

# Canada's Top Ten Weather Stories of 2017

## Introduction

Canadians had plenty to “weather” in 2017 as Mother Nature either froze, buried, soaked, scorched, smothered, blew or frightened us at various times throughout the year. Property damage from weather extremes cost Canadian insurers and governments millions of dollars and the economy billions. Insurers took a major hit from storms to the tune of \$1.3 billion from 113,000 claims. Sadly, severe weather hit individual Canadians with even greater financial loss. Costly flooding was big news in western Quebec, eastern Ontario and interior British Columbia but not, as feared early in the year, along the Red River in Manitoba. Wildfires numbered 66% more than normal and consumed quadruple the usual area, with British Columbia experiencing the longest and most destructive fire season in the province's history. Record hot and record dry in the West meant a year of weather woe for farmers and ranchers, while all Canadian food producers were challenged by this year's nerve-wracking weather. In the end, it turned out to be their best ally when unseasonable warmth and dryness in September and October saved what would have been a devastating harvest.

In Ontario, nature seemed to have a hate-on for Windsor as the city endured its second multi-million dollar rainstorm flooding in less than 12 months. Insurance payouts for the two storms exceeded one-quarter of a billion dollars. Also reeling from a wild weather repeat was New Brunswick, with a January ice storm reminiscent of three other major power-cutting storms that had hit the province over the past two years. In Newfoundland, Brier curlers got a taste of what a winter storm could deliver in that province as “Hurry Haaaarrrrd” was heard outside and inside the arena. In the North, the thinning and shrinking of Arctic sea ice continued to have a profound impact on people, plants and wildlife alike, with many wondering when the ice will disappear altogether. Southern residents in Ontario and Quebec longed for a repeat of the summer of 2016 but ended up with more of a teaser than a pleaser. Comparisons were made to a fickle and fitful “English” summer as daily occurrences of rain, cloud, and coolness interspersed with infrequent bouts of sun and warmth dampened the best of spirits. The only saving grace was that summer finally made an appearance, albeit in the fall.

To be fair, the news wasn't all bad! This year we were spared deadly tornadoes, plagues and hordes of mosquitoes. Everybody east of the Rockies seemed ecstatic over a balmy, soft and open winter. That the “Wet” Coast was the only region with both a colder and snowier winter only added to the delight of the majority. Further, in the year of catastrophic hurricanes in North America, tropical storms were just a nuisance in Canada. Complaints about slush, frostnip, potholes, humidity, wet weekends and poor patio weather paled in comparison to the deadly, unstoppable weather faced by some of our American neighbours.

In the end, it was the “too much” in 2017 that left its mark – too dry, too hot, too wet, too cool, but not too cold. For the 12-month period from December 2016 to November 2017, it was the eighth warmest in 70 years of record-keeping, averaging 1.4°C above normal. Almost every region and every season came out warmer than normal. The only exceptions were British Columbia in winter (-0.8°C), Atlantic Canada in spring (-0.2°) and the Great Lakes/St. Lawrence in summer (-0.1°). Despite a “double-dip” La Niña (the year began and ended with La Niña with neutral conditions in-between), the year continued milder than normal for the 21st consecutive year. As such, Canada was on trend with the rest of the world. According to the United Nation's World Meteorological Organization, 2017 was the 39th consecutive year globally with above-normal temperatures and the second warmest year since observations began 135 years ago. In addition, the past three years have all been in the top three in terms of high temperature records, but 2017 was the warmest year on record without an El Niño influence.

From a list of 100 significant weather happenings across Canada in 2017, events were rated from one to ten based on factors that included the degree to which Canada and Canadians were impacted, the extent of the area affected, economic and environmental effects, and the event's longevity as a top news story.

## Epilogue

Scientists can't say yet that the increased severity of our weather can be directly linked to a warmer world, but it would certainly be consistent with our expectations of climate change. What we do know is that Canadians are becoming more vulnerable to extreme weather. As the Top Ten Weather Stories of 2017 bear out, our communities must become more resilient – not only for what lies ahead but for the climate we've already got.

### 1. BC's Longest and Most Destructive Wildfire Season

This year, across the southern BC interior, a most remarkable weather turnabout occurred. Based on 70 years of observations dating back to 1948, the region had its wettest spring (March to May) on record with more than 40% more precipitation than normal. By contrast, June to August was the driest summer ever with less than half the normal rainfall. The result of this precipitation paradox was the longest, most disastrous wildfire season in the province's history. A growing snowpack and heavy rains in May meant forest fires weren't top of mind for BC Wildfire Service staff who were busier helping with flood relief than firefighting. But excessive spring rains combined with mild temperatures spurred vegetation growth that quickly turned into kindling in June.

The summer started off hot and dry and didn't let up, leaving conditions ripe for a long, busy and intense fire season. A persistent upper ridge of high pressure remained over the West all summer resulting in tinder-dry forest duff. Occasionally, troughs of low pressure swung through the province, bringing gusty, erratic winds, dry lightning and low humidity but no long, sustained soaking rains to quell the inevitable flames.

Aggressive wildfires forced thousands of British Columbians from their homes early in the wildfire season, but evacuations were difficult because so many roads were closed. One of the earliest and largest fires – known as the Elephant Fire – burned west of Kamloops in the Ashcroft-Cache Creek-Clinton area. Fires also threatened districts around Williams Lake. Over 13 weeks, Ashcroft recorded only a thimble-full of rain while Kamloops and Kelowna had even less. In the end, fires burned over 300 homes, mobile trailers, commercial buildings, sheds, barns and two hangars at a regional airport. Hundreds of power poles, transmission towers and transformers were also burned. Ranchers in cattle country returned to scorched fields, dead livestock, and charred fences and equipment. Fires also forced the suspension of operations at several mining and timber sites. For residents and visitors alike, closures to provincial parks and hiking trails in affected areas – along with widespread campfire bans – put a damper on summer activities. Also impacted were neighbouring jurisdictions from Vancouver Island and Washington/Oregon to Saskatchewan as smoky conditions caused widespread air quality alerts.

A province-wide state of emergency, the first in 15 years, began on July 7 and lasted until September 15 when cool, wet weather arrived for the first time in more than two months – making for the longest wildfire season on record and the most destructive in history. In total, the BC Wildfire Service reported 1,265 fires that scorched 1.2 million hectares of timber, bush and grassland (an area twice the size of Prince Edward Island), smashing the previous record for burned land set in 1958 by more than 30%. Total firefighting costs exceeded half a billion dollars and insured property losses reached close to \$130 million. As more than 50,000 residents were forced out of their homes, over 3,100 people were enlisted to fight the fires. The RCMP said 4,400 officers and civilian personnel were deployed on a rotational basis for what was one of the largest and longest emergency support operations the Mounties had ever undertaken.

### 2. Dry and Hot in the West

A massive dome of heat set the stage for record-breaking summer temperatures across the Canadian West. The blocking upper ridge redirected the jet stream farther north keeping weather systems away. As a result, southern regions between the BC Interior and the southeastern Prairies faced their driest summer in 70 years, with many areas recording less than half their normal rainfall during the April to September growing season.

## The Big Heat

In Calgary, the average temperature between May and August inclusive was 16.4°C, compared to a normal of 13.9°C, making it the warmest May to August period with records dating back to 1881. There were 14 “hot days” when the afternoon’s high hit at or above 30°C, including two at 33°C. The normal number of hot days is five. With the heat and dry, combined with western fires, Calgary and its residents were left many a day smelling like a campfire. Calgary Airport recorded at least 320 hours of smoke, surpassing the previous high of 268 hours set in 1969. As for other hot spots, Regina and Swift Current had 11 and 14 July hot days, respectively. In Medicine Hat, 34 days in July and August were hotter than 30°C, while in Kamloops the total hit 42 hot days in the same period. In British Columbia, the extreme summer heat extended into the first week of September when many stations in the province broke records for the highest afternoon temperature on record, exceeding 38°C. The scorching heat took its toll on the urban homeless with several people being treated for heat stroke. In Winnipeg, intense heat at the Canada Summer Games forced a close watch over the health of athletes and spectators. Across the West, attendance at outdoor attractions dropped, golf courses strained to keep their greens green, low river flows and heated water adversely impacted fish, and soaring temperatures pushed summer electricity use to all-time highs.

