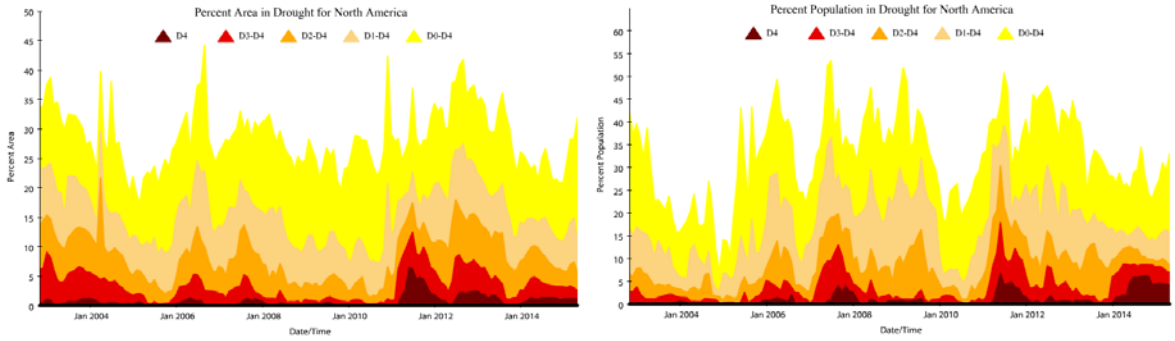
North American Drought Monitor – May 2015

At the end of May 2015, moderate to exceptional drought (D1-D4) affected approximately 11.0% of the area and 15.6% of the population of North America. These percentages are a decrease of 3.9% for area and 0.7% for population compared to the values for the end of April 2015.



CANADA: Dry conditions continued across much of Canada in May. Western Canada experienced an early and very dry spring characterized by below-normal precipitation and above-normal temperatures. This weather was, in part, caused by a split in the jet stream that resulted in a warm and dry ridge over the west. Strong winds also dominated the Prairies, which compounded the already dry conditions and further reduced soil moisture reserves. Southeastern Manitoba, Ontario and Quebec received a few significant rainfall events that improved the short-term drought concerns; however, long-term drought remained an issue. A few areas in the central Atlantic region also received below-normal precipitation this spring following a record wet and cold winter.

In British Columbia, Abnormally Dry and Moderate Drought conditions continued throughout the southern, north-central and eastern regions of the province, and Abnormally Dry conditions emerged across the north. Northern regions have received less than 40 per cent of average precipitation in the past three months and forest fire risk was high-than-normal in May. Record low winter snow pack (as low as 12 per cent of normal at some gauges in the south coast) and early freshet and peak flows (due to the warm temperatures) have increased the risk of water shortages. The provincial government has requested that the public undertake voluntary water conservation measures on Vancouver Island and Haida Gwaii and reduce water use by 20 per cent.

The past three months have been extremely dry for the most of the Prairie region resulting in a significant degradation of soil moisture and increase in drought classifications. A large patch of Abnormally Dry conditions emerged covering much of the region. Large portions of Alberta and Saskatchewan received less than 40 per cent of average precipitation in May and experienced record dry conditions. Many locations along the Alberta and Saskatchewan border received between 20 and 30 per cent of normal precipitation; some regions have received little to no precipitation since March, resulting in a Moderate or Severe Drought classification. This has negatively affected germination rates and crop

growth in the country's grain belt, and caused higher-than-normal rates of grassland fires in the south and forest fires in the north. For much of the western Prairies reports show pasture and rangeland was in poor to very poor condition. The majority of southern Manitoba remains classified as drought due to longer term water deficit, but a couple of intense rainfall events that delivered up to 90 mm of precipitation helped improve soil moisture and reduce drought concerns. Although temperatures were generally above-normal across the Prairies, minimum temperatures on a few nights dipped below zero and damaged crops; for example, frost damaged 10 per cent of the Prairie canola crop.

Abnormally Dry and Moderate Drought classifications continued in Ontario and Quebec although the situation has improved. After a record dry winter, Ontario has had a relatively dry spring, although a couple of significant rainfall events in May improved the short-term drought concerns. Significant rain on May 30 and 31 significantly improved the situation of Southern Ontario. The long-term water deficit was still present and being monitored closely. Conditions improved slightly in southeastern Quebec compared to last month. This area of the province received a significant amount of precipitation (up to 75 mm) which recharged soil moisture and water supplies. Similar to the rest of Canada, temperatures were above-normal, but nighttime temperatures dipped below zero on two occasions and caused minor crop damage.

