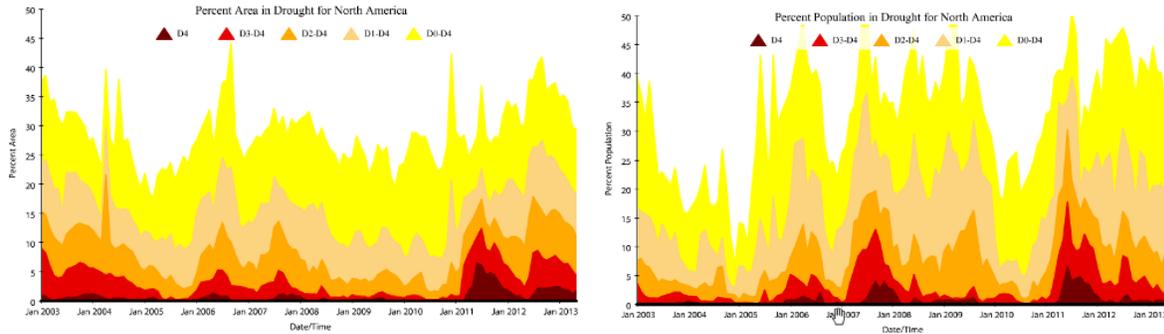


## North American Drought Monitor - June 2013

At the end of June 2013, moderate to exceptional drought (D1-D4) affected approximately 18.9% of the area and 17.4% of the population of North America. These percentages are an increase of 0.5% for area and a decrease of 1.4% for population compared to the values for the end of May.



**CANADA:** As in May the extent and severity of drought across Canada remained low for the month of June with few occurrences of abnormally dry (D0) areas throughout the country. The driest areas remained in Western Canada, mostly in the northern boreal forested region and in some small agricultural regions.

In June, temperatures were warmer than normal throughout northern British Columbia and the Prairie Provinces, while parts of Ontario and Quebec were below normal. All other regions were near normal. Monthly precipitation was above average throughout the Prairie Provinces; particularly in southern Alberta that led to widespread flooding and significant infrastructure damage. Rainfall was also above normal in southern Ontario and on the east coast. Western British Columbia and areas through central Quebec and into New Brunswick were below normal.

Low rainfall and higher temperatures increased the Abnormally Dry (D0) areas across the northern boreal forest region in Western Canada. Since April 1, precipitation in this region has been 40-60 percent of normal. Forest fire activity and risk remained high as a result. Dry (D0) areas also occurred in east-central Alberta where 40-60 mm less than normal rain fell over the past three months. A small D0 area emerged in southeast Saskatchewan where rainfall has been below normal over the past two months. Agricultural impacts remained minimal.

Abnormally Dry (D0) areas continued in British Columbia where rainfall remained below 60 percent of normal since April 1. Coastal BC, including the Queen Charlotte Islands, interior regions east of the Islands, and the northern portion of Vancouver Island remained classified D0. Impacts to date were minimal; however the regions continue to be monitored closely.

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- B.C. Ministry of Forests, Lands, and Natural Resource Operations – River Forecast Centre
- B.C. Ministry of Forests & Range, Wildfire Management Branch
- B.C. Ministry of Agriculture
- Manitoba Agriculture, Food and Rural Initiatives
- Manitoba Water Stewardship
- Nova Scotia Department of Agriculture
- New Brunswick Ministry of Agriculture, Aquaculture, and Fisheries
- New Brunswick River Watch
- Ontario Ministry of Natural Resources – Surface Water Monitoring Centre
- Ontario Ministry of Natural Resources – Aviation, Forest Fire and Emergency Services
- Ontario Ministry of Agriculture, Food, and Rural Affairs
- Ontario Ministry of Environment
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- La Financière agricole (Québec)
- Saskatchewan Ministry of Agriculture
- Saskatchewan Water Security Agency
- Saskatchewan Ministry of Environment Wildfire Management

**UNITED STATES:** An unusually active jet stream for June sent weather systems propagating across much of the country, while high pressure ridging dominated over the Southwest. Weather systems moving in the jet stream flow moderated temperatures in the eastern U.S. and tapped Gulf of Mexico and Atlantic moisture to bring above-normal precipitation, especially to the Upper Midwest and along the East Coast, improving drought conditions in those areas. But the month ended up hot and dry beneath the ridge in the West, especially for the Southwest and Alaska where drought expanded. By the end of the month, the core drought areas in the U.S. included:

- a large area of moderate (D1) to severe (D2) drought, including spots of extreme (D3) to exceptional (D4) drought, stretching from the West into the Central and Southern Plains, with a large area of intense extreme to exceptional drought lingering from the Southwest to the Southern and Central Plains states;
- Hawaii, where moderate to extreme drought largely persisted; and
- Alaska, where moderate drought was expanding.

The lack of rain in the West and Alaska expanded the national (all of the U.S.) drought footprint from 37.2 percent in moderate to exceptional drought last month to 39.3 percent at the end of June, although the contiguous U.S. drought footprint remained about the same at 44.1 percent (per U.S. Drought Monitor statistics). According to the Palmer Drought Index, which goes back to the beginning of the 20th century, 39.2 percent of the contiguous U.S. was in moderate to extreme drought at the end of June, an increase of about 1 percent compared to last month.

**Historical Perspective:** According to preliminary information provided by the NOAA National Climatic Data Center (NCDC), the contiguous U.S. experienced its 15th warmest and 13th wettest June in the 119-year record (since 1895). The Nation's average temperature of 70.4°F (21.3°C) was 2.0°F (1.1°C) above the 1901-2000 mean, while the nationally-averaged precipitation of 3.43 inches (86.9 mm) was 0.54 inch (13.7 mm) above

the long-term mean. The regional temperature patterns were characteristic of the patterns expected from an atmospheric circulation consisting of a warm, dry ridge in the west and a cool, wet trough in the east. Region temperatures were above normal for the Southwest and below normal in the north central parts of the country, with a mixture of anomalies elsewhere. Precipitation was below normal in the Southwest to Central and Southern Plains, and above normal in the East, much of the Ohio Valley to Great Lakes, and parts of the Pacific Northwest.

Four states (Arizona, Colorado, Utah, and Wyoming) had a top ten dry June with Utah turning in the driest June in the 1895-2013 record. Four other states in the West and Central Plains ranked in the driest third of the historical record. Dryness for the last three months was centered in the West to Southern Plains, where nine states ranked in the driest third of the historical record — two of which (Arizona [fifth driest] and New Mexico [sixth driest]) had a top ten driest April-June. At the six-month time scale, dryness was widespread across the West while wet conditions shifted to the Midwest and Southeast. January-June 2013 ranked in the top ten driest category for five states, including California which had the driest January-June on record. Five other states in the West and Southern Plains ranked in the driest third of the historical record. By contrast, four states in the Midwest (Iowa, Illinois, Michigan, and Wisconsin) had the wettest January-June in the 119-year record. The last twelve months were the second driest July-June on record for New Mexico, third driest for Wyoming, and ranked in the top ten driest category for three other states (Nebraska [fourth driest], Colorado [seventh driest], and California [seventh driest]). An additional eight states in the West and Plains ranked in the driest third of the historical record.

The Palmer Hydrological Drought Index (PHDI) was approaching record low values for some climate divisions in the West. For example, the June 2013 PHDI values for the Central Highlands (climate division 6) and Northern Mountains (division 2) in New Mexico were nearly as severe as the worst values reached just last year and in 2011; the June 2013 value in the Arkansas Drainage Basin (climate division 1) in southeastern Colorado was approaching the worst value reached last year; and the June 2013 value in the Upper Platte Basin (climate division 10) of Wyoming was near the worst value reached in 2006.

**Agricultural and Hydrological Highlights:** Integrated satellite and ground observations of vegetation condition (VegDRI) and modeled vegetation condition (Soil Water Index, Water Requirement Satisfaction Index) indicated widespread stress on vegetation across the West, especially the Southwest. The Primary Hard Red Winter Wheat agricultural belt generally received below-normal precipitation during June 2013, with the month ranking as the 41st driest and 27th warmest June in the 1895-2013 record, regionwide. Since the start of the growing season (October-June), the region ranked 24th driest and 53rd warmest. The Primary Corn and Soybean agricultural belt was drier than normal in the western sections but wet in the east this month. For the region as a whole, June 2013 ranked as the 21st wettest and 54th coolest June in the 1895-2013 record. For the growing season thus far (March-June), the region ranked third wettest and tenth coolest. But when just the last three months are examined, April-June 2013 ranks as the wettest and 30th coolest such three-month period.

According to the U.S. Department of Agriculture (USDA), as of July 2, 48% of winter wheat, 45% of cattle, 31% of hay, 17% of corn, and 8% of soybeans were in drought. Except for winter wheat, these percentages are less than the corresponding percentages from a month ago. July 1 USDA statistics revealed that 42% of the U.S. winter wheat crop was rated in poor to very poor condition, with statewide percentages as high as 75% in Texas, 72% in Colorado, 55% in South Dakota, 53% in Oklahoma, and 50% in Nebraska. Less than half (43%) of the nation's winter wheat crop has been harvested, behind the 5-year average of 52% for this time of year. For other crops, 8% of the nation's corn and 7% of soybeans were in poor to very poor condition. June 30 statistics reveal 25% of the nation's pasture and rangeland rated in poor to very poor condition, about the same as last month, with statewide values as high as 98% in California, 96% in New Mexico, 86% in Arizona, 71% in Colorado, and 60% in Nevada. The statewide percentages were above average for this time of year from Texas to Nebraska, from Kansas to Washington, and from Oklahoma to California.

