


[About Us](#)
[Research](#)
[Resources](#)
[Outreach](#)

[Research Home](#)
[Current Publications](#)
[All Publications](#)
[WWA Reports](#)
[WWA Annual Reports](#)
[Intermountain West Climate Summary](#)
[Stakeholder Climate Needs](#)
[WWA Home](#) Æ [Research](#) Æ [Publications](#) Æ [Intermountain West Climate Summary](#)

INTERMOUNTAIN WEST CLIMATE SUMMARY



A product of
the Western Water Assessment

Issued October 12, 2011, Vol. 7, Issue 6

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October 2011 Summary

Temperature — *Temperatures for September were warmer than average across nearly all of the region.*

Precipitation — *September was generally drier than average across the region, and especially dry in Wyoming, northern Utah, and southeastern Colorado.*

ENSO — *After a brief hiatus this summer, La Niña conditions have re-emerged and are expected to persist through the winter season.*

Climate Outlooks — *Consistent with the La Niña conditions, in the late fall and winter seasons, the CPC seasonal outlooks call for some enhanced risk of warmer and drier conditions in the extreme southern portions of our region, and of wetter conditions in the northern portions.*

[RETURN TO TOP](#)

Announcements & News

Do you need information about the socioeconomic impacts of climate variability and climate change? Let us know!

The WWA-funded "Socioeconomic Impacts and Adaptation Strategies Clearinghouse" project is compiling existing research and studies about the social and economic impacts of and adaptations to climate variability and climate change, relevant to the WWA region (Colorado, Utah and Wyoming), into an online, searchable database. The purpose of the project is to provide useful, readily accessible socioeconomic impacts information to decision makers as they prepare to adapt to climate variability and change. Climate-induced socioeconomic impacts could include:

- The cost of acquiring new water supplies due to reduced yield from existing portfolios
- Reduction in recreation visits due to low streamflows, reduced snowpack, and/or wildfires
- Decreases in agricultural productivity during drought

Please let us know which social and economic impacts you need more information about as you plan for climate variability and change. If published research in that area exists, we will add it to the database. If it doesn't, we will add it to a roster of research needs and explore options for funding that research. Contact Bobbie Klein at bklein@colorado.edu.

Utah Bark Beetles and Watersheds Workshop -- December 1, Salt Lake City

We invite our IWCS readers in Utah to join the Western Water Assessment (WWA) and the USDA Forest Service

Intermountain Region for an all-day science workshop exploring the water-related impacts of bark beetle infestations in Utah and the Rocky Mountain West. Beetle-impacts researchers from WWA, the University of Colorado, and the USFS Rocky Mountain Research Station will present their findings. Researchers, water managers, forest managers, and other decision-makers are encouraged to attend. Please RSVP to Tim Bardsley (www.bardsley@gmail.com) by November 23, and specify if you will be attending in Salt Lake City or via videoconference. Space is limited. For more information, go to the WWA [Beetles, Water, and Climate web page](#). (Note: We will also have a 3rd annual beetle-water science symposium in spring 2012 in Boulder, CO--look for announcements after the new year.)

NIDIS Upper Colorado Pilot activities extended, including CCC Upper Colorado drought webinars

The National Integrated Drought Information System (NIDIS) program office has announced that although the NIDIS Upper Colorado Pilot program has formally ended, some activities which were initiated during the pilot will continue. In particular, the CSU Colorado Climate Center has been funded for three years to continue their weekly-to-monthly (depending on time of year) half-hour webinars that present the status of precipitation, snowpack, streamflow, water demand, and drought indices for the upper Upper Colorado basin. Many of the graphics and updates cover the entire three-state region of Colorado, Utah, and Wyoming. To register for the next webinar, go [here](#). The webinars are archived shortly after presentation [here](#).

Changes in this month's IWCS

We usually release the IWCS around the 25th of the month, shortly after NOAA CPC posts its monthly and seasonal climate outlooks on the 3rd Thursday of the month. However, this means that the information released on or about the 1st of the month (previous month's temperature and precipitation, streamflow forecasts, basinwide snowpack maps) is almost four weeks old by the time the IWCS comes out.

We are experimenting this month with an earlier release (by about two weeks) of the IWCS, which will make the first-of-the-month information more timely. Conversely, the monthly and seasonal CPC outlooks are now less timely, having been released the 3rd Thursday of the previous month. Please let us know if you prefer one release date over the other.

[RETURN TO TOP](#)

Feature Article

The National Climate Assessment Is Available and forthcoming resources for the Intermountain West and beyond

by Jeff Lukas, WWA

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[RETURN TO TOP](#)

Focus Article

There is no Focus Article for this issue.

Recent Climate Conditions

Temperatures for September were warmer than average across nearly all of the Intermountain West (Figures RC-1 and RC-2). Warm anomalies of more than 4°F above average occurred in portions of **Wyoming** and **Utah**, while pockets of below-average temperatures were most prevalent in eastern **Colorado**.

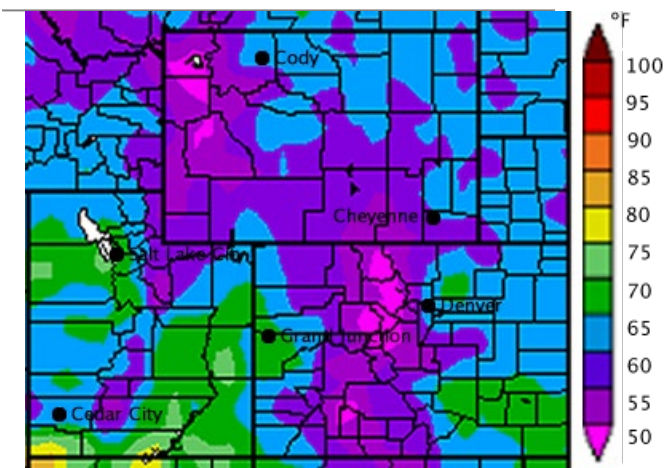


Figure RC-1. Average temperature for the month of September 2011 in iF. (Source: High Plains Regional Climate Center)