## The Big Dry

Hot days were also dry ones. Across the West no other summer, back to 1948, was so dry. The record dryness was centred on Regina and Moose Jaw and between Kamloops and Kelowna. Total rainfall at Regina from April to October was 119.3 mm compared to the previous record of 151.5 mm in 1961, with records dating back to 1886. July was especially dry with only 1.8 mm of rain, making it the driest July in 130 years. And over the 12-month period from November 2016 to the end of October 2017, only 148 mm of precipitation fell in Regina. Typically, the Queen City sees 390 mm of rain and snow annually. Moose Jaw also had its driest July on record, while Swift Current had its driest such period in over 126 years of records. For Yorkton, it was the second driest, and for Saskatoon the third driest. Not surprising, the flows in many southern rivers were down by one-third compared to the long-term average.

As well as being the warmest August on record, Kelowna Airport was also the driest. Just two-tenths of a millimetre of rain fell in the city, compared to the 32.1 mm it usually receives in August and there was no rain at all in July. Overall, a measly 7.3 mm of rain fell all summer. That broke the previous 2003 record for low rainfall of 24 mm. Victoria also set a record with a 54-day stretch of rainless weather that began on June 19 and ended on August 11. In Vancouver, total rainfall from June 20 to August 31 amounted to only 7 mm, less than 10% of normal. The previous driest July and August was 19.6 mm in 1984. In order to maintain adequate levels in streams and tributaries and to protect fish, the provincial government called for voluntary water use reductions of 30% in the Lower Fraser region and Vancouver Island.

Grain crops were also impacted by the heat and drought. In early July, wheat was shorter than knee-high and thin, with premature flowering and drooping stalks. It is to the credit of growers that they had any product at all to market. According to Statistics Canada, average spring wheat yield in Saskatchewan was down 14% compared with 2016 and down 10% in Alberta primarily due to the arid growing season. By Thanksgiving, 94% of Saskatchewan’s crops were in the bin – well ahead of the five-year average between 2012 and 2016. Livestock also suffered as watering holes and grazing land dried up, with hundreds of cattle dying from dehydration and salt poisoning. In Regina, there were a record number of water main breaks and power-metre box fires in August and September. The only positive outcome from the pervasive dry heat was a reduction in biting mosquitoes.

## 3. Spring flooding in Quebec and Ontario

At the beginning of May, flood forecasters across southern Quebec and eastern Ontario were concerned. Several major, slow-moving, weather systems had doused the region with record rainfalls in April. Over half the snowpack, loaded with water, was still to melt and the seven-day weather forecast called for more showers. The rains, intense at times, came as predicted, soaking a still partially frozen ground. Instantly, bloated rivers and streams overflowed and sewers backed-up. Several rivers in southern and western Quebec and southeastern Ontario exceeded their historic maximum discharge, and overland flows occurred everywhere from Gananoque to Gaspésie. The Quebec

government claimed the spring freshet was the worst ever recorded in the province in the past 55 years. In Montréal, April rains totalled 156.2 mm – the second wettest in 147 years of observations. May rains continued heavy and in places like Chelsea were more than double the norm. Even more significantly, both Ottawa and Montréal had their wettest springs in history – 400 mm or more with records dating back to the 1870s.

Spring flooding occurred in hundreds of communities, forcing 4,000 people from their homes. Government offices, businesses, schools, childcare centers and service centers shuttered. Dozens of towns and cities declared states of emergency including Gatineau, Laval and Montréal, which was the first time since the infamous ice storm of 1998. Up to 2,300 Canadian military personnel assisted with flood preparations and rescue relief, as more than 5,000 residences were flooded and countless roads were washed or swept away from engorged waterways and landslides. Tragically, on May 6, two people were swept away by the swollen Sainte-Anne River in Quebec's Gaspé region. According to the Insurance Bureau of Canada, flooding in April and May resulted in more than 15,750 insurance claims and \$223 million in property damages. Greater losses occurred to public infrastructure. Further, spring flooding had an adverse impact on agriculture, delaying field work by at least two weeks. With the spring's high water levels, some yacht clubs were forced to postpone their normal opening by a month, while excessive moisture hit golf courses and driving ranges hard, with some experiencing a 40% loss in green fee revenue.

## 4. BC's Cold and Snowy Winter

Winter was mild across Canada – the seventh warmest in 70 years – with only British Columbia experiencing colder-than-normal temperatures. As Canadians smirked, residents west of the Rockies struggled to cope with their second coldest winter in 25 years. Thousands of residents in the BC southwest bundled up, pushed and ploughed snow, and lined up to bag free salt distributed from local fire halls or scoop up bucket-fulls of beach sand. In early January, winter across much of British Columbia went from mild to wild and stayed that way until two weeks before spring. The Pacific coast was hit with the first of several snowfalls during the first week of December and residents cleared off their last snowfall on March 9, making for a 100-day-long snow season and one of the toughest winters in memory.

For long periods, cold continental Arctic air masses from Alaska and the Yukon combined with warmer, moist air associated with Pacific low-pressure systems to produce that ugly winter mix of cold and snow. Dense, cold air filled all the valleys, fjords and straits on its way to the Pacific coast, accelerating Arctic outflow winds. Although these outflows waned, they still created enough sub-freezing air to mix with moist Pacific storms that then moved in, producing just enough snow and freezing rain to create winter misery.

What distinguished the winter was not the amount of snow but the duration, frequency and length of snowfall and snow on the ground. For example, Victoria had 58 cm of snow, which was 18 cm above normal but far from any record. What made it seem worse was that 16 days had measurable snow and an additional 4 had flurries. That snow stayed on the ground for 22 days, which is nearly three times the norm. In addition, there were 56 days with sub-freezing temperatures – more than any such period in 25 years. In Vancouver, there was even more snow and just as many snow and frost days. In March, the city had nearly 6 cm of snow, which was the first snowfall in March in eight years. Sometimes Arctic cold brings loads of bright sunshine but not that month. It was the gloomiest on record since the meteorological service began tracking sunshine data in 1951.

Too much winter for too long had enormous impacts on the Lower Mainland and parts of Vancouver Island. Community centres became warming centres, while a supply-and-demand retail sector meant a shortage of snow tires and lack of outdoor wear. Hardware stores saw a run on snow shovels, road salt, sleds, heaters, bird seed and bird feeders. And fantastic ski conditions meant more people were buying ski and snow gear, although getting to mountain resorts was, at times, an issue. With no green on the greens, several public golf courses closed for up to two months – something not seen in 20 years. On roads and walkways, frequent bouts of freeze and thaw made for especially icy, treacherous conditions with myriad potholes. As temperatures remained below freezing for lengthy bouts, power consumption rose to unprecedented demands. To make matters worse, on February 10, BC Hydro faced the worst freezing rain storm damage in 10 years as it struggled to restore power to 361,000 clients in homes and businesses across the province. At times, bad weather shut down the main highway connecting Vancouver to the rest of the province, forcing commuters to camp out in their cars. The long winter kept landscapers and gardeners a

month behind schedule and at times heavy, sticky snow crushed blossoms and dropped shrubs. For Easterners, it offered a welcome respite from the annoying mid-winter flower counts that typically emanate from Lotusland.

## **5. Another Windsor Flood: Two Century-Plus Storms in a Year**

Less than a year after a record \$153 million flood occurred in Windsor and Essex County, another deluge with equally heavy rains and damage flooded the same area. For two days at the end of August, a slow-moving storm over Indiana pulled cargoes of moisture from the Atlantic Ocean into southwestern Ontario. Light rain began falling before noon on August 28 and continued with heavier amounts in the early evening. Storms kept re-developing overnight, and the next day intense thunderstorm bands re-occurred and remained stationary. In less than 48 hours, storm rainfall totaled 222 mm in southwest Windsor, 141 to 158 mm in Windsor-Riverside, 150 to 200 mm in Tecumseh and a record 100 mm at Windsor Airport. The nearby community of LaSalle was the hardest hit with 125 mm of rain on August 28 and another 160 mm the next day – an incredible 285 mm in 32 hours that ranks as one of the wettest moments in Canadian history. In Essex county, the town of Essex recorded 190 mm.