There were a few small pockets of Abnormally Dry throughout Atlantic Canada; however, there were no concerns for drought in this region.

UNITED STATES: **Synoptic Overview:** The weather and upper-level circulation during May 2015 reflected influences by an El Niño (on precipitation in the central contiguous U.S. [CONUS]) and by a split flow over western North America. The split flow in the upper-level circulation consisted of a long-wave ridge over Alaska and western Canada, and a trough over the southwestern CONUS. The ridge brought warmer- and drier-than-normal weather to Alaska through the Pacific Northwest, while the trough was responsible for cooler- and wetter-than-normal weather over the rest of the West. Aided by an active El Niño, the western trough funneled Gulf of Mexico moisture into the Plains, fueling frequent storm systems which dumped flooding rains over Texas and Oklahoma. A long-wave ridge controlled the weather over the eastern CONUS for much of the month, resulting in a warmer- and drier-than-normal May. As a result, drought and abnormally dry conditions developed and expanded in the drier-than-normal Northeast, as well as Puerto Rico. Drought and abnormally dry conditions contracted in the Great Plains, Upper Midwest, and Central to Southern Rockies where above-normal precipitation fell. May was drier than normal across much of Alaska, with abnormally dry conditions expanding into the southeast panhandle. Beneficial rains fell over drought areas in the Hawaiian Islands, contracting drought slightly.

Drought Classifications: On balance, the national drought footprint contracted when compared to last month, plummeting from 31.3 percent of the U.S. as a whole to about 20.6 percent of the U.S. in moderate to exceptional drought, according to U.S. Drought Monitor (USDM) statistics. This is the smallest USDM national drought footprint since February 2011. According to the Palmer Drought Index, which goes back to the beginning of the

20th century, about 16.9 percent of the CONUS was in moderate to extreme drought at the end of May, a decrease of about 8.1 percent compared to last month.

By the end of May:

- moderate (D1) to severe (D2) drought covered a large part of the western U.S., with extreme (D3) to exceptional (D4) drought extending from California and the Pacific Northwest into the Intermountain Basin;
- pockets of moderate drought developed or expanded in the Northeast, Southeast, and Puerto Rico;
- pockets of moderate drought remained in parts of the Northern and Southern Plains and Upper Midwest; and
- moderate drought persisted in parts of Hawaii.

Historical Perspective: According to preliminary information provided by the NOAA National Centers for Environmental Information (NCEI), when integrated across the CONUS, May 2015 ranked as the wettest May in the 1895-2015 record, as well as the wettest month ever, due largely to record rainfall in the Plains. May 2015 was also the 48th warmest May in the 121-year period of record. The nation's average temperature of 60.8°F (16.0°C) was 0.6°F (0.3°C) above the 1901-2000 mean, while precipitation averaged 4.36 inches (110.7 mm) – 1.45 inches (36.8 mm) above average. For May, 15 states from the Great Basin to Mississippi River had precipitation totals that were much above average, with Colorado, Oklahoma, and Texas each record wet for the month. In fact, Oklahoma and Texas each had their wettest month of any month on record with precipitation totals more than twice the long-term average. The record spans 1895-2015. On the other hand, 17 states ranked in the driest third of the historical record. Six of these states ranked in the top ten driest category, including Massachusetts which had the second driest May in the 1895-2015 record, Rhode Island (third driest), New Jersey (third driest), Connecticut (fourth driest), Delaware (tenth driest), and South Carolina (tenth driest).

The precipitation anomaly patterns for the last three to six months were similar, consisting of dryness in the Far West, Northeast, Northern Plains to Midwest, and parts of the Southeast, except the year-to-date pattern of dryness was more severe. Eighteen states ranked in the driest third of the historical record for March-May, seven of which had the tenth driest, or drier, spring. Seventeen states ranked in the driest third of the historical record for January-May 2015, eight of which ranked in the top ten driest category. Fourteen states ranked in the driest third of the historical record for December 2014-May 2015, two of which ranked in the top ten driest category. Eleven of the last 15 January-May periods in California have been drier than the long-term average, with the last three being exceedingly dry.

For the last twelve months (June 2014-May 2015), eight states ranked in the driest third of the historical record. Connecticut had the eleventh driest June-May. In California, May 2015 and December and the summer months of 2014 were wetter than normal across much of the state, but the last 12 months still ranked as the 29th driest June-May in the 1895-2015 record, statewide, in spite of those wet months. Ten of the last 15 years (June-May periods)

have been much drier than normal in the state. The persistent record warmth of the last three years has combined with the extreme dryness to produce a record dry 36-month SPEI (Standardized Precipitation Evapotranspiration Index) for California.