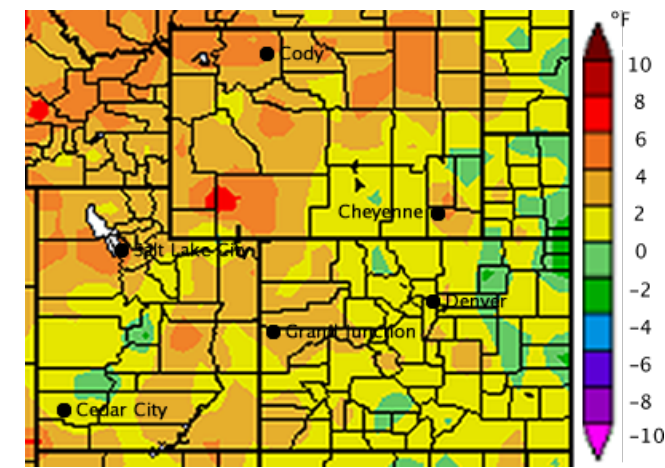


Figure RC-2. Departure from average temperature for the month of September 2011 in iF. (Source: High Plains Regional Climate Center)

September precipitation was generally below average across the region, especially in much of **Wyoming**, northern **Utah**, and southeastern **Colorado**, where less than 40% of average **September** precipitation was recorded (Figures RC-3 and RC-4). The only wet anomalies of note were in parts of southern **Utah** and east-central **Colorado**; the latter reflects a single storm on September 14 that dropped up to 6" of rain in the Colorado Springs area.

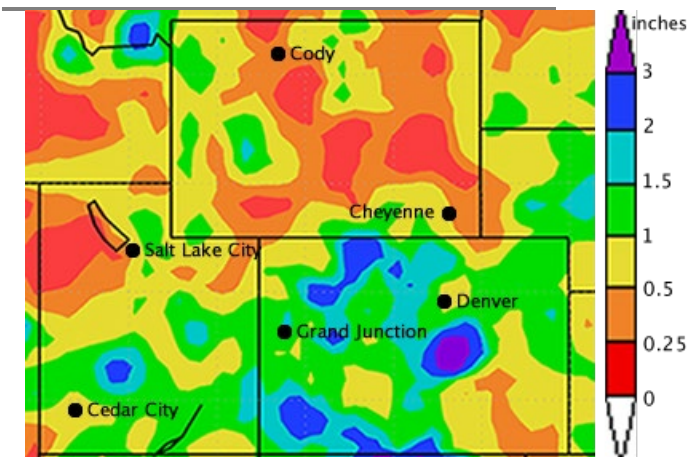


Figure RC-3. Precipitation for the month of September 2011 (inches). (Source: NOAA ESRL Physical Science Division)

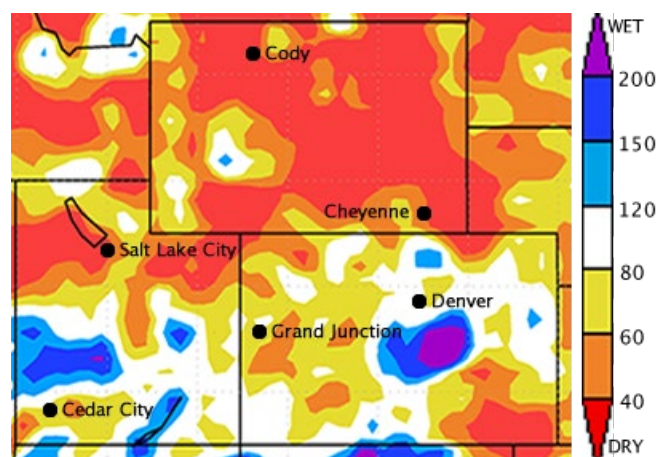


Figure RC-4. Precipitation for the month of September 2011 as percent of average precipitation for September. (Source: NOAA ESRL Physical Science Division)

For the 2011 water year that just ended, the region on balance saw wetter-than-average conditions, with more than 150% of average precipitation occurring in much of northern and western **Utah**, southwestern **Wyoming**, and northwestern **Colorado**. Most of this widespread wet anomaly occurred during the December–May period as the storm tracks consistently favored those regions, leading to record snowpacks in many mountain locations. Both **Utah** and **Colorado** experienced a strong gradient from wet conditions in the northwest to dry in the southeast, with southeastern **Colorado** seeing less than 70% of average precipitation for the water year.

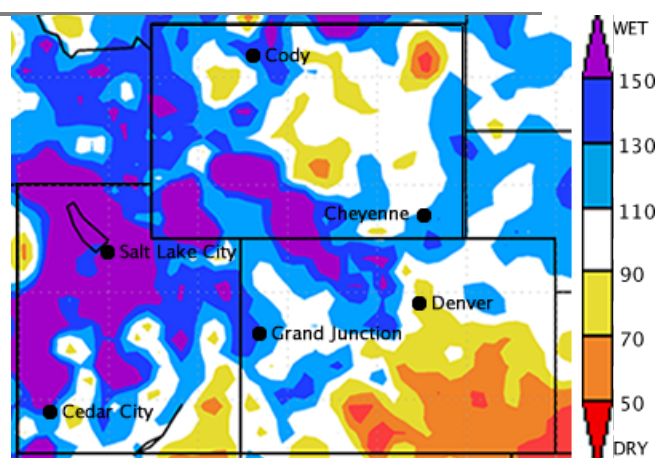


Figure RC-4b. Precipitation for the 2011 water year (October 2010–September 2011) as percent of average precipitation for that period. (Source: NOAA ESRL Physical Science Division)

The 3-month SPI (Figure RC-5) as of October 1 indicated near-normal conditions across **Colorado** and most of **Utah**, with moderately wet conditions in northeastern **Utah**. Dry conditions in August and September were balanced out by a wet July in those two states. **Wyoming**, however, was on the dry side over the past three months, with very dry to extremely dry conditions in the northern part of the state.