Flood waters filled thousands of basements to the rafters and stalled vehicles on waist-high flooded streets. A large mall closed all stores for the day, water flowed into the main floor of Windsor's largest hospital and a major car plant sprang water leaks that forced the assembly line to shut down for the day. The scene was a repeat of September 2016 when curbs were piled high with waterlogged carpets, spoiled furniture, broken appliances and sodden personal belongings. However, this year's flood came in at 6,200 claims totalling more than \$154 million. For weather events inflicting property losses across Canada in 2017, the Windsor flood was the most expensive.

## **6. Central Canada's Missing Summer**

Ontario residents knew it was going to be hard to beat last summer's hummer with 30 to 40 hot days, record-warm lake waters and a season-long bout of super delightful vacation weather. They were right, but no one could have predicted the bummer of summer that 2017 turned out to be. Going into the heart of summer, total rainfall from April to June inclusive across the Great Lakes and St. Lawrence River Basin was historically the wettest in 70 years of observations. A lot of rain over a lot of wet days led to flooded basements, engorged waterways, drowned farm fields and swollen Great Lakes water levels.

The cool, overcast weather and frequent spring showers continued unabated throughout summer. The seasons may have changed but the jet stream didn't, stubbornly hanging out south of the Great Lakes for weeks on end. As a result, mid-latitude weather systems with attendant cold fronts continued their endless march across the region two to three times per week. Every day had a persistent and frustrating suite of cool air, endless hours of rain and overcast, and an absence of sunshine or any sustained warmth. Only the odd ray of sun or an occasional warm day appeared, raising false hopes that summer had arrived. More often, spiraling, moisture-laden weather systems with embedded thunderstorms stalled north of Waterloo to Georgian Bay and into western Quebec causing prolonged and relentless bouts of cloud and rain that prevailed for most of the summer.

From dryness in 2016 to flooding in 2017, farmers again feared losing their crops to the weather. The dampness posed a serious fungus threat to winter wheat. By mid-June, corn should have sprouted, the first hay should have been cut and baled, and soybeans planted. Even the poor bees which were usually busy pollinating at that time were kept hive-bound by the cool and wet weather. The tough beginning to the season, which featured planting depths that were sticky and soggy, meant that farmers remained weeks behind until September. The rain also put a damper on sports fields, forcing recreation associations to cancel, re-schedule or move baseball and soccer games to more durable turf. The damp year also affected the construction industry, especially road-building, and, for golf courses, it was one continuous water hazard.

Rain, rain, and more rain filled the Great Lakes, with Lake Ontario reaching 75.9 metres above sea level in May – the highest the lake has been since at least 1918 when the first reliable measurements were taken. Rising waters shuttered the Toronto Islands from mid-May to the end of July, keeping the popular summer destination off limits

for both city residents and tourists for nearly three months. Flooding also threatened the possible evacuation of Toronto Island's 700 residents. At times across the Great Lakes, storm-lashed waters flooded low-lying lakeside homes, devouring beaches and taking a bite out of popular shoreline trails. Even commercial shipping was adversely affected as slower travel through the waterways meant reduced revenues.

May to August comparison at Toronto Pearson International Airport:

	<u>2017</u>	<u>2016</u>
Hot days >30°C	9	36
Hottest day (°C)	33	36
Average temperature (°C)	18.5	20.7
Total rainfall (mm)	352	167
Number of wet days	70	48
Days with rain >10 mm	12	3
Longest wet spell	8	5
Longest dry spell	7	10

## 7. A New “Storm of the Century”\*

The winter's worst storm stretched across Eastern Canada, first striking parts of Ontario on March 13 before moving eastward into Quebec and the Maritimes over the next two days. The great storm was so bad that in the United States it was given a name – Stella. Areas at the west end of Lake Ontario, from Oakville to Niagara, received in excess of 30 cm of snow with a few reports of sites with over 40 cm. The storm led to a multi-car pileup in whiteout conditions in Brockville, involving 15 transport trucks and other vehicles on Highway 401. The accident resulted in one death, while a few dozen others were sent to hospital. Officials closed the highway in both directions as twisted metal littered the road and a highly toxic acid spill polluted the air.

The storm then moved into Quebec where it dumped 50 cm of snow at over half the weather reporting stations across the south. According to the Quebec Department of Sustainable Development, Environment and Climate Change, no previous storm had eclipsed so many snowfall records. Lacolle in Montérégie and Sutton in Estrie received more than a metre of snow and instantly became all-time snow champions across the province (with the exception of Gaspésie). Winds of 70 km/h in Montréal caused blowing snow, making all forms of transportation hazardous. Hundreds of flights were grounded and many workplaces told their employees to stay home. Across the city, 200 buses were stuck in the snow at the peak of the storm while across the province, Canada Post suspended all mail delivery. In Gaspésie, where 50 cm snowfalls are common, winds reaching 175 km/h caused total whiteouts. In addition, a storm surge powered by 100 km/h winds along the St. Lawrence had tragic consequences. The monster storm took five lives and left hundreds of people stranded in a multitude of accidents across the south. On one stretch of Highway 13 in Montréal, 300 people spent the night storm-stayed in their cars – children among them – with many vehicles running out of gas in attempts to keep occupants warm.

On the Ides of March, the storm had sufficient strength to cripple parts of Atlantic Canada. It featured a messy mix of rain, snow and strong winds that caused vehicle collisions and thousands of power outages in Nova Scotia and New Brunswick. The heaviest snowfall of 30 cm occurred in northern portions of New Brunswick. The nor'easter, now a two-storm hybrid system, led to travel restrictions on the Confederation Bridge and multiple flight cancellations at several regional airports.

\*The original Storm of the Century (SOC) occurred on March 12, 1993 and is remembered for its intensity and size, impacting life from Central America to Canada. Others believe that the SOC refers to the blizzard between the Outaouais and Gaspésie that occurred between March 3 and 5, 1971.

## 8. Summer in September

Officially, fall arrived on September 22 at 16:02 EDT. The next day marked the beginning of the warmest period in 2017 across Eastern Canada – even warmer than the dog days of summer. From September 22 to 27, over a thousand heat records tumbled, with humidity and humidex values shooting up close to or above 40, which prompted a week-long stretch of heat warnings. Even more delightful, leading up to the five-day scorcher, the region had experienced two weeks of delightfully sunny, warm and rain-free weather – the most beautiful stretch of summer weather in the entire year. Of course the downside was that the kids were back in school and vacations had ended for most. Students sat in sweltering classrooms, prompting teachers in Ontario and Quebec to call for mandatory air conditioning in elementary schools. The unseasonable warmth across the eastern half of North America was attributed to a strong ridge of high pressure anchored to the south of the Great Lakes that caused a large northward bulge in the jet stream. Perhaps of importance was the earlier occurrence of four major hurricanes – Harvey, Irma, Jose and Maria – which likely shook up the atmosphere, enabling summer to arrive, albeit after the autumnal equinox. Dozens of cities across eastern Canada had their warmest September and October on record, including Ottawa, Kingston, Montréal, Québec, Fredericton, Moncton, Saint John, Charlottetown and Halifax. The long-term average temperature in Montréal across both months is typically 12.0°C, but this year the city saw a record-breaking average of 15.9°C. For some places, September 25 – with peaks between 30°C and 35°C – was the hottest day of the year and the hottest fall day on record.

Everywhere you looked there were full patios, people strolling in the sun and crowded beaches without lifeguards. The late heat wave prompted a re-opening of water parks and wading pools, while the unusual heat and humidity forced several long-distance races to be cancelled due to health concerns. The abundant dry-warm days were a blessing for farmers harvesting crops and vintners picking grapes, as the record-breaking 30°C temperatures made up for plantings that were weeks behind schedule because of a soggy spring and cooler summer. Some corn growers boasted the best corn yields ever, while in Annapolis Valley apple growers turned on overhead sprinklers. For wet, wet Ottawa it was a double bonus of warm and dry. The city hadn't had any rain for 16 straight days prompting Ottawa Fire Services to impose a ban on all open-air fires across the city. To everyone's dismay, the fall heat wave came to an end on September 27 when a cold front swept across southern Ontario and brought a much cooler air mass to the region.

