

Top Ten Weather Stories 2016

Introduction

If Canada's weather for 2016 had to be summed up in one word, it would be "warm". For the 12-month period from December 2015 to November 2016, it was the fourth warmest in 70 years of record-keeping, averaging 2.3°C above normal. For British Columbia it was the warmest year on record, in the Prairies it was the second warmest, and for millions of Canadians in southern Ontario and Quebec it was the third warmest ever. Every region and every season measured warmer than normal. It was no surprise that 2016 began a little toastier than usual with a super El Niño arriving on the scene, but the nation continued to be near-record warm long after the El Niño faded off in March. In fact, it remained warm for the 20th consecutive year. According to the United Nation's World Meteorological Organization, Canada was on trend with the rest of the world. Globally, 2016 was the 38th consecutive year with above-normal temperatures and the warmest year since observations began 135 years ago. It was also a three-peat phenomenon, with each year since 2014 breaking the previous record for highest average temperature. More importantly, 16 of the 17 warmest years globally have occurred since 2000. Although the El Niño accounted for approximately 20 per cent of the warmth in 2016, the emergence of a weak La Niña in late summer certainly didn't counterbalance that impact globally or in Canada. Comparing the two over the long term, the Earth has warmed 0.9°C over the last 135 years while Canada has warmed twice that much in half the time (1.8°C since 1948).

Warmer air and water in the North continued to erode Arctic sea ice to its third-least expanse in 35 years of satellite monitoring. It was also the driest and the second warmest winter-spring in history in northern Alberta, which created prime conditions for the Fort McMurray fire – an event that resulted in the most expensive insurance loss in Canadian history and likely the nation's largest urban evacuation. Insurers also took a major hit from storms in 2016. On the Prairies, one large supercell storm over the long weekend in August cost the industry \$400 million and, when combined with several June-July storms, amounted to more than \$750 million dollars. Farther east, \$100 million in claims were filed after Cape Breton Island was hit with the remnants of Hurricane Matthew in July and Windsor was pummeled with three days of thunderstorms in late September. There weren't too many complaints from those in the East, however, as their wonderfully long, warm summer stretched well beyond the Labour Day weekend. At the end of the year, the weather offered some marked contrasts. While persistently record warm temperatures in November enabled farmers to finish the harvest, they were followed by a dreaded Polar vortex just days before the official start of winter.

From a list of 100 significant weather events across Canada in 2016, stories 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.

1. Fort McMurray's "Fire Beast"

In early May, the tinderbox around Fort McMurray, Alberta was just a spark away from becoming the most disruptive and destructive firestorm in Canadian history. The seeds of the disaster had been sown much earlier. The El Niño-influenced winter-spring was the driest in 72 years of weather recordings at Fort McMurray. Total rain and melted snow was less than half of normal – a record low. Between April 15 and May 8, a measly one millimetre of rain fell. Consequently, the period between the disappearance of snow cover and the appearance of new forest greening (known as the spring dip) was much longer than normal. Further, winter-spring was the second warmest on record, with a record mid-spring temperature spike of 33°C on May 3 and 4. Warm southeasterly winds and Sahara-dry air sucked every bead of water from the matted grass and forest litter. Weeks of warm, dry weather created a bone-dry forest floor – the perfect breeding conditions for a fire storm with Fort McMurray at the epicentre.

Officials realized the high risk of a catastrophic fire season and started preparing much earlier than usual. What they didn't know was where and when the first spark would ignite. It came on May 1 near Horse River. Fire crews quickly mobilized and contained the fire for a few hours, but then blustery winds blew the blaze out of control. On May 3, residents and visitors were ordered to leave. They didn't need urging – they could feel the heat, see the flames and smell the smoke. All of Fort McMurray's 88,000 residents became "disaster refugees" who were forced to seek refuge in shelters, work camps, campus dorms, evacuation centres, or the homes of friends' and relatives hundreds of kilometres away.

In two days, the fire had doubled its size, jumped highways and wide rivers, and headed downtown. By May 4, the wildfire began creating its own firestorm when intense 900°C heat induced towering pyrocumulonimbus clouds, dry lightning and thunder, gusty in-drafts of up to 90 km/h and erratic swirls. Firefighting aircraft were unable to fly over the fire because it was too hot and smoky. Wind gusts whipsawed glowing red-hot embers, twigs and bark overhead and on to homes and businesses that quickly ignited. Covering more than 500,000 ha, the wildfire was larger than Prince Edward Island and could be seen space. In the end, it charred 2,400 homes and other buildings, scorched 18,600 vehicles and left parts of Alberta's fifth largest city a smoky wasteland. Some neighbourhoods were reduced to burnt concrete with possibly the largest number of private homes lost from a single disaster in Canadian history. Countless families were left with nothing. The fire also forced a quarter or more of Canada's oil output offline, knocking out an estimated one million barrels of production from Alberta's oilsands. Nicknamed "The Beast", the wildfire became the costliest catastrophe in Canadian history with total costs reaching \$4 billion in insured losses and billions more in lost business, infrastructure and uninsured losses.

In the end, it took two months for 2,000 fire-fighters to tame "The Beast" and yet it was not defeated. It is now called a "holdover fire", smouldering underground and threatening to flare up again come spring.

2. Super El Niño Cancels Winter

During winter 2015-16, Canada was left out of the cold – the second warmest winter since country-wide records began in 1948. Nationally, December to February averaged 4°C above normal, which was only a tenth of a degree below the warmest winter six years ago. All of Canada was at least 2°C above normal, with northern British Columbia and the Yukon soaring to nearly 7°C above normal. A persistent “super” El Niño got much of the credit for the missing winter globally and in Canada. Another consideration was shrinking Arctic sea ice, which had thinned and retreated to record levels in recent years.

Warm Pacific breezes blew across North America delaying any hint of winter for much of the continent. In western Canada, every month from October to March was consistently warmer than normal. In a typical winter, Regina would have registered a dozen days with -30°C temperatures; instead they only had one. Further, the Queen City didn't have a single February day below -20°C as they recorded their second-warmest winter with records dating back to 1883. Even Winnipeg, arguably Canada's coldest major city, has never experienced a winter with only one day below -30°C until this one. Incredibly, one year after Ottawa's Rideau Canal Skateway set a record for the most number of skating days in a season (59), it set a record for the least number (18). In Montréal, there were only 5 days with minimums below -20°C, while the norm is 15, and in Moncton there had never been a winter this mild for at least 60 years. The average winter temperature in Moncton was -3.8°C, which was almost a degree warmer than the last record set in 2010, and on the last days of winter the 14 cm of snow cover received was a welcome contrast to the 140 cm of snow blanketing the city a year before.

The mild, snow-light winter resulted in huge savings for governments and businesses. With less winter, productivity was undoubtedly higher with fewer commuting problems and infrequent snow days for students and teachers. But prolonged balminess also left parkas and shovels gathering dust on store shelves. The unprecedented mildness and sunshine led to the cancellation of winter carnivals, dogsled races, ice fishing derbies and pond hockey tournaments. Cross-country skiers and snowmobilers cursed the warmth, as did ice wine-makers and ice fishers. On the other hand, the unseasonably mild weather was welcomed for its huge energy savings (15 per cent). And in Calgary, the March 9 start to the golf season was the earliest anyone could remember teeing-off.

