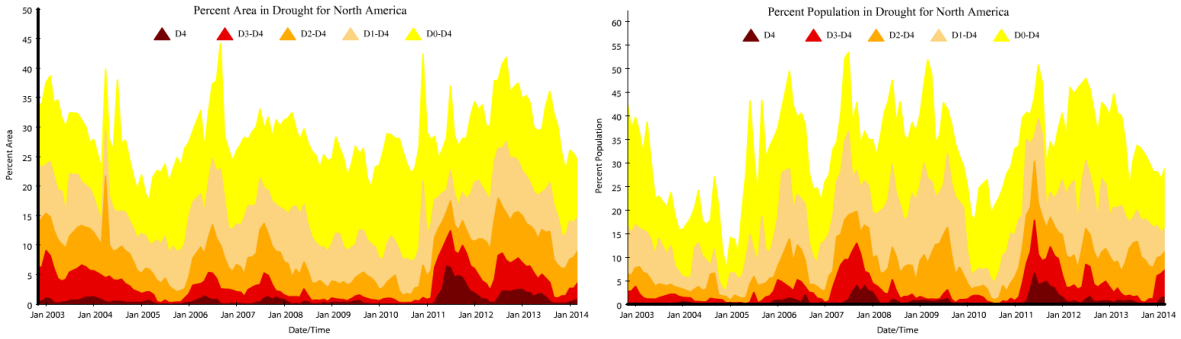
North American Drought Monitor – March 2014

At the end of March 2014, moderate to exceptional drought (D1-D4) affected approximately 14.7% of the area and 16.0% of the population of North America. These percentages are an increase of 0.9% for area and 0.7% for population compared to the values for the end of February 2014.



CANADA: The frigid Canadian winter continued into March, with monthly mean temperatures more than 5 degrees Celsius below-normal from Alberta all the way to the Atlantic region. This continued to delay snowmelt across the country, resulting in little change in drought conditions. However, between February and March, the amount and severity of drought in Canada did decrease slightly. Some new abnormally dry areas were identified in central British Columbia and northwestern Alberta, but other dry areas showed slight improvement. The areas of Moderate Drought (D1) and Severe Drought (D2) were smaller in March than in February due to increased snow accumulation.

Precipitation in March was above-average in southern British Columbia, east central Alberta, and the Atlantic region, average in northern Ontario and Quebec, and below-average throughout the Prairie region and southern Ontario. Over the winter season, the areas receiving the least precipitation were east central Alberta and southern Manitoba. As a result, an area of Moderate Drought (D1) has been acknowledged in east central Alberta, as precipitation has been below the 10th percentile since September 2013 in that area. In southern Manitoba, the area of Moderate Drought (D1) expanded slightly. The other area of concern was southern British Columbia, but this area has improved since February due to significant precipitation. There remains some Moderate Drought (D1) and a small strip of Severe Drought (D2), but provincial records are showing average to above-average snow water content in that area, which should bring further improvements upon snowmelt. High elevation snowmelt in British Columbia typically begins in the middle of April. Other than a few Abnormally Dry (D0) areas, the Central and Atlantic regions were free of drought conditions.

UNITED STATES: During the 4-week period ending April 1, drought coverage across the contiguous United States increased from 35.9 to 38.4%. The increase was due to widespread drier-than-normal conditions during March stretching from southern California to the central and southern Great Plains and the western Corn Belt. Coverage of

exceptional drought (D4) increased from 1.6 to 2.2% of the contiguous U.S. during the same 4-week period—the greatest such coverage since early-August 2013. By April 1, D4 covered nearly one-quarter (23.5%) of California and more than 8% of Oklahoma and Nevada. Meanwhile in Alaska, a lingering pocket of moderate drought (D1) was removed during March, while coverage of dryness (D0) shrunk from 12.3 to 2.5%. Similarly, Hawaii experienced general improvement in its situation, with the coverage of dryness (D0) and drought (D1 to D4) diminishing from 56.6 to 36.3% during the month. In Puerto Rico, however, coverage of abnormal dryness (D0) expanded from 23.5 to 45.0%.

Historical Perspective: According to preliminary information provided by the National Climatic Data Center, the contiguous U.S. experienced its 43rd-coldest, 41st-driest March during the 120-year period of record. The nation's average temperature of 40.5°F (4.7°C) was 1.0°F (0.6°C) below the 20th century average, while the average precipitation of 2.29 inches (58.2 mm) was about 91% of the long-term mean. Cold weather dominated the eastern half of the U.S., but warmth covered much of the West. Wintry temperatures were especially notable from the Great Lakes region into the Northeast, while spring warmth dominated California and the Desert Southwest. It was the coldest March on record in Vermont, but the ninth-warmest March in California. Meanwhile, monthly precipitation rankings ranged from top-ten dryness in Illinois, Iowa, and Kansas to top-ten wetness in Montana and Washington.