The 36-month SPI (Figure RC-6) indicated either near-normal or moderately wet long-term conditions across the entire region, with the exception of moderately dry conditions in south-central **Colorado** and very wet conditions in east-central **Wyoming**.

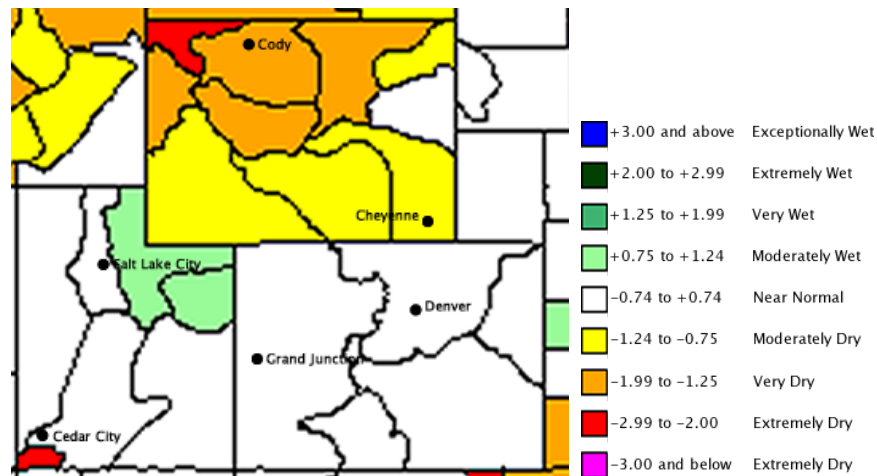


Figure RC-5. 3-month Intermountain West regional Standardized Precipitation Index as of the end of September 2011 (data from 7/1/11Ð9/30/11). (Source: Western Regional Climate Center)

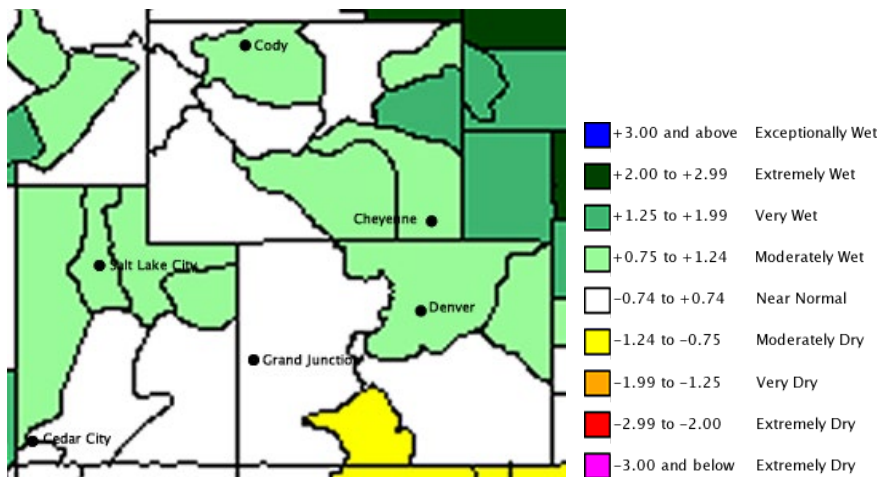


Figure RC-6. 36-month Intermountain West regional Standardized Precipitation Index as of the end of September 2011 (data from 10/01/08Ð9/30/11). (Source: Western Regional Climate Center)

The U.S. Drought Monitor issued October 4 indicated that the extreme (D4) and severe (D3) drought conditions in southern **Colorado** have been partly alleviated since mid-July, though a large portion of the state is still in drought (Figure RC-7). A small area of abnormally dry (D0) conditions has persisted in extreme southeastern **Utah**, and a new area of abnormally dry conditions has emerged in eastern **Wyoming**.

