Intermountain West Climate Summary

A product of
The Western Water Assessment

Issued October 2009
Vol. 5, Issue 6

The 2009 Water Year in Review

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Introduction

The water year (October 1–September 30) reflects the regional cycle of snow accumulation in the winter, peak runoff in the spring and summer, and reservoir storage and outdoor and agricultural water use in the summer and early fall. This article describes the hydrologic and climate conditions of the 2009 water year in the Intermountain West, focusing on precipitation throughout the year and the resulting evolution of drought status and streamflow and reservoir levels.

Summary

At the beginning of the 2009 water year (hereafter WY2009) in October 2008, D0 (abaveragely dry) and D1 (moderate drought) conditions, as assessed by the US Drought Monitor, existed in eastern Colorado, eastern Utah, and southwest and central Wyoming (Figure 1). During the course of WY2009, near-average and above-average precipitation fell across most of the Intermountain West region (Figure 2). While a warm May led to an early melt and runoff, spring and summer streamflows across the region were generally near-average, reflecting the precipitation level. Also, drought conditions improved from D1 and D0, to average conditions across Wyoming and eastern Colorado (Figure 3). In Utah, conditions improved or remained average for the central and northern basins. The entire three-state region was relatively free of drought (D1–D4) in mid-July, with only two small areas of D0. However, relatively minimal precipitation from July through September led to D0 and D1 conditions across most of southern Utah and western Colorado, with drying localized in the Four Corners area and the Escalante Basin in Utah (Figures 2 and 3). For most of the Intermountain West, WY2009 ended the very dry decade of the 2000s on a relatively high note.

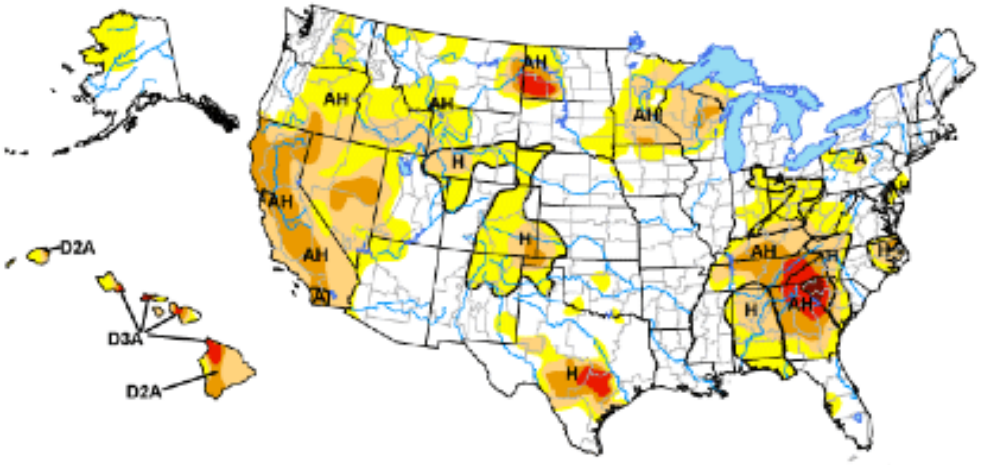

Figure 1: Drought Monitor from October 7, 2008, at the start of WY2009. Dry conditions (D0) and moderate (D1) and severe (D2) drought are shown across eastern Colorado, eastern Utah, and western and central Wyoming.