With the mild weather, spring flooding was a non-threat for most of the country. On the environment front, migratory birds returned weeks earlier than usual due to friendly spring weather, although at times it created a mismatch with the available food supply. Additionally, the Gulf of St Lawrence, which is normally 89% ice-covered to a foot or more, was less than one-quarter covered. The thinner ice meant extremely high mortality rates for seal pups unable to survive their first year. And in forests across British Columbia and Alberta, warm temperatures meant lower winter mortality rates for

mountain pine beetles. A major impact of the record mild winter was the extraordinarily short ice road season. Mild weather and scanty snow across the North forced more than half of the ice roads to close after less than a month, cutting off the winter lifelines of food and fuel for northerners and leaving dozens of drivers stranded in the wilderness. At Yellowknife, days with ideal temperatures for building ice roads (-30°C or lower) numbered only 29 for the entire winter compared to a normal number of 55 days.

Strangely, an extraordinary lack of winter in the west turned out to be ideal for alpine skiers. In March, the mountain resorts had so much snow they extended the ski and snowboarding season well into May. In the East it was another story with ski resorts reporting one of the poorest seasons in memory. Inconsistent weather, including rain, made snow-making an ongoing challenge.

3. August Long-Weekend Storm on the Prairies ... Big and Costly

July was a month of stormy weather across the Prairies, but the storm on the August 1 long weekend had the most far-reaching and expensive impact. A warm moist air mass prevailed across the Prairies leading up to the long weekend. Crops were growing feverishly, which added moisture through transpiration and evapotranspiration. On July 30, an intense low-pressure system with an accompanying cold front swept through Alberta and continued into the eastern Prairies the next day before exiting Manitoba on the August 1 holiday. The system triggered several supercell thunderstorms. Wind, rain and hail battered homes, shattered windows, shredded flower beds, dented automobiles, ripped siding and lifted roof shingles in Calgary. Above the city, hail damaged the windshield of an Air Canada plane with 144 passengers aboard, forcing it to divert south to Lethbridge. As the storm rolled through Edmonton, it flooded Whitemud Drive and stranded motorists for the second time in a week. Further north, Fort McMurray was once again a target. Twelve weeks after they couldn't get a drop of rain, the fire-ravaged city was pounded with more than a month's worth of rain in two hours (87 mm). The rain knocked out traffic lights, filled basements with sodden debris and flooded the hospital emergency department. Entire neighbourhoods were under water less than three months after a fire destroyed one-tenth of the city's buildings. Choosing comic relief over grief, some residents water-skied through areas that had been on fire just months before. First drought, then fires, now floods...could locusts be far behind?

Elsewhere in Alberta, the supercell caused significant damage with strong winds up to 113 km/h whipping tennis-ball sized hail near Bottrel and Airdrie. In Saskatchewan, daytime heating and an unstable atmosphere caused two tornadoes, straight-line winds, flooding rains and grapefruit-sized hailstones. Storm damage was widespread, involving trees, powerlines, farm buildings, vehicles and crops. The storm swept into Manitoba on the Sunday and holiday Monday packing the same fierce weather. In rural Manitoba, hailstorm damage was so severe that some areas experienced 100 per cent crop loss. Three tornadoes were confirmed and there were numerous reports of flooding rains, and straight-line winds. Among summer storms on the Prairies, this one was typical but

far more damaging. Insurance claims numbered 42,000 and losses totalled \$410 million, with the vast majority in Alberta.

4. A Summer to Remember in the East

In Canada, the unofficial kickoff to summer is the May 24 weekend – a full month ahead of its astronomical start. Cottages, cabins and pools open up, campers pitch their tents for the first time and gardeners plot their annuals and veggies with confidence that frost risk is negligible. In the East, following a cold and snowy April and unexpected wintry bout in mid-May, summer weather arrived on the Victoria Day weekend. Moreover, it stayed consistently hot and humid, almost dry and fairly quiet past Labour Day. For the majority of city folks, it was the summer to remember with persistent warmth, perfect weekends and little foul weather. Most residents didn't want summer to end. It was so pleasantly warm for so long that they either felt guilty or concerned that somehow they were soon going to pay for it. The wonderful sustained weather was largely due to a strong, stable, high-pressure dome known as the Bermuda High that reached farther west and north than usual. It wasn't the warmest summer on record, but Easterners weren't complaining. What stood out for most was summer's consistency, with all seven months from May to November being warmer than normal. In Toronto, it was its warmest ever.

Hefty hydro bills were, in part, a testament to how hot it got. In Toronto, cooling degree-days (CDDs) were 85% higher than normal. In Montreal, CDDs were at least 50% above normal. At Toronto Pearson International Airport, there were 39 days with maximum temperatures at or above 30°C, compared to a normal 14. That was more hot days than the three previous summers combined. Toronto Public Health issued 22 heat alerts – the second highest since the health program came into effect in 2001. Additionally, sizzling temperatures in Toronto above 35°C occurred in all four summer months – June, July, August and September – a first for the city. Despite excessive heat, the province recorded only one smog and air health advisory.

But what was good for campers and beachgoers, was bad for farmers and gardeners. Beautiful Ontario didn't live up to its name as burnt grass, cracked soil, curled-up leaves, shriveled corn cobs, and dying trees were the norm. A prolonged drought prevailed across a broad swath of Ontario, from Chatham north to Ottawa and into Quebec and Nova Scotia. In southwestern Quebec, several areas from Témiscamingue to the Eastern Townships received 25 to 75 per cent less precipitation than normal in June. In the summer and early fall, residents of western Nova Scotia confronted dry river beds, cracked soil, depleted wells and tinder-dry brush. At Yarmouth, rainfall totals from June 1 to mid-September were less than 30 per cent of normal. Communities hadn't seen such acute water shortages in 50 years. In the short term, officials delivered water to dry residents and opened water stations at fire halls and public showers at schools and provincial parks. They also imposed mandatory water restrictions, with lawns, cars and pools off limits. In spite of stringent bans, water levels steadily dropped to the point where the inland Nova Scotia fishery virtually shut down. On the other hand,

the hot and dry weather pleased the province's vintners who produced a bumper crop of grapes with better quality and sweeter fruit.

Other areas showing the wear and tear of drought were the Niagara Peninsula, the Greater Toronto Area and the north shore of Lake Ontario. At Toronto Pearson, it was the driest summer in 57 years with a string of 104 consecutive days in the middle of summer without a significant rainfall (above 12 mm). In Vineland, the rainfall total was a paltry 30 per cent of the norm. Incredibly, nearly half of the rain over two months fell in a three-day period from May 12 to 14. Farmers in the Niagara region were desperate for rain. Even when it fell in many parts of western Ontario in mid-August, Niagara growers received a relative sprinkle. For the first time in nearly 20 years, some vintners resorted to irrigating their vineyards. On the other hand, grape growers couldn't recall a better growing season. Farmers in Essex County benefited from ample, timely rains. As a result the tomato crop was described as the best ever, although there was a glut at the processing plants in Leamington. In the final wind-up, the weather came through for growers in Ontario and Quebec. Farmers broke all kinds of records for the quality and productivity of winter wheat. Rescue rains in mid-August helped in most areas. And spectacular harvest weather in September and October meant record soybean yields, decent corn yields and a second or third crop of hay.