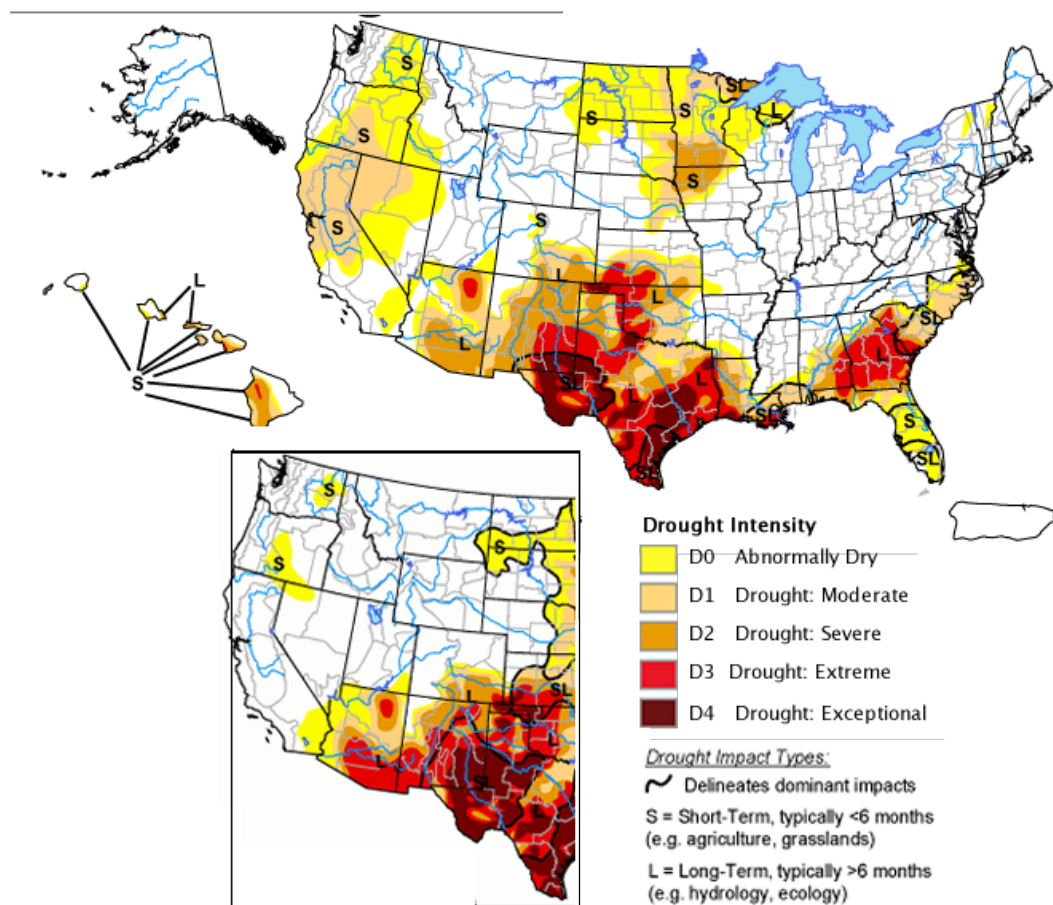


Figure RC-7. Drought Monitor from October 4, 2011 (full size) and July 19, 2011 (inset, lower left) for comparison. (Source: National Drought Mitigation Center)

Notes & Weblinks

(provides explanations of graphics and additional information sources)

RETURN TO TOP

Intermountain West Snowpack

Snowpack levels during October reflect the beginning of the winter snowpack accumulation and are poorly correlated with peak snowpack levels. However, October precipitation and snowfall can be important for alleviating summertime drying of the soil, potentially improving runoff efficiency in the following spring, and for establishing the snow base at regional ski areas.

After a large and moist storm system moved through the region during the first week of October, as of October 10, most higher-elevation SNOTEL sites throughout the region showed well-above-average SWE for the date (Figure SP-1). While this looks like a promising start to the season, bear in mind that the actual SWE amounts at nearly all sites are less than 20", with some sites in southwestern **Colorado**, northeastern **Utah**, and central **Wyoming** having up to 40".

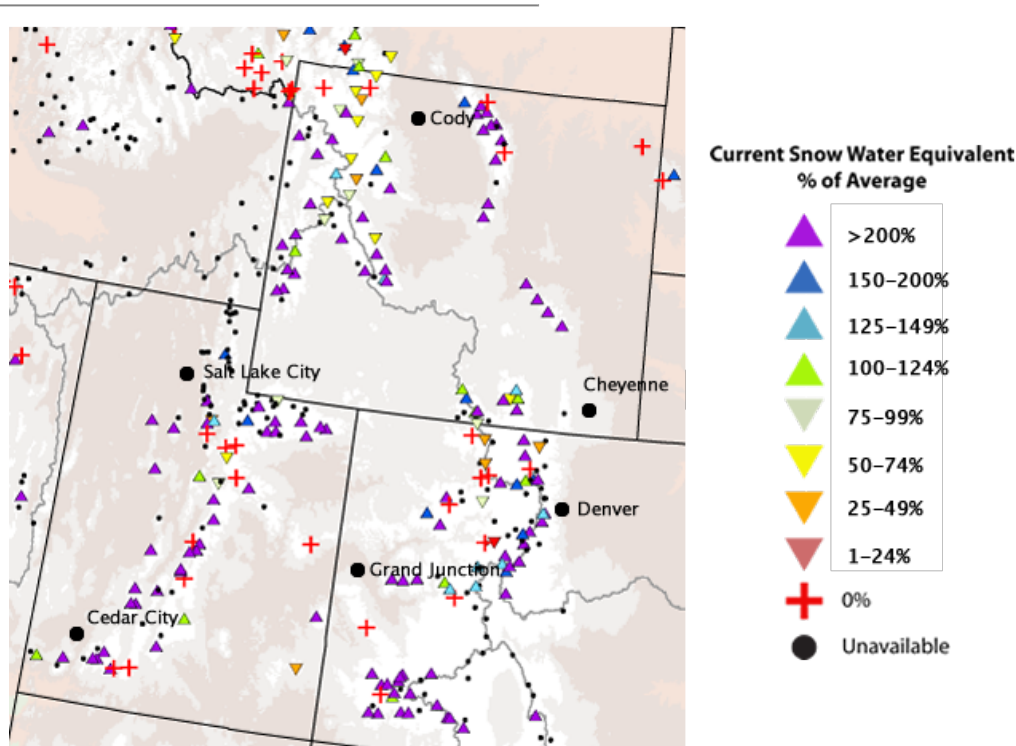


Figure SP-1. Snow-water equivalent as of October 10, 2011 as percent of the long-term average, at SNOTEL sites across the Intermountain West. (Source: Natural Resources Conservation Service)

[Notes & Weblinks](#)

(provides explanations of graphics and additional information sources)

[RETURN TO TOP](#)

ENSO Status and Forecast

The end of a moderate to strong La Niña episode in early May 2011 was followed by neutral ENSO conditions until August, when weak La Niña conditions returned. This "double-dip" La Niña behavior—diminishing during summer and reappearing in fall—has occasionally occurred in the past, most recently in 2008.