Agricultural and Hydrological Highlights: The dryness of May 2015 was reflected in below-normal precipitation totals, few days with precipitation, and long runs of dry days, especially across parts of California, Arizona, and the Southeast. While April and May rains have improved conditions in the Plains, soils dried out in the East and continued to be parched in the Far West. Vegetation, including crops and pastures and range land, improved with the May rains in the West and Plains, but vegetation showed signs of stress in satellite observations in the East. According to May 31st reports by the U.S. Department of Agriculture (USDA), only ten percent of the nation's pasture and range land was in poor or very poor condition. As of June 2nd, only three percent of U.S. corn production was within an area experiencing drought, which is a decrease of 23 percent compared to the end of April. Two percent of soybean production was in drought (a decrease of 20 percent), 12 percent of hay acreage (a drop of 16 percent), 14 percent of cattle inventory (a drop of 22 percent), and 9 percent of winter wheat production (a drop of 35 percent).

The lack of rain in the Northeast, and lack of winter/spring snowpack across most of the West, have resulted in low streamflows in these regions, with many streams recording record low levels. Groundwater levels were low. While reservoirs recovered significantly in Texas, reservoir levels continued well below normal across most western states.

MÉXICO: The precipitation at the national level in May 2015 of 53.7 mm (2.11 in) was 13.4 mm (0.53 in) above the May's long-tern mean (40.3 mm or 1.6 in) and ranked as the ninth wettest since 1941. Above-normal precipitation occurred in the northeast, north-central as well as in Baja California. A low-pressure, four frontal systems and moisture from the Pacific caused the largest number of this rainfall.

Three frontal systems combined with the low-pressure extended from the northeast to the center of the country. These combinations have led to substantial rains on the northeast, where Tamaulipas experienced its second wettest May; while Coahuila and Nuevo Leon reached their fourth wettest; as a result moderate drought (D1) in northern Coahuila disappeared. The moisture from the Pacific combined with the low-pressure in the central regions resulting in above-normal precipitation for the Western and Central States, reducing abnormally dry regions (D0) in Guerrero and Michoacan. These two states also reached their fourth wettest May, while Morelos had their second wettest. The extreme drought (D3) in Baja California had a slight reduction thanks to rains provided by a frontal system and a low pressure; however, despite the third wettest May in Baja California drought concerning still remains as seen in long-term impacts such as low level reservoirs.

The anticyclonic circulation persisted this month again on the Yucatan Peninsula and the Gulf of Mexico's States, inhibiting precipitation and rising temperatures (the ninth driest and fifth warmest May for Yucatan) that resulted in new moderate drought (D1) areas between Yucatan and Quintana Roo and the increase of abnormally dry areas. At the national level, drought percentage from moderate to extreme (D1-D3) reduced 0.57 %

compared to the last month (from 4.66 % in April to 4.09 % in May). The main drought regions were observed in Baja California, 70.8 % of the state in drought (D1-D3), while areas of moderate drought (D1) was also observed in northern Sonora and Chihuahua, Michoacan, Guerrero, Oaxaca, Veracruz, Yucatán and Quintana Roo.

For second consecutive month, the Yucatan Peninsula had warm weather. Campeche had its fifth warmest May, while Quintana Roo and Yucatan reached the third warmest May. Other seven states were also in the top ten warmest May since 1971, with Colima (fourth warmest), Oaxaca and Chiapas (eighth warmest May). The rains in central regions favored cool temperatures to Aguascalientes (eighth coldest May) and the State of Mexico (fifth coldest). Cold air masses promoted below normal temperatures in northern Coahuila, and the coldest May in this state. The mean temperature of 23.9 °C (75 °F) was 0.6 °C above the 1971-2010 normal and ranked as the fifteenth warmest May since 1971 at the national level.

From January 1st to May 28th May this year, the National Forestry Commission (CONAFOR) reported 3,058 fires that burned 47,403.09 hectares (117,135 acre) at the national level. Comparing similar periods, this is the less area burned season by forest fires, according to records since 1998. The National Water Commission (CONAGUA) reported on June 2 below to 25% storage in eleven reservoirs; this includes Sanalona Dam in Sinaloa with 20% capacity (slightly above the 12% capacity average in the last ten years at the end-of-May). On the other hand, three main dams (Marte R. Gomez, El Cuchillo and Vicente Guerrero) in the northeast are at their maximum capacity at the end-of-May, the first time in the last ten years to reach this level.