5. November's Heat Wave and December's Deep Freeze

By Thanksgiving, westerners were resigned that winter would be arriving much earlier than normal this year. Early October seemed too soon for wind chill and blowing snow on the Prairies. Frequent Pineapple Express storms crashed the Pacific coast, and clipper systems left swaths of snow across Alberta and Saskatchewan during the first week of October. By Thanksgiving, westerners were resigned that winter would be arriving much earlier than normal. Some saw it as payback for one of the warmest winter-spring periods on record. Luckily, October's false winter ended before Hallowe'en with a remarkable warm-up. By mid-November, more than 300 daily records had fallen across the west and north. And not just by a tenth of a degree; in some cases it was by five degrees or more. Countless weather stations recorded temperatures that not only crushed the daily record but, in some cases, smashed the record for the warmest November day ever. Temperatures were more typical of Thanksgiving Day or even Labour Day but not Remembrance Day!

The unseasonable November warmth arose from a strong, broad upper ridge that kept re-building across central North America and extending up through British Columbia, the Prairies and north into the Mackenzie Valley. The stalled jet stream remained well north of what is climatologically expected. The real surprise was that the ridge persisted for more than four weeks, which allowed warm air from the American southwest to flood across western Canada. Adding to the weather treat, the month was mostly dry and snow-free.

An incredibly long run of warm weather helped many Calgarians forget their miserable July. The summer-like temperatures had golf courses and patios re-opening. More importantly, the unseasonable warmth gave farmers and ranchers a second chance to finish the delayed harvest. November's atmospheric gift of warmth and dry provided farmers and ranchers with the finish to what was one of the longest, drawn-out harvests in memory. Farmers worked full out running combines well into the night. One farmer said all he needed was 10 harvest days to finish up, but it took him two months to get them.

The downside of the November heatwave was that flowers and shrubs were tricked into re-blooming. With no snow in sight, pre-work on ice roads and trails was put on hold. As is usual with unseasonable weather, retail sales of winter clothes and equipment also took a big hit. And, for the first time in 29 years, the abnormal warmth melted snow on top of mountains and forced officials to cancel the men's World Cup Ski Race at Lake Louise.

Selected weather highlights:

- At Winnipeg on November 9, the maximum temperature reached 18.8°C, smashing the old record of 14.4°C set in 1923 and 1930, and coming in 20 degrees higher than average. Never has the temperature been so high so late in the year. Further, Winnipeg's average temperature came in at about +3.1°C – the warmest November since records started in 1872. Further, according to meteorologist Rob Paola, Winnipeg recorded its first day with measurable snow on November 21 after having gone 224 days without snow. It was the third-longest snowless streak on record since 1872. Only once before in 145 years has the city ever posted a later date for winter's first measurable snowfall – November 22.
- Also on November 9, Regina's temperature soared to 21.7°C, which was also the highest temperature ever recorded at the end of the year. In fact, every weather reporting station in Saskatchewan broke a temperature record on that day.
- For military veterans and others, it was the warmest Remembrance Day ever in Saskatoon, Prince Albert, Lethbridge and Peace River.
- Eighteen weather stations on the Prairies recorded their warmest November on record including Winnipeg, Brandon, Portage la Prairie, Thompson, Regina, Estevan, Moose Jaw, Prince Albert, Yorkton and Lloydminster. In British Columbia, Kelowna and Vancouver also recorded their warmest November.

With a new month came different weather. In the first week of December, a mass of Arctic air with Siberian and Alaskan origins swept southward across British Columbia, the Prairies and into Northern Ontario. The frigid air gripped the West for two weeks with temperatures at times 15 degrees below average and wind chills of -40 and below. Victoria and Vancouver endured their coldest temperatures in four years and Edmonton registered three maximum daily temperatures below -20°C; there were no such afternoons all last year. Tragically, the bone-chilling cold cost several Canadians their lives. For the homeless, the bitter cold made a hard life harder. Hospitals were pushed

to handle more cases of frostbite and hypothermia. Millions of Canadians cranked up the thermostat to beat back the cold, pushing up power usage to record loads on the Prairies. It also forced a host of transportation challenges, school closings and service delays. At times, the cold made it feel like the dead of winter, and the snows gave it the look of winter. Coastal British Columbia received more snow in one week than they had realized in the previous two years. Southeastern Saskatchewan and Southern Manitoba were walloped by a huge pre-winter storm dumping 20 to 50 cm of snow leading to school and highway closings, and roof collapses. By mid-month, Easterners were re-introduced to the dreaded Polar Vortex, snow squalls and the Colorado low. The frigid air didn't loosen its grip until the first official day of winter but did ensure that millions of Canadians had a white Christmas.

6. Arctic Sea Ice Going Going ...

Seldom does the Arctic sea ice maximum in March garner much public interest and certainly not as much as the ice minimum in September. According to the National Oceanic and Atmospheric Administration's (NOAA's) National Snow and Ice Data Center (NSIDC), the maximum ice extent before the onset of melting in March 2016 was a fraction above last year's record low – not surprising given the exceptionally warm weather at the top of the world. Temperatures over the Arctic Ocean from December 2015 to February 2016 inclusive were 2 to 6°C above average. In the Canadian Arctic, winter temperature anomalies were 3 degrees above normal.

With an abundance of fairly thin ice in the Arctic Ocean at the beginning of the melt season, there was a good chance that the minimum ice extent in mid- to late-September would once again be close to a record low in 2016 and that's exactly what happened. According to the Canadian Ice Service, Arctic waters in Canada had their third lowest minimum ice coverage on record (2012 had the lowest; 2011 the second lowest). Ice loss was especially rapid during early September when 34,000 square km of ice vanished per day, primarily owing to extra heat in the upper ocean and two strong storms in August.

NOAA scientists point out that the ten lowest September ice extents over the satellite record have all occurred in the last ten years, continuing the decades-long decline. The once solid sheet of multi-year ice is now fragmented into smaller floes that are more exposed to warm ocean waters and strong winds.

The Canadian Ice Centre in Ottawa reported several highlights in 2016:

- This year's ice melt in northern Baffin Bay between Baffin Island and Greenland opened up in early May – four to five weeks earlier than normal.
- Further south, Hudson Bay began melting two weeks earlier than usual with ice covering about 7 per cent less of the ocean surface.
- At the end of May, the Beaufort Sea – which is normally 92 per cent frozen – was only a little more than half ice-covered. Melting began in May, a full month ahead of normal and a record early start.

- By mid-September, sea ice minimum coverage in the Beaufort Sea was the second lowest ever (behind 2012). The freeze-up started on time, but with the large area of open water, it wasn't until the end of November that ice covered the expanse – a remarkable four weeks later than normal.
- By the second week of July, most of the ice in Frobisher Bay was gone. That was quite a contrast to a year earlier when southeasterly winds kept thick ice fastened in the Bay, preventing supply ships from docking and delaying supply ships.
- By August 9, the Northwest Passage was nearly free of ice. Strong storms broke up the ice pack and cleared out the ice along the southern route of the Passage. This allowed the luxury cruise ship *Crystal Serenity* to journey from Alaska on through the Northwest Passage to New York – the largest ship to ever do so.