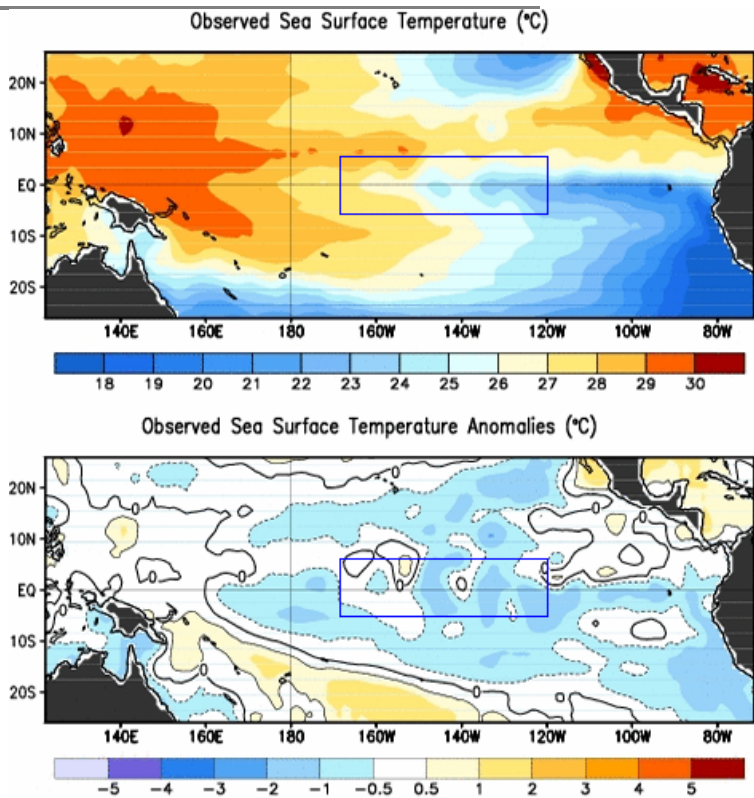


Figure EN-1. Observed SST (upper) and observed SST anomalies (lower) in the tropical Pacific Ocean. The Ni-3.4 region encompasses the area between 120°W-170°W and 5°N-5°S. The graphics represent the 7-day average centered on September 28, 2011. (Source: NOAA Climate Prediction Center)

Model forecasts made in late summer of SST anomalies as compiled by the International Research Institute for Climate and Society (IRI) reflect a nearly even split between models projecting a continuation of La Ni-a conditions through the winter, and those projecting a return to ENSO-neutral conditions (Figure EN-2). Note that this set was compiled in mid-September from forecasts made earlier; the next set of forecasts, to be released October 20th, should show a greater likelihood of continuing La Ni-a conditions, given more than a month of recent observations of cooling SSTs like those shown in Figure EN-1.

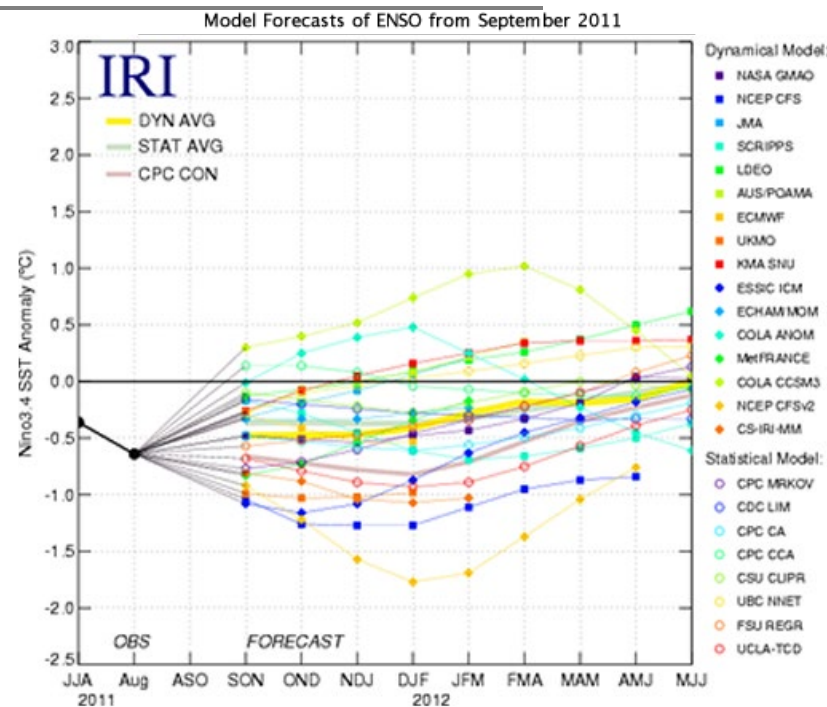


Figure EN-2. Forecasts made by dynamical and statistical models for sea surface temperatures (SST) in the Ni-3.4 region for nine overlapping 3-month periods from September-November 2011 to May-July 2012 (released September 15, 2011). (Source: International Research Institute (IRI) for Climate and Society)

Notes & Weblinks

(provides explanations of graphics and additional information sources)

RETURN TO TOP

Temperature Outlook October 2011–February 2012

The latest temperature outlooks from the NOAA Climate Prediction Center indicate an enhanced risk of below-average temperatures across the western portions of the Intermountain West in October 2011, shifting to an enhanced risk of above-average temperatures in the southern part of the region for the November-January season, consistent with typical La Ni-a impacts (Figures TEMP-1 and TEMP-2). In the subsequent season, this area of enhanced risk of warm temperatures shifts to the south and east (Figure TEMP-3).

Temperature impacts of La Ni-a over the U.S. are typically weaker during the summer and early fall, and strengthen during the late fall and winter. The ENSO state heavily influences the outlooks for temperature for November and subsequent seasons through the winter. The monthly outlook for October blends both long-term climate forecasts with shorter-term (up to 14-day) weather forecasts. There is also an overall trend towards warming conditions in the southwestern U.S. that is incorporated into the forecasts.

