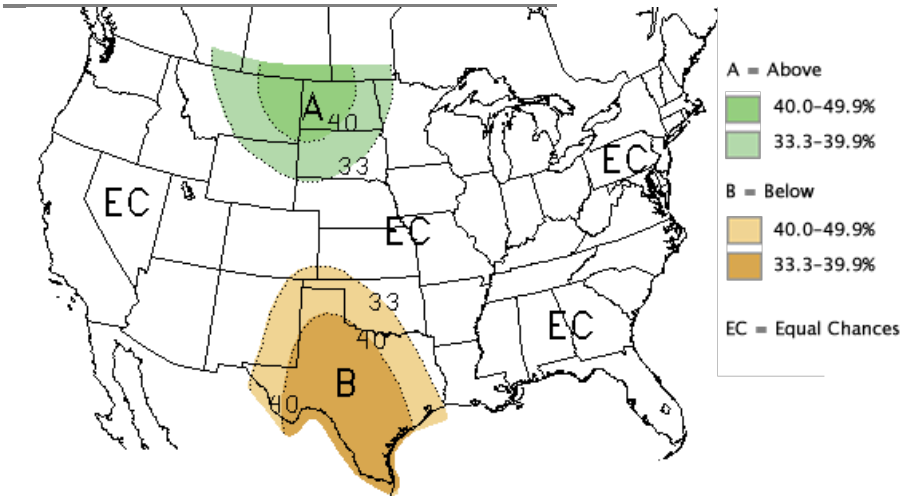

Figure PPT-1. Long-lead national precipitation forecast for August 2011. (Source: NOAA Climate Prediction Center)

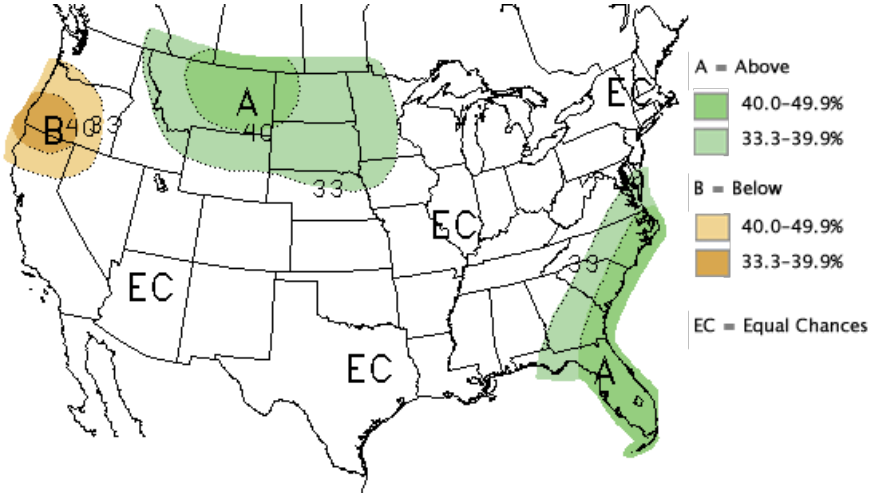

Figure PPT-2. Long-lead national precipitation forecast for AugustÐOctober 2011. (Source: NOAA Climate Prediction Center)

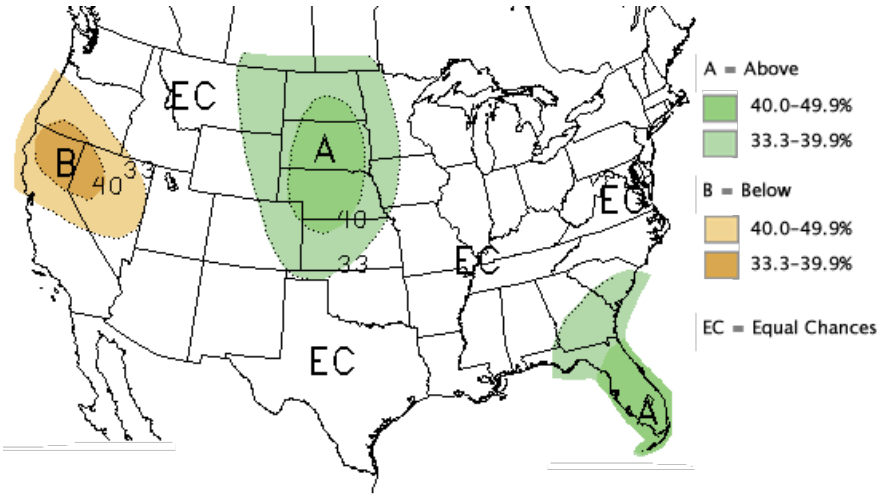

Figure PPT-3. Long-lead national precipitation forecast for SeptemberÐNovember 2011. (Source: NOAA Climate Prediction Center)

