

CLIMATE DISASTERS IN MICHIGAN

With Trump gutting FEMA and fighting with state governments, what is in store for the rest of 2020 for Michigan?

TL/DR:

Trump has [failed to prepare us](#) for disasters caused by climate change. What does this mean for Michigan?

- In Michigan, increases in precipitation due to climate change are driving extreme flooding costing Michiganders billions of dollars.
 - Due to projections that the lakes surrounding Michigan will remain [inches above](#) their average level through the end of 2020, and precipitation will remain [heavier than average](#), it is expected that water levels will continue to [overwhelm](#) Michigan infrastructure that was built for different conditions.
 - From 2009 through 2019, Michigan [experienced](#) 3 flood events that caused a total of \$12 billion in damages and resulted in 5 deaths.
 - This May, historic flooding overwhelmed Midland, Michigan,
 - Parts of lower Michigan received 7 inches of rain
 - Floodwaters [caused two dams to fail](#)
 - 10,000 residents in Midland County were forced to evacuate
 - A Dow Chemical superfund site is [at risk](#) of spilling toxic chemicals, though it's too soon to assess the damage
- In addition to flooding, Michiganders face severe winter storm events due to climate change:
 - [Severe storms have been linked to climate change](#), as hotter air carries more moisture, leading to more frequent and more intense storms.
 - The National Weather Service predicts [higher than average](#) precipitation in Michigan this summer, and U Mich scientists [predict](#) climate change will increase the intensity and area affected by lake-effect snow.
 - Since 2009, Michigan has [experienced](#) 9 severe storm events, causing \$15.4 billion in damages and resulted in 67 deaths
- In Michigan, climate change is also [spurring an increase](#) in drought conditions:

- Michigan is projected to [experience](#) higher than average temperatures through the end of 2020.
- Since 2009, