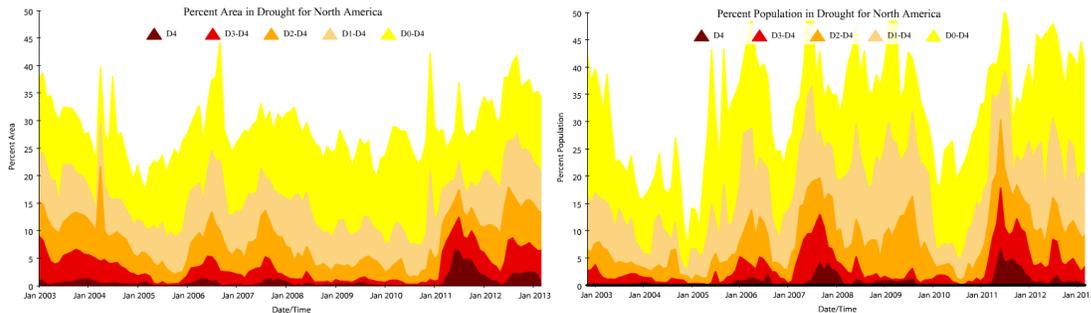


North American Drought Monitor - March 2013

At the end of March 2013, moderate to exceptional drought (D1-D4) affected approximately 20.6% of the area and 20.5% of the population of North America. These percentages are a decrease of 1.1% for area and 0.1% for population compared to the values for the end of February.



CANADA: The extent and severity of drought remained low across Canada at the end of March. Most concern for continued dryness was in the Thunder Bay region of northwest Ontario and in northwest British Columbia. Abnormally dry areas remained in southwest Ontario, which is still recovering from last year's severe drought. Isolated areas of Alberta and southeast British Columbia were also identified.

March brought colder than normal temperatures to the Prairie Provinces, while regions from Quebec eastward were warmer than normal. The frigid conditions kept winter lingering in the west, and prevented any thawing and runoff. As a result flooding was not expected until later in April, allowing more time for preparations in Saskatchewan and Manitoba. Temperatures were near normal in Ontario.

Moderate drought (D1) remained in the Thunder Bay area on the north shore of Lake Superior. Precipitation there has consistently remained below 50 percent of normal since late 2012. The region will be monitored closely for potential impact of spring precipitation. A small area in southwest Ontario remained classified D0 (abnormally dry). Snow accumulation was negligible all winter for most of the region and especially so in this narrow band bordering Georgian Bay. With spring approaching, sustained average to above-average precipitation will likely further dissipate this drought area.

Great Lakes water levels continue to be down because of the 2012 drought, and will require some time to recover to normal levels. Of note Lakes Michigan and Huron remained near record low, at 26 in (660 mm) below average in March; that is only two inches (50 mm) higher than the record low set in 1964. Lake Superior was 13 in (330 mm) below average.

In Western Canada, abnormally dry (D0) conditions were noted throughout northwestern British Columbia. Winter precipitation remained less than 60 percent of normal. A small area was marked D0 in the southeast of the province where the snowpack was also below normal. In Alberta, abnormally dry conditions continued in the southwest where winter

precipitation was below normal. In the northwest Peace River region the D0 classification also remained. This area experienced moderate drought conditions during the 2012 growing season, and has not witnessed a return to normal moisture levels. Snowpack in the region is higher than normal though, so the eventual spring melt and runoff could help alleviate these dry conditions.

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- AAFC District and Regional Offices
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- B.C. Ministry of Environment – River Forecast Centre
- B.C. Ministry of Forests & Range, Wildfire Management Branch
- B.C. Ministry of Agriculture and Lands
- Environment Canada
- Manitoba Agriculture, Food and Rural Initiatives – Ag-Weather Program
- Manitoba Water Stewardship
- Natural Resources Canada – Canadian Forest Service
- Ontario Ministry of Natural Resources – Surface Water Monitoring Centre
- Ontario Ministry of Natural Resources – Aviation, Forest Fire and Emergency Services
- Saskatchewan Ministry of Agriculture
- Saskatchewan Watershed Authority
- Saskatchewan Environment Fire Management and Forest Protection Branch

UNITED STATES: During March 2013, the polar jet stream (which marks the edge of the circumpolar vortex and the boundary between the cold polar air masses to the north and the warmer sub-tropical air masses to the south) was well entrenched over the eastern United States in association with a strong negative Arctic Oscillation. This pattern reduced the occurrence of severe weather, with the preliminary tornado count below normal for the month, but funneled cold air masses into the country east of the Rockies while keeping the western U.S. generally warmer than normal. Weather systems moving in the very active jet stream flow combined with the frigid air to produce abundant snowfall, resulting in above-average national snow coverage for March. A few weather systems moved through the upper-level ridge over the western U.S., but for the month as a whole, the West averaged drier than normal. Much of the country east of the Rockies was drier than normal, but a few areas were wetter than normal and the precipitation that fell there shrank drought areas in the Midwest and Southeast. By the end of the month, the core drought areas in the U.S. included:

- a large area of moderate (D1) to exceptional (D4) drought stretching from the West, across the Northern and Southern Plains, into the Upper Midwest, with the most intense drought centered in the Plains states;
- an area of moderate to severe (D2) drought in the Southeast; and
- much of Hawaii, where moderate to extreme (D3) drought persisted.

Monthly precipitation totals exceeded five inches (127 mm) across part of Arkansas, much of the Tennessee Valley and upper Deep South, part of the Mid-Atlantic coast, and the Pacific Northwest coast. This beneficial precipitation reduced the drought area in the Midwest from 46.6% at the end of February to 33.3% at the end of March, and reduced the drought area in the Southeast from 27.3% to 19.2%. But March was especially dry

(according to the 1-month Standardized Precipitation Index [SPI]) for the West, South, lower Great Lakes to Northeast, and coastal North Carolina. Much of the Plains remained in the grip of drought, with 91.7% of the Central and Northern Plains classified as D1-D4, and drought expanding in the Southern Plains to 60.2% in D1-D4. About two-thirds (63.5%) of the West remained in D1-D4 drought. October-April is the wet season across the West. After a wet start to the season, the last three months (January-March) have been extremely dry for much of the West. The 2-month and 3-month SPI maps also show an area of dryness over the Northeast. A small area of D1 remained in the Koyukuk Basin of Alaska where the water content of the snowpack and water-year-to-date (October-present) precipitation were low. Hawaii ended the month with about 43.2% D1-D3 coverage, a slight improvement compared to last month.

March precipitation over the drought areas helped reduce the moderate-to-exceptional national (contiguous U.S.) drought footprint from 54.2% at the end of February to 52.9% at the end of March, based on the U.S. Drought Monitor. However, according to the Palmer Drought Index, which goes back to the beginning of the 20th century, 48.7% of the contiguous U.S. was in moderate to extreme drought at the end of March, an increase of about 10% 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 43rd coolest and 5th driest March on record (since 1895). The Nation's average temperature of 40.8°F (4.9°C) was 0.9°F (0.5°C) below the 1901-2000 mean, while the nationally-averaged precipitation of 1.68 inches (42.7 mm) was 0.72 inch (18.3 mm) below the long-term mean (70% of the long-term mean). Eleven states in the Ohio Valley, along the Gulf Coast, and in the Southeast had March temperatures that were among their ten coolest on record. In fact, Florida, Georgia, Alabama, South Carolina, and North Carolina had March 2013 temperatures that were cooler than January 2013. In the West, Arizona, California, and Nevada each had March temperatures ranking among their ten warmest. March 2013 ranked in the top ten driest category for two states (Louisiana and Wyoming) and 12th driest for two others (Texas and New York). Twenty-five other states ranked in their driest third of the historical record. Only one state (Minnesota) ranked in the wettest third of the historical record.

For the year-to-date (January-March 2013), the contiguous U.S. ranked 46th warmest and 29th driest. Dryness was centered in the West and Northeast, where 19 states (along with Florida) ranked in the driest third of the historical record. Six of these states (California, Idaho, Oregon, Nevada, Utah, and Wyoming) had a top ten driest January-March, with California having the driest January-March in the 1895-2013 record. Eleven states (from the Gulf of Mexico to the Great Lakes) ranked in the wettest third of the historical record, with one (Michigan) in the top ten wettest category. The last twelve months were the driest April-March on record for Nebraska and Wyoming, with four other states (Colorado, New Mexico, Kansas, and Oklahoma) ranking in the top ten driest category, and 14 other states (stretching from the west coast to Ohio Valley, plus Delaware) ranking in the driest third of the historical record for April-March.