7. Wild Summer Prairie Weather

Weather forecasters were kept busy on the Prairies this summer with one of the longest and most active storm seasons ever since statistics were first kept in 1991. Clusters of intense thunderstorms were more frequent and seemed to move slower than usual, taking longer to spread their misery. There were numerous reports of large hail, heavy rain, high winds, frequent lightning and countless localized events that included tornadoes, brief non-destructive landspouts and microbursts. Tornadoes were also more frequent owing to favourable low-level winds and ample moisture advected into the region from ocean sources and crop evapotranspiration. All told, there were 48 vortices compared to the 30-year average of 34 and they were evenly divided among the three provinces. Fortunately, nearly half of them were non-damaging. There were also 564 severe weather events (large hail, strong winds, heavy rain and tornadoes), which is over twice the normal number. Manitoba was hit the hardest with 240, followed by Alberta at 205. Nearly two-thirds of these severe weather events were hailstorms, which was twice the average, with payouts for crop hail insurance claims coming in at 50 per cent higher than last year's figures and well above the five-year average. Losses started early in the season and went right through early October. Late-season hail strikes are significantly more damaging than pre-harvest hailers. The number of hailers reported in each month was up from last year, but the overall severity of the storms was not as great. All three provinces were hit hard in terms of loss ratios, with Manitoba the worst off. Early estimates from the Insurance Bureau of Canada show property losses from summer storms (not counting crop losses), exceeded \$834 million.

2016 Prairie Severe Summer Weather

| | Tornadoes | Hail | Strong Winds | Heavy Rain | Total |
|------------------------------------|------------------|-------------|---------------------|-------------------|--------------|
| 2016 Numbers | 48 | 368 | 108 | 40 | 564 |
| 30-year Average (1986-2015) | 34 | 128 | 51 | 26 | 239 |

Environment and Climate Change Canada's James Cummine, Supervisor of Public and Severe Weather in Winnipeg, explains the higher numbers are, in part, driven by the popularity of reporting/recording such events on social media and the presence of more storm chasers.

Significant Summer Storms

- On June 24 and 25, severe storm cells caused widespread and significant losses in southern Saskatchewan and Manitoba with insured property losses exceeding \$41 million. At West Hawk Lake, strong, straight-line winds, toonie-sized hail and copious rain (136 mm in just a few hours), led to significant flooding. The deluge washed out roads and caused a voluntary evacuation of cottage communities at Caddy Lake and Whiteshell. In Winnipeg, the storm caused a CFL game between the Blue Bombers and the Montréal Alouettes to be delayed for 65 minutes due to lightning strikes that forced players and spectators to seek shelter.
- At the end of June, multiple rounds of severe thunderstorms across Alberta included an EF-0 tornado near Ponoka. In Okotoks, hail drifts clogged drains and – along with heavy rains – caused localized flooding. A deluge in Edmonton brought 50 to 75 mm of rain in five hours. And on June 30, hail slammed Calgary, damaging roofs, siding, windows and automobiles. Insurance losses totalled \$86 million.
- In the second week of July, a slow-moving weather system from Montana and North Dakota intensified and stalled over southern Saskatchewan causing flooding rains (130 mm in 2.5 hours) at Estevan. When storm water systems and sewers in the city backed up, a state of emergency was declared. The force of the water pushed cars off roads and onto lawns. Intersections were flooded and vehicles had water up to their mirrors. It was the wettest day in Estevan history with records that go back to 1899. Insurance loss estimates were pegged at \$57 million.
- From July 15 to 16, inclement weather prompted flooding rainfall and large hail across Alberta and Saskatchewan that cost \$72 million in property losses. Damage was especially high in the Calgary area, where windows and siding were smashed by tennis ball-sized hail. On July 16, storms in Saskatchewan yielded a sudden and unexpected torrential rainfall leading to flash flooding in Swift Current.
- From July 18 to 20, a swath of large hail, intense rains and damaging straight-winds struck the three Prairie provinces and accounted for \$92 million in property losses. Most of the damage was due to shattered windows and trees that fell on buildings and vehicles. Calgary endured more street and basement flooding. In Winnipeg, an apartment complex had its roof blown off.

8. A Tale of Two Springs

Summery in the West

Following an unusually mild winter, Westerners were expecting the worst but got the best – an early and record warm spring. A dome or upper ridge anchored over the Pacific coast ushered in a flow of warm California and southwest desert air into western Canada. The mildness melted much of the snowpack earlier than usual, furthering the spring warm-up. British Columbia, the Yukon and the three Prairie provinces experienced their warmest spring in nearly 70 years of record-keeping – up to 4.5 degrees warmer than normal. In April, daytime highs in British Columbia reached 10 to 15 degrees above normal. For Vancouver, it was the warmest and one of the driest Aprils on record. Some areas received their lowest precipitation totals in 50 years. In May, Cowichan River stewards started rationing the water supply when Cowichan Lake measured 46 per cent full – the lowest late-May level since 1957. Underground, half of British Columbia’s wells showed groundwater below seasonal levels.

In Calgary, it turned out to be the second warmest spring (March to May) with records dating back to 1885. Across Alberta, it was beginning to look a lot like “drought”. In some southern districts, seeding was being done in some of the driest conditions in years. Many farmers were forced to postpone spring seeding, dig deeper to tap water reserves well below the surface or change their crop plans. At the beginning of March, Alberta’s forests and ranges were dangerously dry and free of snow prompting the province to declare an early start to the fire season. By mid-May, forests north of Edmonton were bone dry, humidity was low, and winds were strong and gusty, which raised the wildfire threat from high to extreme. Soon after, a sweeping fire ban was issued across most of the province. On May 4, temperatures soared in Winnipeg to an unbelievable 35.2°C. It was the city’s earliest 35°C reading since records began in 1872 and, as it turned out, it was the highest temperature of any day in 2016 – a good seven weeks before the official start of summer.

Across the West, local garden centres were busy with brisk plant sales, grass cutting started much sooner than normal, and residents flocked to parks for picnics, fraternized on patios, and cycled and golfed much earlier than usual. On the downside, allergy sufferers were hit harder and earlier than normal because trees began shedding their pollen up to a month earlier. Aquatic life also took a hit when spiking temperatures and shallow waters caused a mass fish die-off on some Prairie lakes.

Wintry in the East

April lived up to its reputation as the cruelest month this year in Ontario, Quebec and parts of Atlantic Canada. For much of southern Ontario and Quebec winter delayed its arrival until spring! Starting the first week of April, temperatures plummeted to values more typical of mid-winter. In Toronto, April was snowier than any of the winter months had been (20.3 cm fell), and spring showers came down as flurries. For Easterners,

most of the spring was just too long, too cold and too much like the winter they didn't get.

London and Windsor had their coldest April in 20 years and airports in both cities reported snow on May 15. Officials in Ontario kept a close watch on the water levels of a number of rivers, including the lower Thames, Sydenham and Grand, with the worry that the partially frozen ground might lead to flooding on rivers and in low-lying areas. The ground was already saturated from earlier rains and there was little capacity to absorb any more. In southern Quebec, cruel April became miserable May – at least until the Victoria Day weekend – as May temperatures dipped 6 to 12°C below normal. The Eastern Townships and Beauce received 5 to 7 cm of snow, while 10 to 15 cm fell in Abitibi. May snowfalls are uncommon in southern Quebec but extremely rare after the 15th of the month.