## 9. Newfoundland's Brier Blast

The traditional winter months of November through February were not too trying across Newfoundland and Labrador, but when a series of powerful and impactful winter storms hit the province in March and early April the so-called soft winter turned hard. Slow-moving, often three-day blizzards racked the province with some of the toughest weather in years, featuring shrieking gales, humongous snows and freezing rain. Hurricane-force winds ravaged Newfoundland on March 1 and 2, but it was the “Brier blast” on March 11 that defined the rest of winter and spring. On the last Saturday of the Canadian curling championship, curlers, spectators and townies in St. John's faced the usual Newfoundland mix of rain, freezing rain and snow in near-zero visibility. However, it was the winds that stirred the tempest into one of the fiercest storms the province has seen in more than a decade. Wind gusts in the Avalon Peninsula peaked at a hurricane-force of 190 km/h at Bay de Verde, leaving over 70,000 residents and visitors in the dark. It was said that wind speed and storm damages exceeded those from Hurricane Igor in 2010. Winds yanked trees out of the ground, brought down traffic lights and power lines, blew away entire roofs and overturned vehicles. In some cases, strong winds ripped the second storey floor off some houses. Cars were either buried in deep snow drifts or covered with fallen branches or downed hydro wires. In total, the vicious storm cost almost \$60 million in insurance losses from 4,500 claims.

From April 1 to 4, another powerful storm packing winds of 100 km/h buried central parts of Newfoundland and the northeast coast with up to 75 cm of snow. Blowing snow and northeasterly winds gusting up to 100 km/h made for treacherous driving conditions. Sea ice packed the coastline hindering marine travel. The snow changed from freezing rain to rain and then back to snow. Later in the month, between April 20 and 23, St. John's saw 60 consecutive hours of freezing rain or freezing drizzle. In Gander, a record 238 cm of snow lay on the ground on April 5. It was the deepest snow on the ground ever recorded for any day or any year in that city (previous record

was 174 cm on March 14, 2004). Nearly 200 cm of that snow fell after the first day of spring. It's not hard to understand why there's a saying in Newfoundland and Labrador: "Give me winter anytime; its spring that kills me."

## 10. New Brunswick's Ice Storm

A long-lasting mix of rain, snow, freezing rain and ice pellets dangerously impacted portions of Quebec and Atlantic Canada during the last week of January, leading to the deaths of two people, dozens of injuries, and more than 30 individuals being sickened by carbon monoxide poisoning. At the peak of the event, wind-stressed and heavily ice-coated power lines snapped, putting close to 300,000 residents in the dark and cold. An estimated one in three New Brunswickers had their lives turned upside down when the power remained off in some communities for up to eight days; the last customers were connected 12 days after the storm began. Hydro workers were hampered with slippery heights to climb, biting winds, and falling ice and tree branches that snapped without warning. More than repairs, entire hydro grids had to be reconstructed, especially in northern Acadian communities. At the gas pumps, lines of cars stretched for kilometres – long enough to see some motorists hit empty before they made it to the station. Schools closed for up to four days and public transit was shut down. Public safety officials went door to door to check on the welfare of residents, while Canadian troops were deployed to help with the ongoing emergency response. According to the CEO of New Brunswick Power, the province endured four major storms in the last two years compared to only two high-intensity storms in the previous twenty-odd years. The government reimbursed residents close to \$7 million in estimated damages and recovery operation costs. Elsewhere, storm surges came ashore in Quebec and there was local flooding in the Gaspé. In Halifax, strong easterly wind gusts of close to 100 km/h scattered construction debris and downed power lines. Newfoundland and Labrador also experienced extensive power outages and roads were clogged with slush and water buildup.

## Regional Weather Highlights 2017

### Atlantic Canada

#### Two January nor'easters cripple Newfoundland

On January 21, snowfall accumulations of 30 cm accompanied by blustery winds up to 110 km/h put a halt to life in eastern Newfoundland. In St. John's, foul weather delayed transit and air services, closed entire malls and libraries and government offices. Less than a week later, a second slower-moving nor'easter struck the western part of the Island and Labrador, bringing heavy snow and a brief period of freezing rain followed by rain. The Avalon Peninsula got more than 50 mm of freezing rain. Wreckhouse winds reached 160 km/h.

#### Four February storms in 10 days

A vicious, quick-hitting storm, and what turned out to be the most impactful weather of the winter, blew up from the United States and pounded the Maritimes during the second week of February. The storm struck only days after the groundhog Shubenacadie Sam predicted an early spring. What made the storm especially harsh, it was the fourth in 10 days with barely a reprieve between storms. The nor'easters combined piled lots of snow driven by strong east winds in whiteout conditions for several hours. People ran out of places to put the snow. At the end of the stormy period, most major cities in the Maritimes had received more than a metre of snow. Moncton and Greenwood, NS led the way with over 120 cm. To illustrate how bad it was, yes businesses closed, but so did Tim Horton's, liquor stores, and Casino Nova Scotia.

#### Gander disappears under snow

Gander recorded a record of 238 cm of snow on the ground on April 5. Previous deepest snow on the ground on April 5 was 114 cm in 2001. Furthermore, it was a record for snow on the ground on any day or for any year beating the record of 174 cm on March 14, 2004. Nearly 200 cm of snow fell in Gander after the first day of spring.

#### New Brunswick spring flooding

The Saint John River rose above flood stage in Fredericton, Mougerville and Jemseg, however spring flooding was more inconvenience than catastrophic. Fortunately, May rains weren't coincident with snow melting three weeks earlier, otherwise flooding would have been much worse. Several businesses along the St. John River got off to a late start. Following a 36-hour non-stop downpour on May 6-7, a dozen roads were closed near Fredericton. Northeast of Saint John, one weather site recorded 155 mm of rain in two days.

### **Record wet May for Cape Breton Island**

Much of Cape Breton Island saw rainfall totals during the first nine days of May that surpassed what would normally fall in a wet month. Stretches of the famed Cabot Trail were washed out and closed for weeks. Days of steady rain left yards saturated, watercourses engorged and basements flooded. No daily record rainfall amounts occurred; it just rained persistently. Farmers were delayed two weeks in seeding. In the end, Sydney recorded 255.3 mm of rain in May – two-and-a-half times the average and making it the wettest start to summer since 1870.

### **Rock tossing storm in Acadia**

Following a hot, humid afternoon with numerous heat alerts on May 18, severe thunderstorms with strong winds and large hail struck northern New Brunswick. In mid-evening, more organized thunderstorms crossed the Acadian peninsula snapping hydro poles, felling trees and lifting concrete roof tiles. Winds estimated at 195 km/h launched rocks from the shoreline breaking windows and glass doors of cabins and mobile campers.

### **Big year for icebergs**

Before a storm with hurricane-force winds tracked across Newfoundland at the end of March, there were hardly any icebergs off the coast. The U.S. Coast Guard's International Ice Patrol reported that in a one-week period the iceberg count in North Atlantic shipping lanes went from 37 to 455 in 3 days. By the end of April, the Ice Patrol counted 673 icebergs almost as many as for the entire ice season in 2016, ending in late September. Iceberg-crowded seas near the Grand Banks forced trans-Atlantic vessels to slow or take detours. It was hazardous for shipping and oil operations but excellent for tourism. Elsewhere, persistent easterly winds pushed thick pack ice close towards shore, keeping the spring coolish and fishers shore-bound.

### **Hurricane Gert – no Harvey, Irma or Maria**

The remnants of Hurricane Gert passed well southeast of Newfoundland on August 17 clipping only the extreme southern Grand Banks with gale-force winds. Heavy rains of 50 to 100 mm fell in parts of Atlantic Canada from a non-tropical system. Long-period swells of 2 m reached south-facing coasts in Nova Scotia and Newfoundland. Hurricane Gert also generated rip currents and increased water levels in harbours and inlets. Sailors at the Chester (NS) Race Week encountered tricky waters and gusty winds.

### **Labrador's miserable summer weather**

The summer was disappointing in western Labrador with both July and August much cooler and wetter than normal. In fact, August was the wettest on record – 210 mm of rain, well in excess of the previous record of 171 mm. There were only four days in August when it didn't rain. The first freeze appeared near the end of August. And along the Québec/Labrador border, snow occurred.

### **October blows across the East**

A mighty wind storm across Northeastern North America at the end of October caused power outages and travel issues across parts of Atlantic Canada. Top wind speeds of 150 km/h occurred at Wreckhouse in Newfoundland. Marine Atlantic cancelled ferry crossings, and the Confederation Bridge was closed to high-sided vehicles. Extensive power outages occurred in Nova Scotia and in Québec where more than 210,000 customers lost power. Coastal residents faced pounding surf and higher-than-normal water levels, especially at high tide.