Note: These climate outlooks are intended for use prior to the start of their valid period (in this case, prior to the beginning of November). Within any given valid period, observations and NWS short- and medium-range forecasts should be consulted. The zero-lead monthly outlook and the seasonal outlooks are updated on the third Thursday of the month, and the next ones will be issued on October 20th.

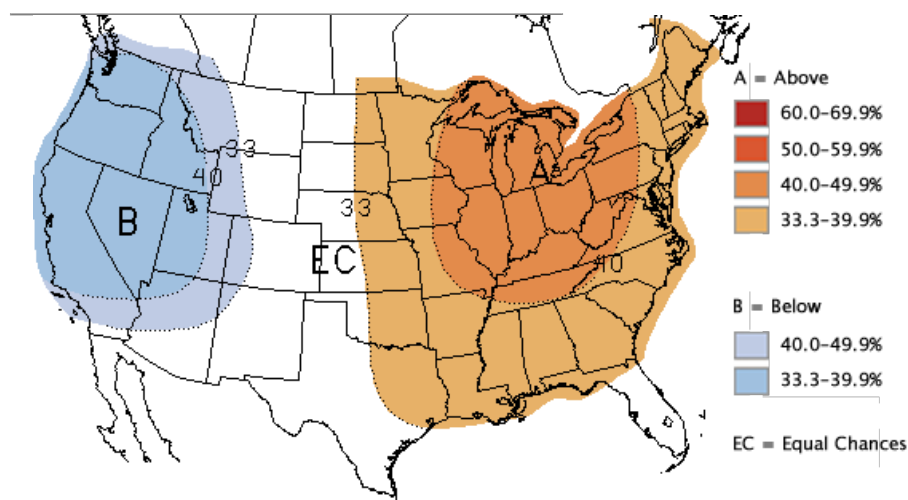


Figure TEMP-1. Long-lead national temperature forecast for October 2011 (released September 30, 2011).
(Source: NOAA Climate Prediction Center)

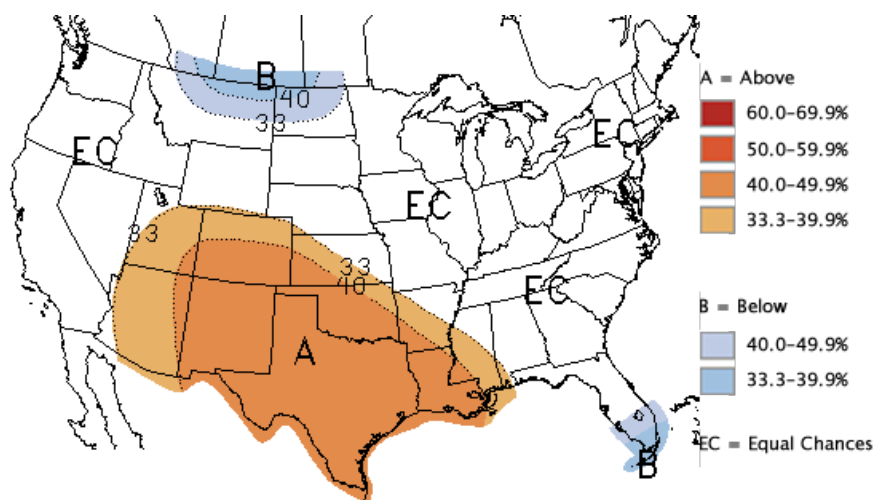


Figure TEMP-2. Long-lead national temperature forecast for November 2011/January 2012 (released September 15, 2011). (Source: NOAA Climate Prediction Center)

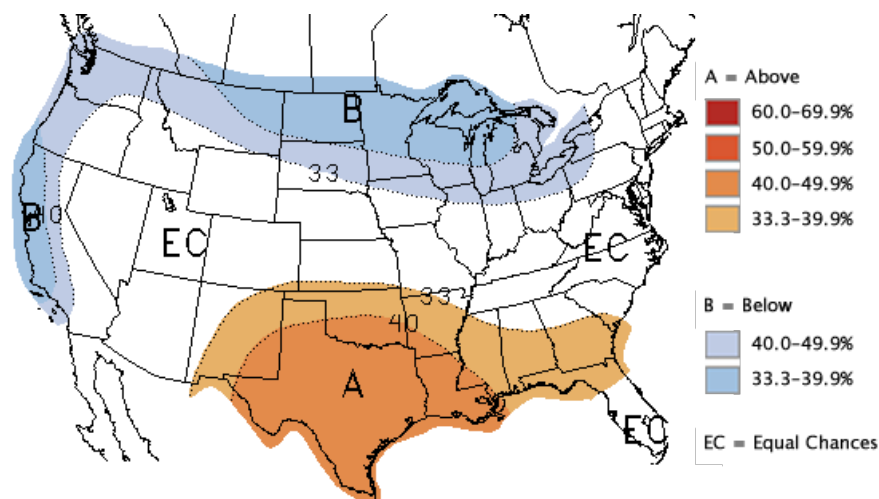


Figure TEMP-3. Long-lead national temperature forecast for December 2011/February 2012 (released September 15, 2011). (Source: NOAA Climate Prediction Center)

Notes & Weblinks

(provides explanations of graphics and additional information sources)

Precipitation Outlook October 2011–February 2012

The CPC precipitation outlook for October 2011 (Figure PPT-1) shows a slightly enhanced risk of wetter-than-average conditions in **Wyoming**, with no shift in probability elsewhere in the region. For the November–January and December–February seasons, this region of enhanced risk of wetter conditions contracts to western **Wyoming** (Figure PPT-2), and then expands again into northern **Utah** and **Colorado** (Figure PPT-3). Meanwhile, enhanced risk of drier-than-average conditions lurk to the south of our region, extending into far southern **Utah** and **Colorado** in the November–January season.