9. Thanksgiving Day Atlantic Weather Bomb

Hurricane Matthew was a major storm with wind speeds up to 250 km/h at its peak. Its trek across the Caribbean and the southeastern United States was devastating and deadly. The storm killed over 1,000 people and injured hundreds more as it spewed excessive rains, hurricane-force winds, coastal storm surges, flash floods and isolated tornadoes. In the end, Matthew inflicted billions of dollars in damages to several countries including the United States, the Bahamas, Hispaniola, Cuba and northern sections of South America. Matthew was the costliest Atlantic tropical storm since Sandy and the first Atlantic Ocean Category 5 hurricane in nine years.

At 5:00 p.m. on October 9, the Sunday before the Canadian Thanksgiving, Matthew's core was about 320 km east of Cape Hatteras, North Carolina moving East North East at 24 km/h. It had been downgraded to a post-tropical cyclone. Yet, its "atmospheric river" reached 1,600 km north into Atlantic Canada where it interacted with an intense, slow-moving, but rapidly strengthening storm off the coast of Nova Scotia. Further, a shot of moisture from tropical storm Nicole (later major Hurricane Nicole), east of Bermuda, augmented the Canadian storm with heavy rains and strong winds. The hybrid system intensified and began lashing and soaking eastern Nova Scotia and later Newfoundland and Labrador. Cape Breton Island bore the brunt of the now-stalled storm. With more time to spread its misery, record-breaking rains, damaging winds, 8-metre storm waves and widespread flooding inflicted mega-million dollar losses. Sydney received 225 mm of rain, which shattered the city's previous one-day rainfall of 129 mm on August 17, 1981. It was also Nova Scotia's second wettest day on record next to Halifax's 238.8 mm of rain on September 21, 1942. The storm was deemed the worst ever in the Sydney-Glace Bay municipality. More than 140,000 Nova Scotians went without power; some for up to three days. Winds snapped telephone poles, tossed debris on highways and roadways, and washed out highway shoulders. The rush of water was so fierce that the flow lifted manhole covers, took out bridges, destroyed parks, and caused extensive water damage to thousands of homes and vehicles. A host of community programs and services closed, including colleges, schools, daycares,

public libraries and medical offices. Storm impacts were felt in New Brunswick, Prince Edward Island and elsewhere in Nova Scotia but to a lesser degree. Thanks to the Thanksgiving Day soaker, Sydney recorded 312 mm of rain in October – more than double the normal total.

Across central Newfoundland, storm rainfall approached 100 mm, but in Gander and Burgeo totals were closer to 150 mm with the deluge reaching a rate of 20 mm/h at times. In some areas it rained for 54 hours between October 9 and 11. Torrents of rain poured into basements and ground floors in a matter of minutes and washed away countless roads. Brooks were transformed into rushing rivers, powerful winds shook apartment buildings, downed trees and knocked out power, and fallen trees and power lines littered the landscape. St. Alban was marooned as floodwaters swept away the main bridge into town. In Boyd's Cove, the storm led to the death of seven dolphins.

Loss-estimates from the Insurance Bureau of Canada totalled \$103 million, with the vast majority of claims being made in Nova Scotia. Given the extensive damage to roads, bridges, culverts and parks – infrastructure losses will likely add many more millions of dollars in losses.

10. Windsor's \$100 Million Gusher

September is often the wettest month in southwestern Ontario with the Windsor Airport averaging 90 mm of rain. In 2016, the city and outlying areas got twice that amount on the last three days of the month when a moist weather system crawled south of the lower Great Lakes beginning on September 28. Huge amounts of rain fell in Windsor and Essex County but little elsewhere. Rainfall amounts from the storm totalled 127 mm at the Windsor Airport, with most of it falling over a 15-hour period. In all, it rained for 58 hours including five thunderstorm hours. Windsor saw a new single-day rainfall record of 63.4 mm on September 29, drowning out the old record of 36.8 mm set in 1973. Storm rainfall amounts varied widely, including an astonishing 200 mm in the eastern suburbs of Riverside and Tecumseh. At its greatest intensity, rain fell at 30 mm/h. Drainage and pumping equipment worked at maximum capacity but couldn't keep up. The rains were so sudden and heavy that local mayors declared states of emergency on day one of the three-day deluge. Flood waters swamped dozens of roads, stranded cars, flooded fields and yards, and filled basements with a metre or more of dirty sewer water. Water spurted up from toilets and floor drains, flowed through windows and seeped through walls. Some homes lost power for several hours and running water for two days. Area stores exhausted their inventories of sump pumps, wet/dry vacuums, dehumidifiers, fans and cleaning supplies. Along the lakeshore, winds up to 45 km/h pushed water inland eroding beaches and waterfront properties. With an acute shortage of dumpsters in the city, piles of ruined belongings collected at the ends of driveways and on lawns. Preliminary insurance-loss estimates exceeded \$136 million with over 5,159 claims. Further losses were not covered by insurance.

Regional Highlights

Atlantic Canada

January's back-to-back winter storms

A series of storms less than two weeks apart pummelled parts of Atlantic Canada at the end of January and early February. Both systems rapidly intensified as they travelled northeastwards from the Carolinas to south of Nova Scotia and across eastern Newfoundland. The first system featured rain, snow, ice pellets and freezing rain driven by strong winds. Cape Breton and eastern Nova Scotia lost power for 14 hours after trees became weighed down by ice and heavy, wet snow. The biggest snowfalls were in Gander (55 cm), Grand Falls-Windsor (44 cm), Sydney (26 cm) and Halifax (25 cm). The second blast laid waste to the same region of Nova Scotia and Newfoundland. It caused hazardous driving, prompted colleges and universities to cancel classes, and shut down provincial government offices. Two-storm snowfall totals included Charlottetown (86 cm), Saint John (56 cm), Sydney (95 cm), Halifax (46 cm), Corner Brook (83 cm) and Gander (80 cm).

Minimal sea ice but lots of bergs

The Gulf of St. Lawrence was largely ice-free in February – not a surprise given that winter was the third warmest in nearly 70 years of records. Maximum ice coverage in mid-March typically features about 46 per cent of top coverage; this year it was less than 28 per cent. Through the winter, tourists, tour operators and photographers delighted in a bumper crop of gigantic icebergs that – due to strong northerly winds – travelled further south and closer to the coast, making them more visible to people on shore.

A sweet maple syrup season

There were a lot of happy maple syrup tappers in the Maritimes this spring owing to the exceptionally early start to the sap run in February (two to three weeks earlier than normal) and a surprisingly long sap run due to ideal maple syrup weather featuring sub-zero nights and melting days. In some sugar bushes, one-day flows were at record volumes with excellent flavour.

Storm knocks out power in the Maritimes

Powerful winds and heavy rains on April 8 knocked out power to thousands in Nova Scotia. Heavy downpours caused flash flooding and pooling on streets. Storm surges occurred in Digby, Yarmouth and Shelburne counties. The same weather killed power to thousands in New Brunswick and led to the closure of eight schools in the St. Stephen and Bay of Fundy areas. The Confederation Bridge was also closed to high-sided vehicles and motorcycles.