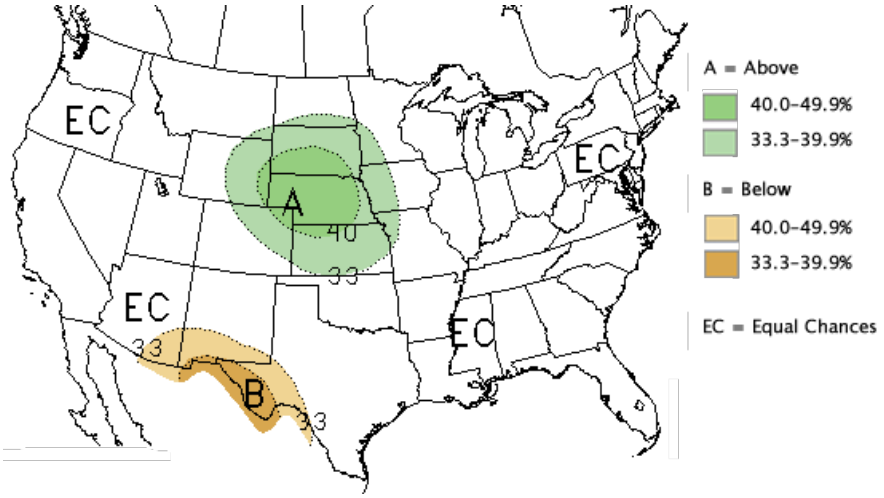

Figure PPT-4. Long-lead national precipitation forecast for OctoberÐDecember 2011. (Source: NOAA Climate Prediction Center)

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Seasonal Drought Outlook
through October 2011 (Released July 21, 2011)

The U.S. Seasonal Drought Outlook (DO) builds on the Drought Monitor categories to project how these drought areas might change or where new drought areas might develop. Southeastern **Colorado**, currently experiencing severe (D2) and extreme (D3) drought conditions, is projected to see improvement in those conditions over the next three months (Figure DO-1). Drought conditions are not expected to develop elsewhere in the region.

Readers interested in the next 1Ð5 days and 6Ð10 days can consult the ÒLooking AheadÓ section of each weekÕs Drought Monitor for near-term drought outlook conditions. The next Seasonal Drought Outlook will be issued August 4th.

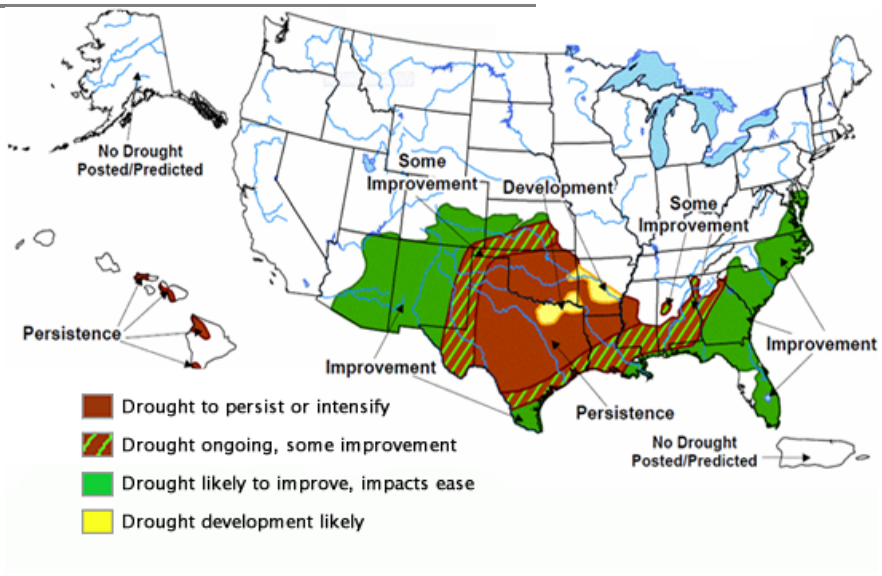

Figure DO-1. Seasonal Drought Outlook for July 21, 2011ÐOctober 2011. (Source: NOAA Climate Prediction Center)

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