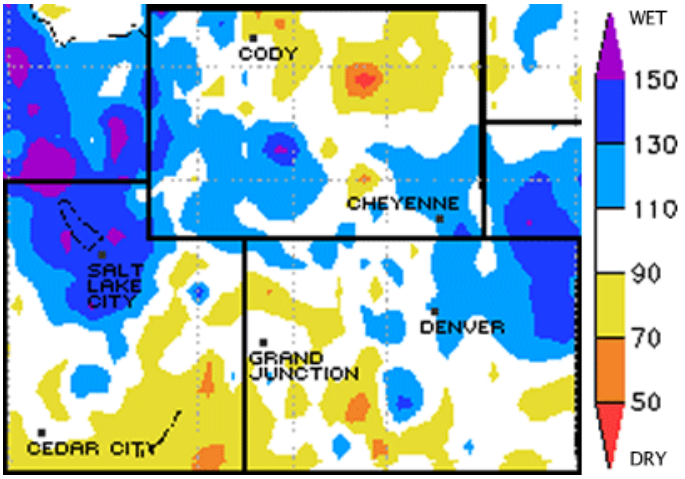

Figure 2: Percent of average precipitation for the 2009 water year (October 1–September 30). Precipitation was near or above-average (>90%) across the Intermountain West; except for southern Utah, portions of western and southern Colorado, and northern Wyoming.

October 1–April 1: Snow Accumulation Season

October–April characterized the typical snow accumulation season for the Intermountain West. From October 1 to December 1, D0 drought conditions spread through Colorado basins with the exception of southeastern Colorado, where drought conditions improved from D1 to D0. In Wyoming, little change was observed from October 1 to January 1. On January 1, D1 conditions persisted in Wyoming's Bear and Green Basins, and D0 conditions remained in western basins, extending into the North Platte River Basin. In December, above-average precipitation (>200% of average) occurred throughout southern Utah into Colorado, while in southeastern Colorado, precipitation for the month was far below-average (<60% of average). Precipitation was consistently near-average across Wyoming. Across the Upper Colorado River Basin, precipitation for December was well above-average (Figure 4).

From January through March, precipitation was near or below-average (125–75% of average) across Utah and Colorado, and above-average (>150% of average) in the North Platte River Basin in Wyoming. During this period, drought status worsened from D0 to D1 in the South Platte Basin in Colorado, while D0 and D1 conditions persisted in southern and eastern Wyoming. In Utah, D1 and D0 conditions persisted in eastern basins, and D0 conditions emerged in the Escalante, Green, and Price River Basins.

April 1 snowpack generally represents peak winter snow accumulation across the Intermountain West. NRCS reported April 1 snowpack as being near or above-average (90–109% of average) for central and northern Colorado and across most of Wyoming, and in northern Utah near Salt Lake City. Snowpack was highest (110–149% of average) in northern Wyoming and central Colorado (Figure 5). Below-average April 1 snowpack (<89% of average) was recorded across Utah, southwestern Colorado, and patches of southwestern Wyoming.

April 1–August 1: Snowmelt and Runoff Season

April–August represents the main runoff season in the Intermountain West, when warm temperatures melt the winter snowpack and fill downstream reservoirs. In April, consistent storm patterns brought heavy snowfall throughout the Intermountain West, improving drought conditions. The northern half of Colorado, most of Wyoming, and north-central mountains in Utah experienced over 120% of average precipitation during April. As a result, drought conditions diminished throughout Wyoming and pockets of northeastern Colorado by May 1. D0 conditions persisted in the southwest corner and eastern basins of Colorado, southwest Wyoming, and in the southern and eastern basins near the Utah-Colorado-Wyoming junction. This was caused by near to below-average precipitation throughout these areas. D1 conditions were localized in southeast Colorado.

May brought nearly uninterrupted warm and dry conditions throughout the Intermountain West, causing an early meltout of mountain snowpack in many basins, especially in southern Utah and