Record April snows in Newfoundland

In the early morning of April 20, a powerful, slow-moving storm tracked east of Newfoundland. Heavy snow, strong winds and blowing snow accompanying the system began over the Avalon Peninsula. An oddity of the storm was the general reversal of

winds, which blew from the southeast to west causing snowfalls of up to 50 cm – rare for such a late date. With peak wind gusts of 100 km/h blowing over several hours, the snow formed monstrous drifts. It was the greatest snowfall ever recorded in St. John's any time after April 5. April snowfall in St. John's totalled 83 cm, which was more than three times normal and the snowiest month of the entire winter.

Tropical storm Colin takes aim at Atlantic Canada

On June 9, tropical storm Colin became a post-tropical storm in Canadian waters. Its remains soon interacted with an existing non-tropical system bringing heavy but manageable rains to parts of eastern Nova Scotia and Newfoundland. Halifax received 37 mm of rain and Deer Lake and St. John's got close to 50 mm.

Tornado watch on Cape Breton Island

Environment Canada issued a rare tornado watch for Cape Breton Island during a tumultuous few hours on August 7. No tornadoes appeared, but wind damage to boats and trailers was reported in Grand Mira South – likely from straight-line microbursts. It was only the second time a tornado advisory had been issued on the Island in the last 10 years, with funnel clouds being a more common occurrence.

First storms of winter 2017

Storms over four days at the end of November buried parts of Prince Edward Island, New Brunswick and northern Nova Scotia. Intense repeat storms brought a messy mix of heavy, very wet snow, copious amounts of rain or both. Residents struggled to clear away the heavy (in some cases rain-soaked) snows that became intertwined with broken branches and fallen power lines. In New Brunswick, 42,000 customers made do without power, with residents of Moncton out for 30 hours amid 30 cm of snow.

Quebec

Winters' first nasty blow

Winter weather struck Quebec on January 9 and 10 when up to 35 mm of rain fell along the St. Lawrence. Powerful wind gusts accompanying the weather system brought down two brick walls in Montréal and contributed to power outages that affected 60,000 Hydro-Québec customers. Strong winds also caused storm surges in the Gaspé region and along the North Shore, severely damaging the boardwalk at Percé. At storm's end, rain became snow (15 to 30 cm) in a thunderstorm followed by a flash freeze. At Chibougamau, Pontiac and Mont-Laurier, temperatures fell 15 degrees in three hours. At the end of the week, a second storm battered eastern Quebec dumping another 15 to 30 cm of snow and causing another storm surge in the Gaspé.

Valentine's Day cold

Around the Valentine's weekend, bitterly cold arctic air invaded Quebec bringing extreme wind chill values of -40 to -55. At this coldest moment of winter, lovebirds across the province huddled in close to stay warm. Mercifully, the cold lasted only a few days, although what followed was no better as a significant episode of freezing rain and heavy snow hit next. Snowfall totals included 35 to 60 cm in the Upper Gatineau and 40

to 45 cm at Mont Tremblant. Freezing rain totals included 5 to 15 mm in Montréal and surrounding areas.

Long-lasting February storm

More nasty winter weather struck southern Quebec on February 24 and didn't let up for two to three days. During the drawn-out misery, most residents experienced a bit of everything – rain, snow, ice pellets, freezing rain, fog and high winds. Sherbrooke received close to 80 mm of rain. Gaspé Airport got three times its normal February rainfall. And in some cities, rain became freezing rain with anywhere from 5 to 15 hours of glaze. Slushy city roads and sidewalks then became dangerous ice patches when temperatures dipped below -15°C. Added to the mix, some 255,000 Hydro-Québec customers lost power.

A long maple syrup run

Maple syrup producers in Quebec were able to tap trees earlier than usual this year, with sap buckets being hung in late February in the southern part of the province. A perfect mix of colder, sub-zero nights and melting days favoured conditions at the sugar shack with the season running through April. In contrast, the past two years have seen late starts and much shorter seasons.

Quebec tornadoes

Quebec's first tornado was confirmed on June 2 in the heart of Maniwaki. Rated an EF-1, the tornado had winds between 135 and 175 km/h, which was powerful enough to damage roofs, uproot trees, tear off doors and cause a store's brick wall to collapse. Then, when a strong cold front swept across Quebec on June 20, it popped off a few thunderstorms accompanied by strong winds and significant rains in the Abitibi area, the Pontiac and regions north of the St. Lawrence River. It also caused a second tornado – an Enhanced Fujita Scale 2 (EF-2) at 190 km/h on Lac Verne in the Upper Mauricie where it seriously injured two cottagers. Quebec's third tornado was confirmed at Metabetchouan in the Saguenay–Lac-Saint-Jean area on July 4. The EF-1 tornado damaged houses, flipped a seaplane, toppled trees – and scared campers. The day before nickel-sized hail inflicted property damage in Abitibi. On July 14, a vigorous cold front (part of a system that inflicted property losses through Ontario and New York State), affected several areas in southern and central Quebec. Large hail, vicious winds and heavy rain combined to take down power lines and trees, and damage buildings. In Drummondville, rains flooded streets. And at Ulverton, experts confirmed a fourth seasonal tornado with an EF-1 ranking.

\$56 million storm in the Saguenay

On July 27, the Saguenay–Lac-Saint-Jean area was hit yet again with hail and strong winds. Hailstones ranging from 2 to 8 cm in diameter caused extensive property losses to cars and houses. Insurance claims numbered 7,000 with over \$56 million in property losses.

October deluge causes floods and landslide

A slow-moving low-pressure system developed south of the Great Lakes on October 20 and then combined with a storm moving up the eastern seaboard of the United States. The moisture-charged system developed rapidly. Heavy rains from 75 to 125 mm and strong northeast winds between 85 and 105 km/h occurred between Montréal and Charlevoix. The fall storm also triggered flooding in the Rive-sud de Québec area and a landslide in Shawinigan in the Mauricie region.

Ontario

NBA All Star record cold

Around mid-February, cold arctic air invaded Eastern Canada, bringing extreme wind chills of -30 to -50 and the lowest temperatures of the El Niño winter. At Toronto, temperatures dropped to -26.3°C on the 13th – the lowest at any time in 22 years. Welland, Hamilton, Oshawa and Kitchener were among the 17 centres that recorded their coldest Valentine's Day in history. That weekend, Toronto hosted the National Basketball Association's all-star game and fans visiting from the United States couldn't believe the frigid temperatures. Toronto Raptors all-star guard Kyle Lowry even apologized to his fellow all-stars, the fans and officials for the cold in Toronto.

Where's the Great Lakes ice?

Brutally cold weather conditions in winter 2014-15 saw ice cover on the Great Lakes soar way above the normal long-term average of 53.2 per cent, topping out at 92.5 per cent. However, in early February 2016, Great Lakes ice coverage was minimal at 3 per cent in Superior, 8 to 9 per cent in Huron and Michigan respectively, and less than 1 per cent in Erie and Ontario. By mid-March, Great Lakes ice cover was at a record low.