The areas of above- or below-median precipitation described above are largely due to expected La Niña impacts on climate, including the typical La Niña-influenced tilt of the odds towards below-median precipitation for some areas of the southern tier and towards wet conditions for the Pacific Northwest. The monthly outlook for October blends both long-term climate forecasts with shorter-term (up to 14-day) weather forecasts.

Note: these climate outlooks are intended for use prior to the start of their valid period (in this case, prior to the beginning of November). Within any given valid period observations and NWS short- and medium-range forecasts should be consulted. The zero-lead monthly outlook and the seasonal outlooks are updated on the third Thursday of the month, and the next ones will be issued on October 20th.

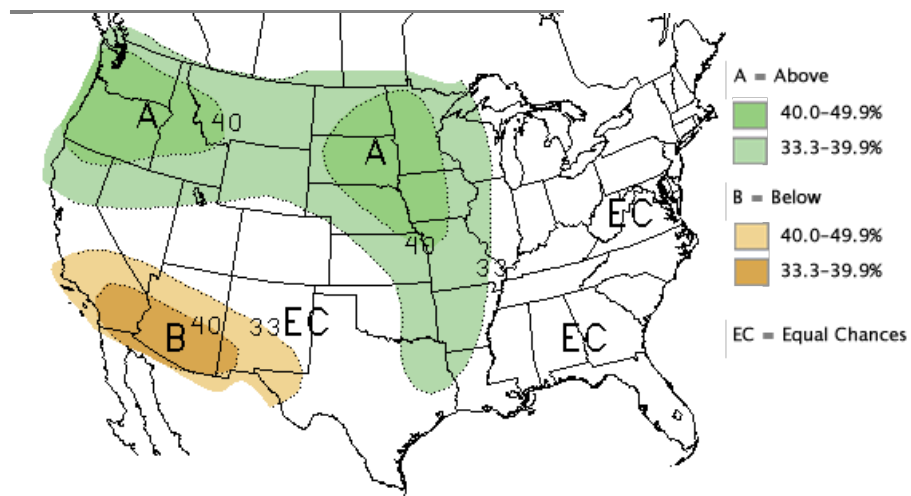


Figure PPT-1. Long-lead national precipitation forecast for October 2011 (released September 30, 2011). (Source: NOAA Climate Prediction Center)

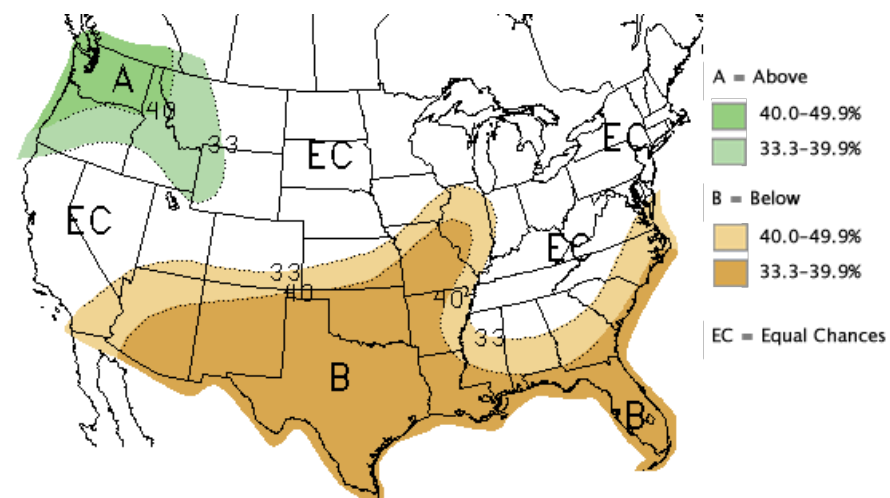


Figure PPT-2. Long-lead national precipitation forecast for November 2011–January 2012 (released September 15, 2011). (Source: NOAA Climate Prediction Center)

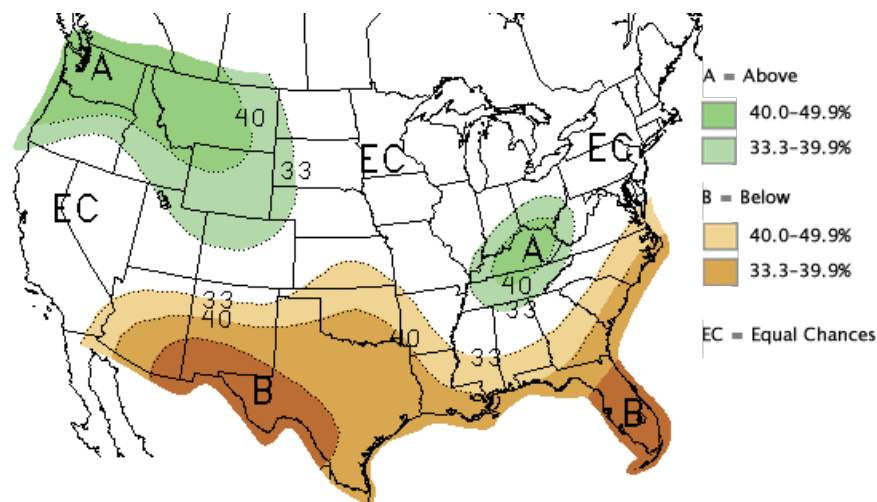


Figure PPT-3. Long-lead national precipitation forecast for December 2011 to February 2012 (released September 15, 2011). (Source: NOAA Climate Prediction Center)

According to the experimental PSD Precipitation Forecast Guidance released in late September, the October to December season has a slight tilt towards drier-than-average conditions over the plains of eastern Colorado, with a stronger tilt (5 to 10%) over south-central Colorado (Figure PPT-5a). The January to March season has a more widespread tilt towards dryness in both Utah and Colorado, especially over northwestern Utah and southeastern Colorado (5 to 10%) (Figure PPT-5b). While not explicitly factored into these forecast maps, they confirm a general tendency in our region for the second consecutive year with cold-season La Niña conditions to be drier than the first year. Thus, a repeat of last year's (near-) record snowpacks in the higher elevations of Colorado and Utah is unlikely.