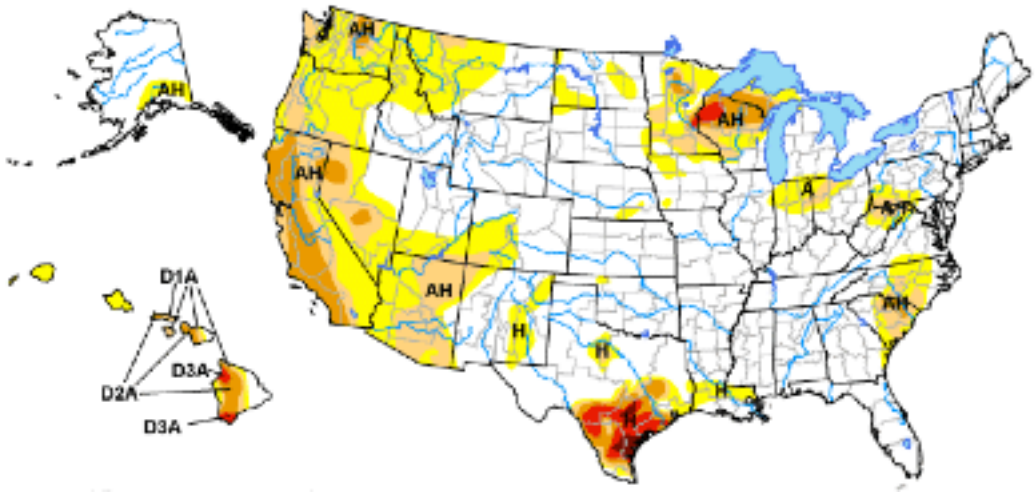

Figure 3: Drought Monitor from September 29, 2009, at the end of WY2009. Dry conditions and drought have been relieved across Wyoming, eastern Colorado and eastern Wyoming. D0 and D1 conditions re-emerged in western Colorado and southern Utah.

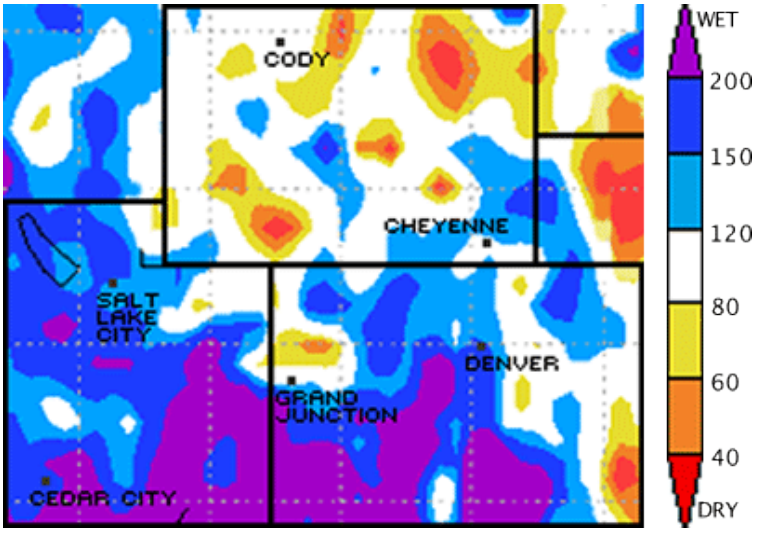

Figure 4: Percent of average precipitation for December 2008 for CO, UT, and WY. Several storms generated above-average precipitation across the Upper Colorado River Basin in Utah and western Colorado, with more mixed results to the north and

southwestern Colorado. Precipitation totals were below-average across Utah; the exceptions include the southeast, all basins in Wyoming, and most of Colorado. By June 1, basin snowpacks in Colorado were 50–55% of average in the North Platte, South Platte, and Arkansas Basins. Southern basins including the Animas, Dolores, San Miguel, Uncompahgre, and Rio Grande experienced complete meltout by June 1. In Wyoming, snowpacks in northern and western basins were not depleted as fast as those to the south due to near-average temperatures in May. SWE levels in Wyoming ranged between 70–80% of average in drainages in the Upper Yellowstone, Madison, and Northwest Basins, 50–65% in the Lower Green, Laramie, Upper and Lower North Platte, and Wind, and almost complete or complete meltout in the Belle Fourche and Upper Bear Basins. Across Utah, state snowpack levels on June 1 were well below-average, with 15–26% of average in northern basins and all southern basins reporting complete meltout.

Rapidly diminishing snowpacks led to above-average regional streamflows in May, with USGS streamflow gauges in western Colorado and a few in northern Utah reported much above-average (>90th percentile) flows. Remaining streamflow gauges in Utah and eastern Wyoming were in the near-average category (25th–75th percentile). The relative conservation of May snowpacks in Wyoming was reflected by below-average streamflows in May.