Ottawa's record dump of snow

A sopping wet low-pressure system with Gulf of Mexico origins intensified into a major winter storm on February 16 as it tracked up along the Appalachians into eastern Ontario. It brought with it a swath of heavy snow from Kingston to Ottawa and large amounts of freezing rain to Cornwall and surrounding areas. The incredibly heavy 51 cm of snowfall at Ottawa International Airport was a largest one-day snowfall record for the nation's capital and more than the average snowfall for the entire month. Thousands in the city faced a massive clean-up as driveways filled in, sidewalks became blocked and roads were impassable.

March roars in like a lion

Across Ontario, March began more lion-like than lamb-like as a moisture-packed storm from Texas headed northeastward. It dropped 15 to 30 cm of snow across southern Ontario but higher amounts (45 cm) in the highlands to the south of Georgian Bay, and featured strong north-easterly winds at 70 km/h that created blowing snow and whiteouts with poor visibility on many roads and highways. Parts of southwestern Ontario, the Niagara Peninsula and the St. Lawrence Valley also reported some freezing rain and ice pellets over a six-hour period.

Ontario's earliest tornado on record

With winter's official end a week away, an EF-1 tornado struck northeast of Clifford on March 16, packing winds up to 170 km/h. Historically, it was Ontario's earliest recorded tornado. Along its 3.5 km path, winds flipped three grain bins bolted to cement bases tossing them 200 metres. Winds also snapped off or blew over several mature trees. At the same time, a strong microburst with winds of 80 to 90 km/h and heavy rain wreaked havoc through Mississauga and Brampton, causing trees to fall and homes under construction to blow over.

Pre-Easter ice storm

More than 100,000 customers in southern Ontario were left without power on March 24 and 25, ahead of the Easter weekend, as freezing rain began ice-coating wires and tree branches. Between 10 and 30 mm of glaze left streets and sidewalks covered under a layer of ice and forced the closure of several schools. Driving and walking surfaces became slippery and hazardous. The hardest hit areas were west and north Toronto in Fergus, Orangeville, Barrie and Newmarket, where over 24 hours of freezing precipitation fell. Insurance losses were over \$26 million.

Windsor's record-wet March

Three landmark rainy days in March helped to make the month the wettest on record in Windsor. The monthly rain total of 123.8 mm broke the previous record of 114.6 mm set in 1973. Fortunately, the three record rainy days were not consecutive. Residents with flooded basements or yards weren't surprised by the record, but some couldn't believe that March had only 11 wet days. It was just that when it did rain it was intense.

Northwestern Ontario's record-wet June

Clusters of strong to severe thunderstorms soaked much of northwestern Ontario on June 25. Torrential downpours and frequent lightning associated with a highly unstable weather system led to major flooding. Kenora reported 40 mm, Fort Frances 53 mm and Thunder Bay 85 mm, with much of it falling in a three-hour period. Some of the thunderstorms packed golf ball-sized hail, which only added to the damage. Thunder Bay received a record June rainfall of 213 mm with records dating back to 1877.

Damaging summer storms

Following days of intense heat and humidity, the atmosphere let loose on August 13 when a slow-moving, low-pressure system crossed the Great Lakes. Officials confirmed an EF-1 tornado (150 to 175 km/h) near the southeast shore of Lake Simcoe. South of Oshawa, downburst winds inflicted more damages. Some good came from the day's weather when rescue rains fell in the Goderich area (78 mm) and in the Ottawa Valley and near Bancroft (60 mm). Unfortunately, the regions most desperate for rain – the Niagara Peninsula and around the GTA – got less than 20 mm.

The year's most powerful tornadoes

A supercell thunderstorm developed rapidly over the Detroit River on August 24. Weather experts confirmed that two tornadoes emanated from the supercell. The first one affected LaSalle when an EF 1 with peak winds between 135 to 175 km/h occurred. The width of its damage was 300 m over a 2 km length. A more powerful second

tornado struck 20 minutes later in Windsor. It was assessed as an EF-2 tornado with peak winds between 200 and 220 km/h over a track of almost 8 km. In LaSalle, significant damage was done to 15 homes. In Windsor, the trail of destruction was long and costly.

Prairie Provinces

Winter's coldest moment

Super El Niño took a break in mid-January, enabling bitterly cold air to sweep across the West in what turned out to be the coldest days of the winter. Wind chills made it feel like -40 or colder, freezing exposed skin in under 10 minutes. Emergency shelters and animal rescue centres were busier than usual. Fortunately, it was remarkably short-lived.

Moose Jaw's \$75 million hailstorm

On the evening of July 22, an isolated severe thunderstorm hit the north end of Moose Jaw, pelting the city with loonie-sized hailstones. The storm dissipated as quickly as it came, lasting for only twenty minutes, but extensive hail damage across the city to vehicles, windows and houses. Total insured property losses exceeded \$75 million from 6,300 claims.

Calgary's miserable July – Stampede soaker

Calgary had a real soaking in July. More than 200 mm of rain fell, which is three times the normal amount. While not a record, it was the wettest July in 89 years. More incredible, the number of rain days tallied 20, one less than the record in July 1993. Included was an astounding 10 days in a row covering all days of the Calgary Stampede following the opening day parade. Repetitive and steady storms left Stampede Park constantly drenched and muddy. Not surprising, the Greatest Show recorded its lowest attendance in 22 years. Adding to the month's weather misery, storms were mostly intense and ferocious with 21 thunderstorms (43 hours' worth) – an anomaly in a city that sees an average of about 28 thunderstorm days a year. Fog appeared on six days [normal less than one]. Late July hail added further costs, and many businesses and outdoor events took a financial bath.

Edmonton's July misery

Edmonton didn't have the impressive rain amounts (102 mm) of Calgary, but it was no less water tortured. The Alberta capital had 18 thunderstorm days [normal is 10] and 40 hours of thunderstorms. There were 87 hours of rain, 19 days with humidex above 25 – with some days between 30 and 32, five fog days, 19 wet days and four more with traces.

Manitoba's four-tornado day

A strong cold front moved across the eastern Prairies on August 8 triggering severe thunderstorms along the way. The system produced four tornadoes in the Parklands area of Manitoba: between Binscarth and Russell (EF-0); in Waywayseecappo (EF-2); northeast of Erickson and Otter Lake (EF-2); and in Elphinstone (EF-0). The

disturbance produced toonie-sized hail in Minnedosa and ping pong ball-sized hail in Erickson. Lightning shattered trees and both twirling and straight-line winds wrecked farm buildings, sheds, carports and play structures in yards. Winds also overturned a school bus but without injuries.

Outdoor hockey delayed by good weather

On October 23, over 33,000 fans basked in gorgeous Manitoba sunshine waiting for a mid-afternoon outdoor National Hockey League game between the Jets and Oilers. Puck-dropping at the Heritage Classic was delayed almost two hours later than expected because of sun glare off the ice. Organizers cited player safety concerns and had to wait for the sun to move behind the stadium infrastructure.

Brandon's soaking in October

Across western Manitoba, it was the rainiest October on record by far. At Brandon, with records dating back to 1890, 118.8 mm of rain fell or 3.92 times normal. There were 13 wet days and six with traces. The previous wettest October was 67.2 mm in 1967. Taken together, September and October had 209 mm of rain or 282 per cent of normal – also a new record. For growers totally into the harvesting period it was a serious setback.