Agricultural and Hydrological Highlights: According to the U.S. Department of Agriculture (USDA), as of April 2, 56% of winter wheat, 51% of hay, and 62% of cattle were in drought. These percentages are less than the corresponding percentages from a month ago. Georgia was an epicenter of drought but has recently improved. April 1 USDA reports indicated that only 3% of Georgia's topsoil and 10% of the subsoil moisture was short or very short (dry or very dry), compared to 38% topsoil and 48% subsoil a year ago, and 10% of the range and pasture land was in poor or very poor condition (about the same as a year ago). In Nebraska – the epicenter of the Great Plains drought – 80% of topsoil and 96% of subsoil was rated short or very short, and 49% of the wheat crop was rated poor or very poor, as of April 1. The percent topsoil/subsoil rated short or very short, and range and pasture land rated poor to very poor, for other Great Plains states include: Kansas (46%/81%, with 79% of the range and pasture poor to very poor), Colorado (50%/83%, 79%), Oklahoma (57%/84%, 66%), South Dakota (72%/87%, 71%), North Dakota (30%/45%, pastures and ranges were still dormant). Wyoming had 60% topsoil short to very short and 68% range and pasture and 42% winter wheat rated poor to very poor, and Texas had 76% topsoil, 49% wheat, and 63% range and pasture similarly rated. The Primary Hard Red Winter Wheat agricultural belt, as a whole, had the 28th driest March in the 1895-2013 record and 27th driest growing season so far (October-March)

Monthly streamflow levels for March were much below normal (in the lowest tenth percentile) for several basins in the Central and Southern Plains, Southwest, Intermountain Basin, and California, and a few basins east of the Mississippi River. April 1 snowpack was below normal across much of the West and less than 70% of normal in many California, Central and Southern Rockies, and Intermountain basins and in some Pacific Northwest basins. End-of-March reservoir storage was below average in several states in the Southwest (Arizona, Colorado, New Mexico) and Intermountain basin to Northwest (Nevada, Oregon), but near to above average in the other states. Integrated satellite and ground observations of vegetation condition (VegDRI) indicated widespread stress on vegetation across the West.

MEXICO: Nationwide, rainfall for March 2013 was the fourth driest since 1941 at 7.1 mm or 0.28 in; that was 51% below normal. Rainfall over the last month were sporadic, but the accumulated precipitation over the last three months helped with the slight recovery of regions classified as abnormally dry (D0) and moderate drought (D1). This January-March rainfall pattern helped reduce the drought area (D1-D4) by 2.3% at the end of March compared to last February. The mean temperature in March was 19.9 °C (67.8 °F), only 0.2 °C above the 1971-2010 normal. Regionally, there was a strong contrast between the warmth in northern regions (from the Baja California peninsula to Tamaulipas) and near or below normal temperatures from the central to the southeast.

Winter systems (mostly cold fronts) from November 2012 to March 2013 decreased in frequency, compared with the records since 1991. During that period only 28 cold fronts were recorded, while the average is closer to 38. This drop in cold fronts caused a scarce winter rainy season, and resulted in the eighth driest period since 1941. This moisture shortage was evident over Chiapas, Puebla and Tabasco which experienced the third driest winter, while other states located across the central and southern regions of the country also had significant deficits that resulted in increased areas of abnormal dryness. In contrast, the

states of Michoacán and Jalisco were ranked as the 17th and 20th wettest winters, respectively. That eliminated the D0 and D1 classifications.

From May to September last year, the country was free of exceptional drought (D4), but during this winter that began to change. So far this year, from January to March, a progressive increase from extreme (D3) to exceptional (D4) drought occurred; this was mainly in the northeast (northern Coahuila, Nuevo Leon and Tamaulipas) where drought intensified to the D4 category. In Tamaulipas, the deterioration from severe (D2) to exceptional (D4) drought caused the loss of 10% of the sorghum crop area; this is a serious risk because Tamaulipas is the leading producer of this grain. This year 77% of the national sorghum crop was seeded in this state alone, according to information provided by the SIAP.

Winter precipitation between Chihuahua and Coahuila over the last three months decreased drought risk and led to a slight recovery in reservoir levels. However, towards Zacatecas and San Luis Potosi the drought conditions intensified. This region was labeled with long-term impacts (L) due to the moisture deficit for more than six months. In the west Pacific coastal region from southern Guerrero to Jalisco, westerly winds combined with the subtropical jet stream provided additional moist air from the Pacific which resulted in cloudy days and orographic rainfall; that in turn led to above normal precipitation.

The Information System for Agri-Food and Fishing (SIAP) reported that the sowing of crops for autumn-winter 2013 was complete. However, only 97.5% of the total area planned was seeded, mainly due to low water storage in the main reservoirs and aquifers. The main crop seeded was corn grain (1.6 million ha or 3.9 million acre), followed by grain sorghum (920,000 ha or 2.2 million acre) and wheat (594, 000 ha or 1.4 million acre). Combined, these three grain crops accounted for approximately 74% of the total area planted. Tamaulipas, Sonora and Sinaloa accounted for 66% of that total. There was concern that livestock feed availability would be reduced over the season, which could affect beef and milk production. That could be worsened by delays to the next rainy season.