## **Québec**

### **Preference for snow not freezing rain**

On January 24, several hours of snow and ice pellets and 12 h of freezing rain occurred in Sherbrooke and Sorel-Tracy. Further east, it was hefty snow: 30+ cm in Trois-Rivières and Shawinigan. In Montréal, five hours of freezing

rain and ice pellets not 22 hours of snow caused havoc in the downtown, turning once dry streets and sidewalks into skating rinks. The Montréal Canadiens cancelled their morning skate. Canada Post gave letter-carriers the day off.

### **Quebec's new single-day snowfall record in Gaspésie**

In the mountainous terrain of Gaspésie National Park more than a metre of snow fell on February 17. At Gîte du Mont-April, the weather observer recorded 122 cm of snow – a new single-day record for Québec according to the provincial environment department. Wind gusts approached 90 km/h. Roads closed isolating the area for several days. Talk about being marooned in Chic-Chocs.

### **Warmest January and February on record**

Across the lower Great Lakes and St. Lawrence River it was the warmest January and February spanning 70 years of records. In Montréal, the traditional three winter months of December to February had 44 melting days compared to the average 30, although the only record warm day was February 25 when the mercury hit 13°C. Only six cold days (<-20°C) occurred all winter, compared to an average of 15.

### **Maple sap runs early**

Moderate temperatures during the last week of February allowed Québec maple syrup sappers to start the boiling and bottling about three weeks earlier than usual, ahead of last year when it was also ahead of schedule. Some producers claimed it to be the earliest sugar-off ever. The grade of syrup though fell fast when daytime highs rose well into double-digits with round-the-clock thawing. The exceptional warmth prompted officials to enforce heavy vehicle road restrictions 2 to 4 weeks earlier than the last two winters.

### **Father's Day tornadoes**

On average, six tornadoes occur each summer in Québec, so having four on the same day (June 18) was a rare occurrence. On one of the few hot/humid days of the summer, a series of tornadoes carved paths several kilometres long in the Lac St-Jean, the Mont-Laurier and Saint-Anne-du-Lac regions, as well as the Laurentides Wildlife Reserve between Québec City and the Saguenay. Two of the tornadoes exceeded winds of 180 km/h. Damage reports included downed trees, roofs torn off, and two houses obliterated. Along with the tornadoes, several non-twisting but equally powerful microbursts occurred.

### **Major hailers in July**

On July 21, a severe thunderstorm featuring large hail and strong winds tracked across central Québec. The Saguenay-Lac-Saint-Jean area was especially impacted where a trailer was damaged and several trees uprooted. At Saint-Gédéon, Saint-Bruno, Hébertville, and Larouche the ground was covered by hail 2 to 4 cm deep. Vegetable crops were shredded and several homes and vehicles were seriously damaged. Strong winds associated with a thunderstorm affected the First Nations reserve of Mashteuiash, uprooting trees and inflicting significant damage in a campground.

### **Beauce tornado in August**

Initially called a microburst but later confirmed an EF-1 tornado with winds of 150 to 175 km/h, a severe storm skirted along Route 276 in Saint-Joseph-de-Beauce, about 75 km south of Québec City on August 5th. The tempest first started as a small rain event but quickly grew stronger scattering building parts widely.

### **Québec's major microburst**

Thunderstorms criss-crossed southern Québec all day on August 22, inflicting extensive property damage. In the Montréal neighbourhood of Notre-Dame-de-Grace, a microburst – a sudden and powerful downdraft that usually occurs during severe thunderstorms – packing winds of 120 km/h uprooted and snapped numerous leafy trees, some of them century-old. Fallen trees blocked roads and felled power lines cutting hydro to more than 115,000 homes. In addition, the fierce winds tore away roofs, scattered shingles, pushed over fences and separated porches from homes. The parent storm also dropped copious amounts of rain. Late in the afternoon, an EF-1 tornado struck the town of Lachute, with winds topping 175 km/h. The twister damaged 310 buildings with 20 homes unlivable.

### Québec's summer of contrasts

Some residents whispered that they liked the cool, moist summer of 2017, however, the majority complained it wasn't even close to last year's great beer-drinking, muscle-shirt, and tank-top weather. The numbers proved their case.

In Montréal from May to August inclusive:

	2017	2016
Number of hot days at or above 30°C	3	16
Months above normal temperature	1	4
Average temperature (normal 18.3°C)	18.2	19.7
Wet days	59	45
Heavy rain days above 10 mm (normal 11)	15	7
Total rain May to August (normal 324 mm)	457	309
Longest stretch of dry days	4	11
Fully dry weekends	2	5

### Suspicious-looking tornado in October

High winds from a Colorado low raced across the lower Great Lakes and the St. Lawrence River on October 15-16 causing power outages affecting more than 30,000 Hydro-Québec customers from Outaouais to Québec City. In Mont-Laurier, at least six homes and carports were damaged, including lost roofs. On inspection, the storm had a clear tornado signature of rotation and suction.

### Pre-Halloween weather bomb

An intense fall storm packing energy and moisture from the leftovers of Tropical Storm Philippe raced up from Florida in the last days of October. The storm pounded Québec with record rains (50-100 mm) and hurricane-force winds. Floodwaters washed out more than a dozen roads in Western Québec, stranding hundreds of people and filling basements with water to the rafters. More than 210,000 Hydro-Québec customers were plunged into darkness on October 30. Some 300 linemen laboured to fix problems across the province - the hardest hit being Montérégie south of Montréal. Prime Minister Justin Trudeau had to deal with the bad weather. Flooded streets outside the PM's residence in the Gatineau Hills near Meech Lake forced security officials to use all-terrain vehicles to get him to Ottawa.

## Ontario

### Year of the pothole

Multiple freeze-thaw cycling and frequent rains occurred throughout winter making it ideal for breaking up asphalt and cement. In Ottawa, the temperature kept hopping up and down across the freezing point – more than double the usual number of freeze-thaw days. Between mid-November and mid-January, city crews in Ottawa repaired a quarter million road craters.

### Ontario-wide SAD

January sunshine totals in Kitchener-Waterloo typified persistent gloominess across Ontario during much of winter. The University of Waterloo's weather station endured a record 13 dreary days in January, including eight fog-filled days during the third week. Windsor saw 20 days in January with fog compared to the average of four. At the gloomiest time, fog blanketed the area for almost 72 consecutive hours. In Toronto, there were 58 hours of bright sunshine (long-term average is 86 hours) – the least number of hours of sunshine in 20 years.

### January-thaw through February

With the jet stream much further north than usual, warm southerly air pushed into southern Ontario during much of January and February, making it the warmest first two months on record over 70 years. At some locations, March was colder and the only month with negative temperature departures. Winter featured more rain than snow and long mild stretches. Kitchener registered 12 straight melting days in January, breaking the longest stretch of mildness since 1944. On February 17<sup>th</sup>, temperatures soared above 19°C. Windsor had only 16 days with minimum temperatures below -10°C, half the normal number to the end of February. Windsorites stripped down to shorts and

T-shirts, took up winter fishing and golfing. Butterflies began fluttering at Point Pelee and tulips sprouted in city parks in February. Swans swarmed Grand Bend and several flood watches and warnings were issued for the Grand River.

### **Short-skating season on the Rideau Canal**

The 25 skating days on the Rideau Skateway was better than last year's 18 days, but the shorter season was especially disappointing in "Canada150". The best day was February 18 when tens of thousands took advantage of the warmth during Winterlude. Unfortunately, too much sun and heat took its toll on the Skateway and the facility was closed the same day.

### **Ottawa – truly the world's snowiest nation's capital**

A pre-Valentine day Colorado low carrying moisture from the Gulf of Mexico tracked south of the lower Great Lakes. The storm dropped 30 cm of snow in Ottawa over two days. With this storm, Ottawa recorded 241 cm of snow so far this winter. Adult-high snowbanks accumulated throughout the city, making sidewalks nightmares to navigate. Two-lane streets became one-way. The city set a snowfall record on March 24 when 21.6 cm of snow fell, making it the snowiest March 24 since recordkeeping began and the snowiest spring day in 40 years. At winter's end, 311 cm of snow fell in Ottawa nearly 40% more than normal.