Agricultural and Hydrological Highlights: The first U.S. Department of Agriculture crop condition report of the year, valid April 6, indicated a sharp decline in winter wheat condition during the winter months. Nationally, the portion of the U.S. wheat crop rated in very poor to poor condition climbed from 8% on November 24—the last report of 2013—to 29% on April 6. At the state level, 61% of the Texas wheat was rated very poor to poor on April 6, up from 28% on November 24. Elsewhere on April 6, the portion of the wheat crop rated very poor to poor included 48% in Oklahoma, 33% in Colorado, and 27% in Kansas. Not surprisingly, USDA indicated that more than half (52%) of the winter wheat production area was in drought on April 1, up from 30% in November 2013. By April 6, USDA was also reporting significant topsoil moisture shortages in several states—75% short in Oklahoma, along with 74% in Texas, 68% in Kansas, 49% in Colorado, and 38% in Iowa.

Late-winter storms provided a slight boost in California's reservoir storage. By March 31, storage in California's 154 intrastate reservoirs was 68% of the historical average, up from 65% the previous month. However, California's water-supply prospects remained bleak, as the Sierra Nevada—a key watershed for the state's reservoirs—had only meager snow accumulations. By April 1, the average water content of the high-elevation Sierra Nevada snowpack stood a little under 10 inches (about 250 mm), just one-third of average. Farther east, statewide reservoir storage was also quite low in Nevada (a little over one-third of average) and New Mexico (just over half of average). Long-term water-supply issues also persisted on the southern Great Plains due to a drought that began in late 2010 and has lasted for 3½ years. For example, O.H. Ivie Reservoir east of San Angelo, Texas, was just 12.2% full at the end of March. Storage in O.H. Ivie Reservoir was frequently more than eight times greater than the present volume in the 1990s, but has been sharply reduced in the last 15 years by chronic drought and above-normal temperatures.

MEXICO: In March 2014, the anomalies at 500 hPa height continued positive over the northwest and near average to the south of the country. This circulation pattern provides low moisture to the peninsulas of Baja California and Yucatán, as well as to Sonora, Veracruz, Oaxaca and Tabasco. On the other hand, frontal systems brought above normal rainfalls over the slope of Gulf of Mexico States. This combination made March 2014 below normal and as the twenty-eighth wettest, with 14.3 mm (0.56 in) of rains to the national level.

Due to rainfall deficit over most of the country, an increase of 7% of drought-area was observed. The main drought areas were located in northern Baja California and northern Chihuahua, in both from abnormally dry (D0) to extreme drought (D3) at the end-of-month. Extreme drought increased slightly (0.08%) compared to the previous month, and it is only in these states. This increase was due to the poor rains in the first quarter of the year (January-March), where at the national level was observed the tenth driest; Sonora, had the ninth driest and Baja California the fifth driest since 1941. On the other hand, it was noted some recovery of dryness (D0) on the coast of Guerrero and Oaxaca such as indicated by the 3-month Standardized Precipitation Index, however the soil moisture model *Leaky Bucket* still indicates moisture deficits in these regions (below tenth percentile). The rainfall brought by frontal systems was not sufficient to relieve the abnormally dryness and moderate drought (D1) developed in southern Veracruz; the percent area (D0-D1) grew to 51% for this state. New abnormally dry areas emerged in Aguascalientes, Guanajuato, Queretaro, between Durango and Coahuila, between Nayarit and Jalisco, and Morelos.

The state rainfall classification for the last month left to Oaxaca and Baja California in the top twentieth driest and Yucatan in the top tenth driest, while Tamaulipas had its eight wettest March since 1941. Rainfalls by frontal systems helped to remove the (D0) classification in Tamaulipas, which in latest February accounted 3.9% for this state. However, drought conditions worsened in Sonora, where percent area from (D0-D2) increased up to 65.6 percent; an increment of 22.1 percent compared to the previous month.

Regarding to temperatures, at the same time that frost days frequency (minimum temperature below 0°C) reduced from central to northern country, hottest days (maximum temperature exceeding 40°C) increased in the south Mexican Pacific side. Warm temperatures increased everywhere. The March's mean temperature of 18.8 °C (65.8 °F) resulted 1.2 °C above normal (1971-2000) and ranked as the ninth warmest March since 1971. The mean temperature occurred within the mean and the upper threshold of two standard deviations without any new record reports. The only areas near or below normal temperatures were northern of Coahuila, Nuevo León and Tamaulipas, as well as a thin strip in the central regions from Michoacán to Veracruz. Ten states reported the warmest March since 1971 including Baja California, Baja California Sur, Campeche, Chiapas, Federal District, Hidalgo, Morelos, Oaxaca, Quintana Roo and Tlaxcala, but Tamaulipas had the fifth coldest March.

From January 1 to March 27 this year, ten states (Oaxaca, Michoacán, Guerrero, Mexico, Jalisco, Puebla, Tabasco, Durango, Chihuahua and Veracruz) reported the greatest area

burned by forest fires. All of these states are experienced abnormally dry conditions, with the exception of Chihuahua and Veracruz, where extreme or moderate drought is also noted. Despite the period from January-March was the tenth driest, the same period time is the fourth with less area burned according to reports since 1998 from the National Forestry Commission (CONAFOR). The foregoing is a reflection of the wet conditions observed at the end of the previous year. Eight reservoirs (four in the northeast, and four in the center of the country) reported close to 100 percent storage by March 31.