June was an unusually wet and cool month across the Intermountain West, characterized by frequent, small precipitation events, with monthly average precipitation exceeding 200% of average across Wyoming, northern Utah, and northern Colorado (Figure 6). Accumulated precipitation for the Upper Colorado River Basin was 215% of average in June. Temperatures ranged from near-average to 4°F below-average for the Intermountain West during June helping slow snowmelt in high-elevation areas. The wet and cool conditions helped diminish areas of drought, and by end of June, the Drought Monitor reported no areas in the Intermountain West within the D1–D4 drought classification for the first time since 2001 (Figure 7). However, small pockets of D0 conditions persisted in southeast Colorado and southwest Utah.

The cool and wet conditions in June also augmented runoff and yielded better than expected streamflow volumes for many basins in the Intermountain West, relative to April-July streamflow forecasts. USGS reported July 1 streamflow volumes in the near-average category (25th–75th percentile) across most of the Intermountain West, contrary to below-average streamflow forecasts. A number of basins in the region experienced a second runoff peak in July. In Wyoming, streamflow volumes were near or below-average overall, but wet conditions in June helped boost streamflow volumes in southern basins. In Colorado, end-of-June overall reservoir levels were at their highest point since spring 2000, with every basin above-average. In Wyoming, total storage was above-average at the end of June in most basins, except for the Belle Fourche and Cheyenne Basins, and the North Platte Basin. In Utah, statewide storage at the end of June was well ahead of last year at this time, with all basins except the Bear River and Sevier storing at least 75% of capacity. The US Bureau of Reclamation reported that unregulated inflow into Lake Powell during June was 2.71 million acre-feet (maf) which was 88% of average, but exceeded the forecasted volume by 0.41 maf.

In July, the precipitation pattern across the region was split by the Continental Divide, with eastern Colorado and eastern Wyoming continuing to enjoy wetter-than-average conditions, but drier-than-average conditions in western Colorado, western Wyoming, and almost all of Utah. By the end of July, streamflow volumes across the region dropped rapidly to typical late-summer baseflow levels (or below those levels, particularly in southwestern Colorado).

August–September 30: Base streamflows and peak reservoir levels

The August 1 Drought Monitor showed average conditions prevailing across the region. However, warm temperatures coupled with below-average precipitation in August and September caused D0 conditions to emerge in southwestern Colorado extending into the Gunnison and Upper Arkansas Basins, and in southern Utah, with D2 conditions localized around the Four Corners area. August was

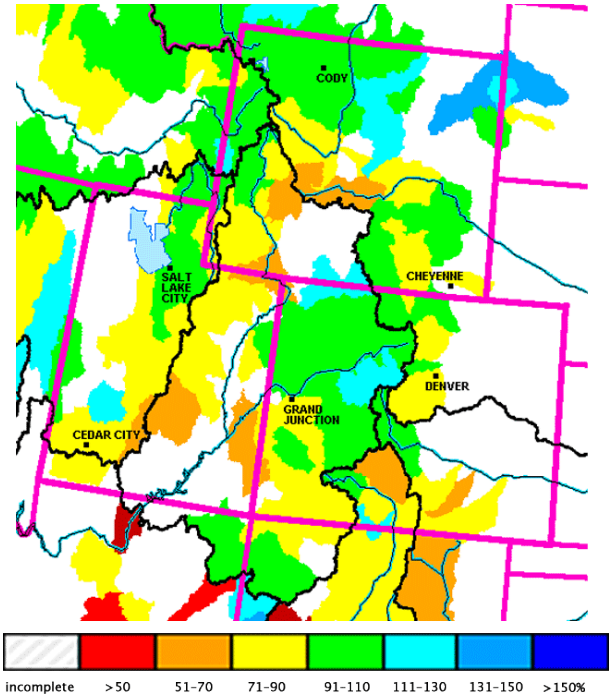

Figure 5: April 1 percent of average snowpack for the West. Snowpack was highest (110-149% of average) in northern Wyoming and central Colorado. Utah snowpack was generally below-average.