### **Major property losses from strong March winds**

On March 8, authorities closed both directions of the Burlington Skyway Bridge because powerful southwesterly winds of 115 km/h, more typical of fall than spring, caused a tractor-trailer to flip over. In addition, winds plucked glass panels from tall buildings in Kitchener and Hamilton. Nearly 70,000 customers lost power during the day. In London, winds fanned fires across snow-free fields. A cinder block wall collapsed killing a worker. Entire roofs were blown off and a store front was destroyed. Across the province, winds blew over signs, tore down fences and traffic lights and collapsed chimneys. Insurance claims numbered 15,000 with costs exceeding \$100 million.

### **June thunder flood**

Powerful thunderstorms raced through southwestern Ontario on June 22-23. Downburst winds and heavy rain showers with embedded thunderstorms centred on an area from Huron, Bruce to Kitchener-Waterloo to northern portions of the GTA. In and around Kitchener-Waterloo, flooding rains between 130 to 160 mm occurred prompting states of emergency. The Grand River flowed through Cambridge at levels not seen in 43 years. Roads flooded and residents were evacuated from homes, trailer parks and campgrounds. Mount Forest had the greatest rainfall with 158 mm of rain over 24 hours.

### **Canada150 celebration soaker**

The wet weather also included July 1 – the most important day of the year for it to be dry. Instead, a weather system brought to "Canada 150" celebrations the second wettest July 1 since Confederation in history. Not something partygoers in Ottawa expected or wished for. During the day 42 mm of rain fell, on a mud-oozy Parliament Hill. The all-day downpour and rain-soaked grounds kept large crowds from coming and staying. A thunderstorm rolled through around 9 p.m. delaying the spectacular fireworks finale. It continued to rain and rain all month, and culminated with a large rainfall on July 24 – 79 mm, the fourth wettest day ever in Ottawa and the wettest July day ever. By July's end, the airport had recorded a total of 249.8 mm of rain. Normal is 91.9 mm.

### **Huntsville tornadoes**

As cottagers arrived to the Muskoka for the August long weekend, strong thunderstorms developed ahead of a cold front over southern Ontario triggering three tornadoes in the Huntsville area. Winds damaged cottages and took out numerous trees. Other storms also hit Brockville downing more trees, ripping shingles off homes and cottages, and damaging docks. Rainfall amounts were in excess of 100 mm, enough to cause local flooding and road washouts.

### **Leamington and Hawkesville tornadoes**

A thunderstorm from Lower Michigan moved over Leamington spawning an EF-0 tornado inflicting significant damage to solar panels and greenhouses. Two hours later, another quickly-rotating but stronger storm passed over Hawkesville and continued south of Elmira towards St. Jacobs. This twister snapped power poles and flung debris into open fields. Six farms were damaged and farm equipment weighing up to a tonne, including a fork-lift and metal press changed locations. Miraculously, two children hid in a kennel with several dogs but all were unharmed.

### **Microburst ends September heat wave**

A severe thunderstorm powered by a cold front occurred just south of Arnprior on September 27 before tracking rapidly eastward across Ottawa. Rains fell for the first time in days and the storm ended several days of 30°C. Winds uprooted trees across the central and west side of Ottawa. Wind gusts at Britannia Yacht Club exceeded 160 km/h. Parts of a roof from a low-rise apartment were removed and winds collapsed a scaffold stranding 2 workers. A woman was killed after being struck by a tree.

### **Hurricane Nate arrives for Thanksgiving**

A weakened Hurricane Nate had enough storm rain to make for a soggy Thanksgiving weekend across southern Ontario. The highest rainfall amounts were recorded along the north shore of Lake Erie and the Niagara Peninsula, where Vineland recorded 73.5 mm, and the north shore of Lake Ontario where 50 to 60 mm of rain fell over Sunday and Thanksgiving Monday.

### **Tropical storm Philippe and more Ottawa rains**

The tail end of tropical storm Philippe merged with a low pressure system near the Carolinas late in October. The resulting storm rapidly intensified and brought rains into Eastern Canada between October 28 and 30<sup>th</sup> along with strong southerly winds. Once again, Ottawa got drenched with more than 100 mm of rain, enough to create sinkholes and flood roads. Some public schools shut down due to power outages and plumbing problems. Flooding rains forced the National Capital Commission to close more than a dozen popular trails in Gatineau Park and restricted access to Meech Lake putting in question the winter camping season.

### **Ottawa's Year-long Big Wet**

No matter which way you cut it, Ottawa was a soaker in 2017. A traffic jam of storms meant lots of rain on lots of days. Ottawa's rainpocalypse washed away all kinds of weather records in 2017 including: the wettest May and July, the wettest spring (March 1 through May 31), and most of all the wettest year on record eclipsed not on the last days of the year but before Halloween with still nine weeks to go in 2017. Total rainfall from January 1 to November 30, inclusive was 1085 mm; normal is 660 mm or 64% more than normal; previous record from January 1 to December 31 was 1001 mm in 2006. Thus 2017 was 8% more and counting than previous 12-month total record. Days with rainfall at or above 25 mm numbered 9 compared to 1 in 2016. Perhaps the most miserable stretch of wet weather was from June 15 to July 2 with 18 straight wet days, including 5 days with heavy rain amounts over 10 mm. The previous longest stretch of summer wetness was 9 days.

## **Prairie Provinces**

### **Mackenzie clipper brings cold to the Prairies**

What had been an unusually mild winter came to a sudden end in mid-January when a Mackenzie clipper pushed through the Prairies bringing extreme wind chill readings of -40 and -50. Powerful winds also ushered in widespread blowing snow and blizzard conditions to much of the south and forcing the closure of numerous highways. Surprisingly, the whiteout conditions made for the first official blizzard at Winnipeg International Airport in nine years. The Mackenzie clipper is much like its cousin – the more frequent Alberta clipper – but originating farther north and clipping along at a faster speed often with less snow.

### **Bonspiel January thaw**

On the heels of the Mackenzie clipper and raw winter cold, welcomed mild Pacific air originating north of California flooded the Prairies, breaking several afternoon records across the West. Among the record-breakers on January 19<sup>th</sup> were Moose Jaw, SK at 10.8°C, and Brooks, AB at 11.3. Puddles formed on city streets and outdoor skating rinks were under assault. It's not that unusual to have the annual "bonspiel thaw" in January, but it was long and pronounced in 2017.

### **Alberta's metre-sized snowfall**

Over a metre of snow fell in parts of extreme southwestern Alberta throughout the weekend of February 4 and 5<sup>th</sup>. Snowfall occurred for 66 consecutive hours at Lethbridge, AB fed by a continuous stream of Pacific moisture. Incredibly, up to 120 cm occurred over extreme southwestern parts of Alberta such as Waterton Park, Coleman,

Blairmore and Lethbridge. In Saskatchewan, snow totals ranged from 15 to 35 cm with the greatest amounts near Cypress Hills.

### **Nature warms hearts on Valentine's**

A westerly flow of mild Pacific air across the Prairies produced the warmest Valentine on record. Among the sites breaking records were Fort McMurray 13.6°C, Jasper 12.2°, Lethbridge 13.8°, Calgary 16.4°, and Edmonton 16.4°. In Saskatchewan, several communities smashed records not previously bested for more than 100 years. Maple Creek was highest at 18.9°C and the warmest site in Canada on Valentine's Day. The abnormal warmth and some rain worried northern communities relying on winter roads for re-supply.

### **March storm buries Churchill**

A powerful winter storm tracked northward from the Dakotas and blasted a large portion of the eastern Prairies and northwestern Ontario on March 6-7. Driving was treacherous with some routes buried in 9+ metre drifts. People were trapped in their vehicles on the Trans-Canada Highway for 18 hours. In Flin Flon, MB one official claimed he couldn't remember a day in the past 27 years when schools were closed. Conditions were especially harsh for 19 refugees crossing into Canada near the border at Emerson, MB. Even by Manitoba standards, the blizzard across the north was a wicked one. Churchill recorded 36 cm of snow. Blizzard conditions with zero visibilities persisted for 31 consecutive hours and a storm total of 74 hours (less than 400 m visibility) for four days. Wind gusts exceeded 100 km/h and wind chills dipped to -55. It was the third longest blizzard in Churchill's history. Another storm on March 20 made conditions even more desperate in Churchill where resupply trains did not arrive for three weeks. Food shelves lay bare. Snow on the ground at the end of April measured over 60 cm, but it disappeared in three weeks. The rush of melt water led to spring flooding, cutting rail service from the south and forcing residents to fly or ship in goods until an ice road could be built at the end of 2017.