British Columbia

Deadly avalanche season

Some of the deadliest avalanche seasons are El Niño years. In 2016, British Columbia had its deadliest avalanche season in eight years. On January 29, five snowmobilers from Alberta died in a massive avalanche east of McBride, a popular sledding area close to the British Columbia/Alberta border. Earlier in the week, heavy rain was followed by a metre of fresh snow. Further, it was mild then cold, which created stresses in the snowpack and increased the avalanche risk. Two more Alberta skiers died in an avalanche on March 14 near Blue River, with another in late September when an experienced skier was swept off a 100-m cliff by a small avalanche on Mount Victoria.

Deadly March winds

A severe windstorm packing winds of 100 km/h whipped across British Columbia's South Coast on the morning of March 10. Blustery wet weather led to flooding, school closures, travel disruptions and power outages for 120,000 hydro customers. In one tragedy, a woman died when a tree crashed through her Port Moody home.

Spring fires and floods in northeast

Hot and dry spring weather and a scanty snowpack allowed for an early and intense start to the wildfire season in northeastern British Columbia. Forests, grasslands and woodlands were dry and primed for fire on April 19 when strong winds fanned forest flames that prompted evacuations around Fort St. John and in Prince George. On June 15, massive rains caused floodwaters to rush through Dawson Creek leaving behind a trail of destruction. Other soaked and flooded communities included Fort St. John and Chetwynd. In some areas, up to 130 mm of rain fell, shattering all-time rainfall records

and turning creeks into major water courses, washing out roads and bridges, and damaging power lines.

Record-low water levels

Too many dry days between April and August left the Cowichan River with water levels much below normal. Total rainfall over the five months was 36 per cent of normal. At the end of May, according to the Cowichan Valley Regional District, Cowichan Lake was about 46 per cent full – the lowest late-May level since the weir was built in 1957. Over half of the province's observed wells reported below-normal levels. Officials urged residents to voluntarily conserve water, cutting usage by 30 per cent.

BC summer heat wave

In mid-August, a strong high-pressure system became stationary offshore. Twenty communities broke afternoon temperature records including 34.9°C at Chilliwack, 36.4°C at Squamish and 32.3°C at Victoria, with many readings eclipsing the previous daily records by 3 to 5°C. A campfire ban covering all provincial parks on Vancouver Island and the Lower Mainland went into effect due to dangerously dry conditions.

Trilogy of October storms

Following the Thanksgiving weekend, a trio of major storms over four days pounded the province's South Coast unleashing heavy rains and powerful winds. The first storm came on the morning of October 12, the second arrived two days later and the third hit the day after that. The first two storms packed a solid punch in both rain and wind, but the third storm was expected to hit harder coming out of the remains of small but powerful Typhoon Songda. In the end, the third storm made only a glancing blow. Taken separately, none of the three storms was particularly concerning, but it was their arrival in short succession with prolonged rainfall upwards of 200 mm that led to localized flooding and overflowing rivers. The three storms affected 285,000 customers with power outages, with some losing power more than once.

Umbrella fatigue

Vancouver recorded 203.4 mm of rain in October, which was much more than the normal rain total of 120 mm. And while it was far from the wettest October on record, the city eclipsed a new record number of wet days – 28 days with measurable rain – breaking the previous record of 26 days in October 1967 and 1985. There were eight wet days in a row at month's beginning, followed by 20 consecutive days and another 2 days in November. Like Vancouver, Victoria also recorded less rain than the previous record, but it was the second wettest October. It also broke the record for the greatest number of wet days at 27. In Vancouver, November was even wetter but on fewer days – 240 mm on 25 days.

Sunken tug leaks fuel

A 30-m tug boat loaded with 225,000 litres of diesel ran aground on October 13 and partially sank in 9 metres of water just west of Bella Bella. Fuel leaked into the pristine waters and shellfish-rich beds off British Columbia's Great Bear Rainforest. Crews scrambled to contain and clean up the diesel spill, but adverse weather – including

winds of 65 to 90 km/h and tricky currents – complicated clean-up and salvage efforts. Bad weather the next four weeks kept crews from finishing the clean-up and raising the sunken tug.

November flooding

The Tseshaht First Nation near Port Alberni declared a state of emergency after heavy rainfall caused significant flooding along the Somass River in early November. A series of storms dropped 150 to 300 mm of rain in mid-Vancouver Island. Water levels in rivers and reservoirs ran high, prompting authorities to release waters to prevent further flooding. On the mainland, scores of Pemberton residents experienced flood damage as the Lillooet River and surrounding creeks and tributaries breached their banks. Besides heavy rains, unseasonably warm weather melted snows in the upper reaches of the watersheds, which added to the flooding.

The North

January warm and windy on Baffin

A southeasterly flow of air originating from the Atlantic Ocean brought snow, strong easterly winds and very mild temperatures to much of the eastern and high Arctic on January 12. The strong winds up to 124 km/h at Pangnirtung led to power outages and property damage. Debris from building material flew through the air in Grise Fiord damaging hydro lines and cutting off half of the community's electricity supply. More spectacular was the very mild air, with temperatures hovering around the freezing mark and – at some stations – as much as 4 to 8°C greater than the previous record for the day.

Thundersnow over Yellowknife

A freak storm brought thundersnow to Yellowknife on April 18 when warm southern air collided with a cold Arctic front. Thunderstorms are not common in the North but are rare outside of summer. The low-pressure system and undercutting cold front provided the impetus for the thunderstorm that developed. It completely lit up Environment Canada's lightning detection system when sensors recorded 4,000 lightning strikes as the storm passed over northern British Columbia, the Yukon and the Northwest Territories.

Quiet forest fire season

In the Yukon, wildfires during the third week of April made one of the earliest appearances of the season in recent years. Across the Northwest Territories, ample spring rains kept the forest fire risk down, but hot July weather sparked several active blazes. In early August, wildfires burned near transmission lines connected to the Snare hydroelectricity facility triggering short power outages in communities across the North Slave. Overall, however, it was a quiet forest fire season.

Iqaluit snowfall in April

Iqaluit experienced an exceptionally snowy period from late March to mid-April. During a 20-day stretch that began March 26, there was 160 hours of snow that dropped about

56 cm in total – seven times the amount of snow the city would normally receive during that time.

Canada's blowing snow capital

Iqaluit lays claim to many winter weather superlatives including the coldest, highest wind chills and longest snowcover season. It is also tops in days and hours with blowing snow. From January 1 to April 14, the number of days and hours with an occurrence of blowing snow in the Nunavut capital numbered 66 days and 1,059 hours. Normal figures for the same period are 29 days and 268 hours.

Record wet July for Iqaluit

A very slow-moving, low-pressure system over Ungava Bay tapping moisture off the Atlantic Ocean produced significant rainfalls over Iqaluit on July 21 and 22. The soaking lasted 30 hours and brought a two-day total of 80.5 mm – the second highest two-day total on record for the community. The wet weather persisted for the last three weeks of July with rain occurring on 19 of the final 23 days. The wet spell helped to make the month's total precipitation of 131 mm the second wettest on record, topped only by 157 mm in 1959.