The lack of rain and depletion of source meltwater (from the mountain snowpack) were reflected in low streamflows for many western basins. Monthly streamflow levels for June, monitored by the U.S. Geological Survey, were much below normal (in the lowest tenth percentile) for some basins in the West and Central to Southern Plains. End-of-June USDA statewide summaries revealed near average reservoir storage in Montana but below average storage in most other western states.

**MEXICO:** In June, two cyclonic systems brought significant rain that helped to relieve drought conditions in the Yucatan Peninsula and southern Mexico. In its first stage as disturbance and tropical depression (from 3 to June 4) Tropical storm Andrea, brought rain to Mexico's Caribbean coast which decreased the abnormally dry (D0) areas in the northeast of the Yucatan Peninsula. The storm then tracked to the southeast United States. By mid-month, tropical storm Barry (active from 17 to 20 June), left significant rainfall on its path from the border between Tabasco and Chiapas to northern Veracruz; as a result of all that moisture, these regions were also removed from the D0 category. On its final stage, Barry left above normal precipitation in northern Hidalgo and Puebla, thus these areas also recovered. A third system was Hurricane Cosme, which brought much moisture to the Pacific coast of the country and widely reduced the drought classifications from D2 (moderate drought) to D0. Other incoming rainfall in northern regions of the country was related to a trough and a cold front.

Overall, the rain received decreased the nationwide coverage of drought or dryness. The areas marked from D1 to D4 decreased 3.9% compared to last month, now at 20%; from D0 to D4 decreased 8.9%. However, the worst categories of drought remained in northern regions. Northern Tamaulipas is still experiencing all drought categories (D1-D4). On June 14, heavy rains associated with a trough occurred in Piedras Negras, Coahuila, where up to 495 mm were reported in just twenty four hours; something unprecedented in the last five years. This rain improved drought conditions in the region and left much of that state free of drought by the end of the month.

Nationwide, the monthly rainfall of 103.2 mm (40.6 in) was only 1% above June's long-term mean. The statewide rainfall classification for June placed five states in the top ten wettest: this included Campeche and Yucatan (9<sup>th</sup>), Baja California (7<sup>th</sup>), Baja California Sur and Morelos (4<sup>th</sup>). Conversely the states with less precipitation received were Durango, Oaxaca and San Luis Potosi and were classified between the thirteenth and the tenth driest. For the past three months (April to June) Baja California Sur (9<sup>th</sup>), Campeche and Chiapas (8<sup>th</sup>) and Morelos (3<sup>rd</sup>) were the highest classified states; but Oaxaca (13<sup>th</sup>), Durango (12<sup>th</sup>) and San Luis Potosi (10<sup>th</sup>) were in the driest classification. From January to June (6-month), only Campeche (5<sup>th</sup>) and Morelos (3<sup>rd</sup>) placed in the top ten wettest. The dryness persisted for Oaxaca, San Luis Potosi and Durango, placing them between the sixth and the eighth driest. From July last year to June (12-month), Baja California (8<sup>th</sup>) was the only one in the top ten wettest, but Jalisco (8<sup>th</sup>), Hidalgo and Tabasco (7<sup>th</sup>) and Oaxaca (4<sup>th</sup>) were in the top ten driest.

The nationwide mean temperature of 26.8 °C (80.2 °F) was 3.0 °C above the 1971-2000 normal and ranked as the seventh warmest June since 1971. At least six states were classified in the top ten warmest; State of Mexico and Aguascalientes (6<sup>th</sup>), Tlaxcala and Sinaloa (5<sup>th</sup>), and Puebla and Yucatan recorded their second warmest June since 1971. Regarding the coldest states, Baja California and Morelos (7<sup>th</sup>), Baja California Sur and Tamaulipas (6<sup>th</sup>), and San Luis Potosí had their second coldest June. Mean temperature calculations are based on statewide records since 1971.

The Information System for Agri-Food and Fishing (SIAP) reported the onset of the rainy season in most of the country except for the northwest. Rain-fed agriculture, where crops depend only on rain for water supply, has sown 85% of the crop scheduled nationally; estimated at 11.86 million hectares (29.3 million acre). The rain of this summer brought a positive seeding balance with respect to the previous year: 4% more land seeded to corn grain, 6% for bean and 10% in forage. However, the drought in northern Tamaulipas left a deficit of 5% less land planted to grain sorghum.

According to reports from the National Forestry Commission (CONAFOR), from January 1 to June 27 about 10,208 fires were reported; higher than the 6,859 reported last year. At least 332,188 hectares were burned, 72% of which was reported in Jalisco, Oaxaca, Guerrero, Quintana Roo, Chiapas, Durango, Sonora, Baja California Sur, Michoacán and Chihuahua. Of those Chihuahua, Durango and Sonora were most affected by dryness or drought.