### **Red River non-flood**

Heavy rains before freeze-up and above-normal snowfall in December 2016 created the potential for modest to major overland flooding in the Red River watershed. Fortunately, unseasonably mild temperatures from February onwards and scanty snowfall accelerated the spring melt and tamed the flood threat across the Red, Souris, Pembina, Roseau and Lower Assiniboine river basins. Winnipeg got only 32 cm of snow in the final 100 days of winter, but had 100 cm of snow in winter's first 50 days. However, in parts of rural Manitoba, including Peguis First Nation there was some flooding, triggered by ice jams on the Fisher River.

### **Still harvesting last year's crop**

An Easter weekend snowstorm moved slowly across the Prairies. Farmers were concerned because they still had last year's harvest to complete. Fields were too sodden to walk on, let alone to harvest or seed. It was well into May before farmers could spring seed or complete last year's harvest. More than 850,000 hectares across the West waited harvesting in spring 2017

### **Big May blow across the West**

A very potent storm crossed Alberta and Saskatchewan on May 24, inflicting more than \$63 million in insurance losses mostly in Alberta. Edmonton International Airport recorded its lowest May pressure in over 56 years. Keoma recorded a peak wind speed of 117 km/h. At the same time, 40 to 50 mm of rain occurred in central Alberta. The powerful storm caused widespread power outages, downed trees, tore shingles off roofs and damaged grain silos, barns, signs and tractor-trailers. The wind forced several construction sites to shut down in downtown Calgary. In Red Deer, it was one of the strongest wind storms the city ever experienced.

### **Summer of Saskatoon hailers**

Saskatchewan Government Insurance received about 7,000 claims from clients with damaged vehicles following a brief but intense hailstorm that targeted Saskatoon on June 2. Auto body shops were five times busier than normal as people came in to get dents the size of ping-pong balls or walnuts worked out of their vehicles. Insurance claims were worth a minimum of \$49 million. Auto claims numbered 8,657 more than a year's average in one day.

On July 10, a strong and slow-moving storm cell with heavy rainfall (50 mm) and large quarter-size hailstones centred right over Saskatoon pummeling some neighbourhoods but not others. The storm also led to power outages, flooded streets and water-filled basements.

On July 16, a cold front swept across central Saskatchewan setting off more severe thunderstorms. Dime-size to tennis ball-size hail occurred. Again Saskatoon was hard hit. Strong cloud rotation warranted a tornado warning but no twister appeared in the sky.

On July 20, a storm ripped through Strongfield southwest of Saskatoon, levelling the curling rink and scattering debris as a result of very strong straight-line winds or a “bow echo”. The next day, a line of severe thunderstorms spawned four to six tornadoes. In Manitoba, severe weather reports included: a funnel cloud in Virden, golf ball-sized hail in Roblin and wind gusts reaching 100 km/h in Sioux Valley. In Miniota, towards 9 pm, strong winds toppled two grain bins and walnut-sized hail fell.

#### **Hailers and plough winds in Red Deer**

Residents and crews in central Alberta scrambled twice, on May 24 and June 2, to deal with debris and downed trees following two vicious hail storms. The devastating wind and hail left Red Deer in a state of emergency as residents cleaned-up thousands of toppled trees, downed power lines and scattered debris. Up to 20 per cent of the city was without power at times. The second storm packed “plough” winds of 110 km/h. In nearby Innisfail, the roof blew off the town's curling rink. Residents and businesses were without power for up to 3 days on both occasions. Insurance claims totalled 4,965 at \$35 million.

On June 20, a thunderstorm formed along the foothills packing powerful straight-line winds clocked at 111 km/h in Red Deer and even stronger in Maskwacis. At the storm's peak, 1/3 of Red Deer was without power. Wind-driven debris filled the air. Over 5,000 insurance claims totalled \$35 million in property losses.

#### **Calgary Stampede weather – hot and dry except for one day**

Unlike the soggy Calgary Stampede in 2016, this year “the world's greatest show on Earth” was dry and scorching hot. Normal maximum temperatures of 22°C were eclipsed by several 30°+ highs under several heat and humidity warnings. Extra attention was paid to animals competing in the extreme heat. The only “weather day” was July 10 when a weak, non-menacing tornado touched down just north of Calgary; golf-ball size hail fell; and a one-day soaker dropped between 45 and 60 mm in Calgary. Lightning scared off the Chuck wagon Races and forced a late start to the Grandstand Show.

#### **Early July supercells in Saskatchewan**

Supercell thunderstorms with deep rotating updrafts raked parts of Saskatchewan during the first week of July. Golf ball-sized hail fell on several communities, including Prince Albert, Medstead and Spiritwood. Environment Canada also reported 80 mm of rain and nickel-sized hail in an area southeast of Davidson. On July 5, thunderstorms developed just east of Carlyle and passed over the town of Alida where a tornado touchdown and baseball-size hail damaged property.

#### **“Pudding-cup” hail and floods across central Alberta**

A storm moved through central Alberta on July 13 triggering widespread severe thunderstorms. Two tornadoes with winds less than 175 km/h struck 10 km northwest of Breton and near Athabasca. In Drayton Valley, hail the size of “pudding cups” hammered the area. Basement flooding occurred in Slave Lake following 44 mm of rain in two hours. Insurance losses totalled \$35 million.

#### **Costly July storms in Alberta Foothills**

On July 23, more severe thunderstorms developed along the Alberta foothills. Storms with strong outflow winds, lots of rain and large hailstones popped up between Edmonton and Red Deer. Insured property losses totalled \$72 million. On the last days of July, more storms struck the same area through Edson, Rocky Mountain House, Edmonton and Red Deer before tracking east into Saskatchewan. Large hailstones pelted vehicles and damaged house siding and other property to the tune of \$92 million, equally split between the two provinces.

#### **Manitoba forest fire season more active than usual**

Warm and dry weather added to an active forest fire season across Manitoba. More than twice the number of wildfires occurred burning two to three times the area than the long-term average. When smoke put residents at health risk in August, officials evacuated thousands of residents from northern Manitoba and from Pelican Narrows in northeastern Saskatchewan.

### **Winnipeg ... the best weather this summer?**

Between May and August, Winnipeg received 168 mm of rain, whereas normally it would see 296 mm. In all, there were 34 days with rain, short of the normal 47. More importantly, the weekends were remarkably dry. In July and August there were 20 days that fell on weekends or holiday Mondays and it only rained on two of those days. Whatever was planned outdoors: barbecuing, tenting, camping, cottaging, or day excursions likely happened in near-perfect weather. Further, the summer featured record-breaking low mosquito numbers. And the summer warmth continued. Winnipeg recorded its highest yearly temperature on September 12 when the mercury soared to 34.8°C, a record high for the day and the second-latest date for a summer high since 1872. Carman recorded the country's highest temperature (35.7°C) breaking its previous record by 6 degrees.

### **Forest fires in Alberta**

Despite a hot summer that left much of the province tinder dry, Alberta recorded a mere fraction of the area charred in the previous two years and less than half the area consumed over the 20-year average. Of course nothing could compare to the “fire beast” of Fort McMurray in 2016, still the most expensive weather-related disaster in Canadian history. In 2017, the two largest Alberta blazes were the stubborn Verdant Creek fire near Banff in July and the Kenow fire that swept through Waterton Lakes National Park in September. The Kenow Wildfire leapt over the continental divide and roared into Waterton National Park on September 11. Smoke and near-by fires forced closure of a highway through the Park and prompted mandatory evacuations. The fire raged for nearly 20 days closing the Park much of the time. It took an early October snowfall of 20 cm to extinguish the flames, but not before destroying 30% of Waterton Lakes National Park. In mid-October, fast-moving grassfires fuelled by strong winds gusting to 130 km/h burned through southern Alberta, and jumped highways leading to evacuations and local states of emergency. Wildfire emergencies and evacuation alerts stretched from the Crownsnest Pass in southwestern Alberta and all the way into Saskatchewan.