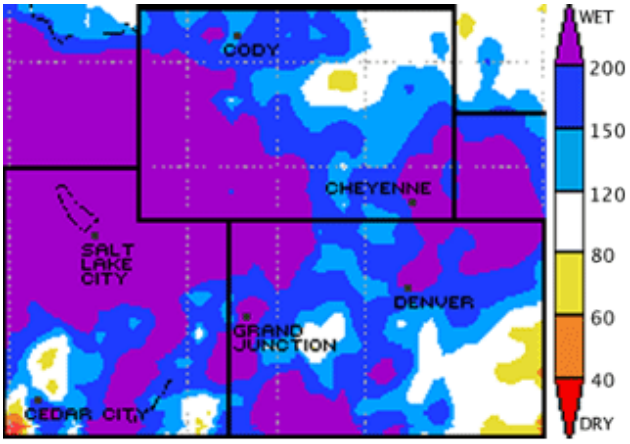

Figure 6: Percent of average precipitation for June 2009. Above-average precipitation (>200% of average) across most of the Intermountain West improved conditions and brought these areas out of drought status by the end of June.

generally drier-than-average across the region, except for the northern half of Wyoming, and September was likewise mostly warm and dry, with the exception of eastern and southern Colorado. In late September, a low-pressure system brought below-average temperatures and significant precipitation across Colorado.

Water Year 2010 begins

In the first three weeks of October, cool and wet conditions across Wyoming and eastern and central Colorado have led to near- and above-average snowpacks for this time of year (see Current Conditions in the October 2009 IWCS). However, D2 drought conditions have emerged in the Four Corners region because of decreased precipitation and increased temperatures. While snowpack conditions in October in the region have historically had little relationship to the end-of-season snowpack, adequate fall precipitation does tend to fill pore spaces in the soil and facilitate the next spring's conversion of snowpack to runoff. Precipitatin and temperature in coming months will provide further insights into WY2010 conditions.

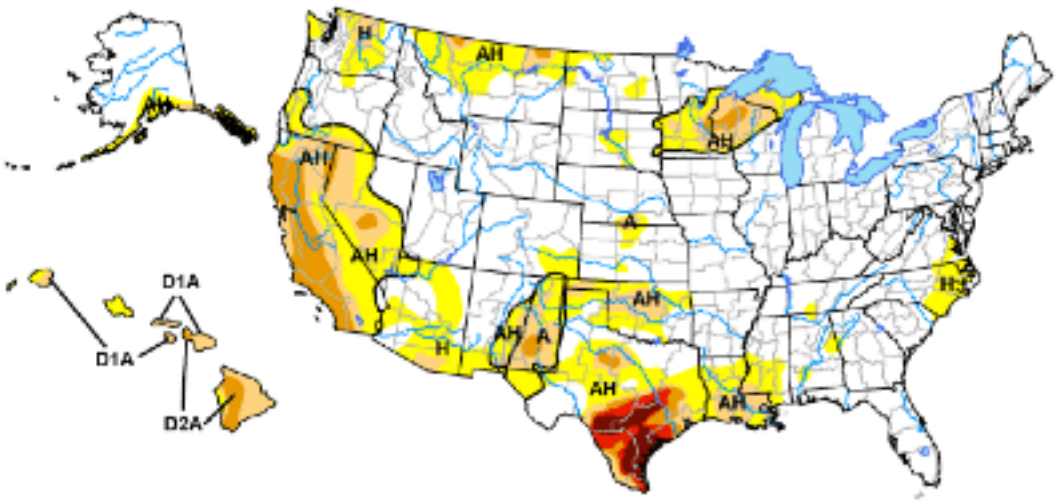

Figure 7: US Drought Monitor from end of June 2009. Above-average precipitation during April and June brought widespread drought relief to the Intermountain West. By the end of June, no basins were reporting D1–D4 drought classification for the first time since 2001.