Experimental PSD Precipitation Forecast Guidance
OCT – DEC 2011 (Issued 21 September 2011)

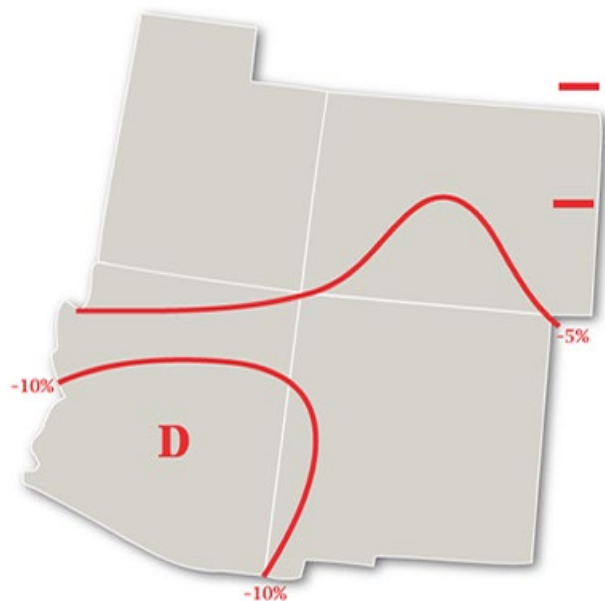


Figure PPT-5a. Experimental precipitation forecast guidance. Forecasted shifts in tercile probabilities for October to December 2011. (Source: NOAA ESRL Physical Science Division)

Experimental PSD Precipitation Forecast Guidance

JAN – MAR 2012 (Issued 21 September 2011)

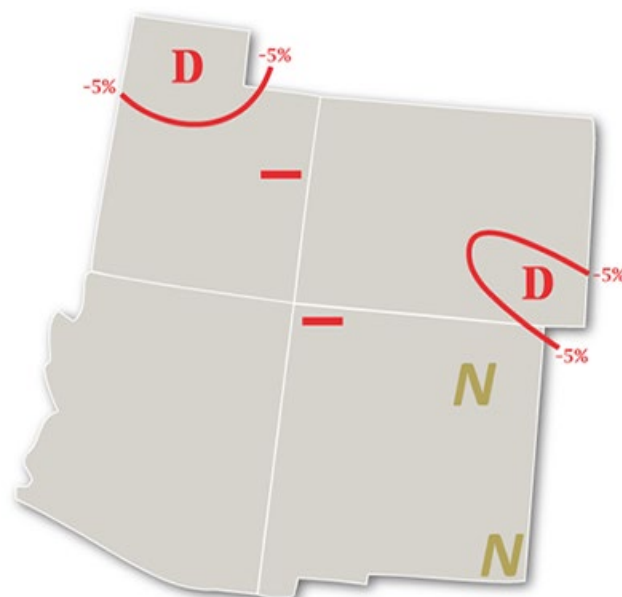


Figure PPT-5b. Experimental precipitation forecast guidance. Forecasted shifts in tercile probabilities for January to March 2012. (Source: NOAA ESRL Physical Science Division)

[Notes & Weblinks](#)

(provides explanations of graphics and additional information sources)

[RETURN TO TOP](#)

Seasonal Drought Outlook through December 2011 (Released September 15, 2011)

The U.S. Seasonal Drought Outlook (DO) projects how drought areas categorized in the U.S. Drought Monitor might change and where new drought areas might develop. The Drought Outlook released in mid-September forecasts that the area of drought in southeastern **Colorado** will improve over the next three months, but drought conditions will develop just to the west, in southwestern **Colorado** and southeastern **Utah**.

Readers interested in the next 15 days and 60 days can consult the "Looking Ahead" section of each week's Drought Monitor for near-term drought outlook conditions. The next Seasonal Drought Outlook will be issued October 20th.

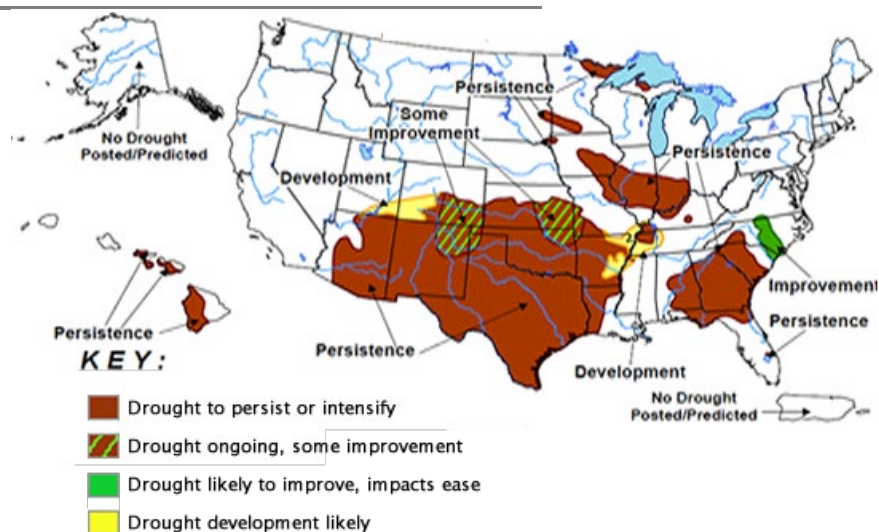


Figure DO-1. Seasonal Drought Outlook for September 15, 2011 to December 2011. (Source: NOAA Climate

Prediction Center)

[Notes & Weblinks](#)

(provides explanations of graphics and additional information sources)

[RETURN TO TOP](#)

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