### **Powerful winds too strong for trains**

A mighty, quickly-moving wind storm with an accompanying cold front tracked across the Prairies on October 17-18 ripping down trees, tearing up shingles, and leaving thousands of residents without power. The system formed on the coast of British Columbia and was over Manitoba in less than 24 hours. Among the windy spots with gusts in km/h were in Alberta (Calgary 115, Edmonton 91, Waterton 141), Saskatchewan (Moose Jaw 131, Swift Current 124, Regina 119, Saskatoon 113), and Manitoba (Dauphin 102 and Portage la Prairie 93). The wind speed at Moose Jaw was a new record for the month of October. In all three provinces, winds fanned brush fires and smoke became so thick that several communities were on evacuation alert. In Alberta, winds blew over transport trucks on Highway 2 and blew two trains off the tracks. Insurance losses across the Prairies totalled almost \$100 million.

## **British Columbia**

### **2016-17 avalanche season**

Avalanche Canada in Revelstoke, BC reported that southern and western regions had above average snow depths in some areas and times. Avalanche risk rose as storms came and went and weak layers formed and were buried. In contrast, northern and eastern regions experienced a weak, shallow snowpack that evolved into a very dangerous snowpack. Not surprising, it was a winter of both natural and human-triggered avalanches. According to the Canadian Avalanche Centre, slide dangers at times measured high on the avalanche scale – an occurrence once every 35 years. There were a total of 12 avalanche fatalities during the winter season, one below the 10-year average. Seven fatalities were snowshoers, including one group of five who died on Mt. Harvey in the North Shore Mountains just north of Vancouver. Of the remainder, two were backcountry skiers, one was engaged in mechanized skiing, one was a snowmobiler and there was one workplace accident. Nine fatalities occurred in BC, two occurred in Alberta and one occurred in Quebec.

### **Damaging April wind storm**

High winds up to 80 km/h along the south coast of British Columbia led to a string of ferry cancellations in Strait of Juan de Fuca in early April. The powerful winds blew bricks off buildings and toppled trees. In Vancouver, strong winds blew over a concrete-block firewall attached to a six-storey building under construction. The storm weather also triggered a mudslide that destroyed two homes and sent two people to hospital in the interior Shuswap community of Tappen.

### **Wet and gloomy weather delays spring planting**

After a March that saw a record number of rain days in Victoria – 29 of 31 days – growers were well behind in their field work. Not surprisingly, hours of sunshine were way down – the third gloomiest March on record. On the BC Mainland, farmers also faced planting delays following such a harsh winter and soggy spring. Sweet corn got planted a month later than usual. Gardeners were playing a waiting game as tulips opened about two weeks to a month later than normal. Incredibly, some growers had to heat their greenhouses.

### **Okanagan spring flooding**

In southern and central British Columbia, copious amounts of rain double to triple the long-term average between mid-March and early May fell on top of an already deep snowpack, then came a sudden warm-up in early May. The rush of water led to mudslides, debris flows, and devastating flooding, especially along several major BC Rivers. Adding to the problems were several severe thunderstorms towards the end of May. In the Okanagan, gusty winds exacerbated lake flooding by pushing waves far inland. On May 28, water in Okanagan Lake was at flood levels not seen in 70 years. Flooding and landslides led to bridge washouts and road closures including the Trans-Canada Highway. Docks were under water and beaches were gobbled up and closed. Boaters were warned to watch for submerged trees. Two people including the fire chief of Cache Creek drowned. High streamflow advisories were also in place for northern parts of the province, including the Bulkley Valley and the Peace region.

### **Trio of October windstorms**

A series of three storms brought heavy rains and strong winds to the south coast and BC interior between October 17 and 21. The storms disrupted flights, energy delivery and transportation. As many as 145,000 people were without power during the storms, some on more than one occasion. Ferry services were disrupted at times and the Sea-to-Sky Highway experienced closures. October storms have an added concern because many trees are still leafed and fallen leaves block storm drains causing street flooding. The week's rainfall total was 87 mm and 75 mm in Victoria and Vancouver, respectively. Winds tipped at 142 km/h at Grouse Mountain in North Vancouver. Heavy snow fell in the Whistler, Columbia and the Shuswap regions.

### **Snow-vember in Vancouver/Victoria**

Snow began falling along the southwest coast of British Columbia in the first days of November. Behind the snow came record low temperatures including -11.5°C in the central Okanagan, making for the earliest ice wine harvest on record. Skiers and boarders began waxing their equipment getting ready for an early opening to the recreational snow season.

### **Rain on and off along the south coast**

November is the wettest month in Vancouver and Victoria and in 2017 it was wetter than normal, but not by much, less than 2% more in Vancouver. What stood out were the number of rain days: 27 in Vancouver, tying a record set in 1953, and 28 days in Victoria, nine more than normal, but breaking a record for number of rain days. Somewhat unusual was that in both cities it rained on 23 consecutive days from November 8 onwards and two more days on December 1 and 2. Then nature's faucet turned off with no rain for possibly 12 days in a row.

## **The North**

### **Northern ice roads later and later**

Ice roads are a vital connection between the north and south for winter re-supply. A warm November and December meant that the ice road connecting Yellowknife to Detah in the NWT opened 2 ½ weeks later than usual on January 6 instead of before Christmas. In the 1980s and early 1990s, winter roads frequently opened in late November or early December.

### **Early winter low snowfall in Northwest Territories**

Up to the end of the first week of January, Yellowknife, NT received the least amount of snowfall in 40 years – 50 cm so far this season rather than the 87 cm that would normally fall by this time. With November, December and October being the three snowiest months, there was not much time to catch up, yet it was too early to panic over low water levels or the upcoming forest-fire season. Only 21 cm of snow sat on the ground, the rest of it having either

melted, evaporated or blown away. Milder temperatures are often accompanied by more snow but this year the warm weather moved up from the dry US Southwest.

### **Arctic heat wave**

The arctic version of a heat wave swept across western Nunavut in August with record-breaking temperatures from Cambridge Bay to Pond Inlet. Some residents even dipped into the Arctic Ocean to cool off. On August 12, Bathurst Inlet set a record high temperature of 33.5°C. Cambridge Bay on the western entrance to the Northwest Passage and well above the Arctic Circle maxed at 21.6°C well above the average high of 10°C. About 15 kids jumped into the Arctic Ocean at the town dock to cool off. Other children played in the beach sand.

### **Arctic sea ice going, going...**

The Canadian Ice Service reported that there was an early clearing of ice in the western portion of the Northwest Passage by 2 or 3 weeks. When the Canadian Arctic opened up for shipping in the beginning of July, the western Arctic waterway had a record lack of ice. The low amounts of sea ice carried through to early August when there typically is little ice in the Canadian territory.

Using satellite readings going back to 1979, the US National Snow and Ice Data Center reported that Arctic sea ice extent on March 4<sup>th</sup> set a record for the smallest winter amount, but a stormy summer and a cloudy and cool August in the central Arctic inhibited sea ice loss. As expected, by mid-September ice shrank to its smallest area of the season: 4.64 million square km – well below the 30-year average but more than the record low five years ago. Over the 38-year satellite observing period, thick four-year old sea ice is almost non-existent now going from 2 million square km in the beginning to 150,500 km in 2017.

### **Fierce September gales**

Two days of powerful winds on September 10<sup>th</sup> and 11<sup>th</sup> at Rankin Inlet, NU peeled away part of a roof that houses the Nunavut Tunngavik Inc. and Service Canada offices, prompting all schools and some roads to close. The winds peaked at 86 km/h – unheard of at this time of year.

### **Weather delays Halloween**

Officials in Iqaluit postponed Halloween a day owing to hazardous winter weather. A powerful low pressure system approached Ungava Bay late on the morning of October 30<sup>th</sup>. It brought 10 to 15 cm of snow in very strong northeast winds that generated poor visibilities in Kimmirut and Iqaluit and prompting a flurry of wind, snow and blizzard warnings. Public service employees were advised to go home. In Sanikiluaq, hurricane-force winds of 140 km/h peeled back metal roofs and pulled staircases away from homes.

### **Warm November gales**

A very potent November storm over Hudson Bay ushered in blustery winds with near zero visibilities in blowing snow and in places September-warm temperatures to eastern Nunavut. Wind gusts of 120 to 140 km/h ripped through Pangnirtung and Grise Fiord. Temperatures with rain showers engulfed southern parts of Baffin Island, breaking temperature records for November 21st. The same weather system created blizzard and whiteout conditions in the Kivalliq region at Baker Lake.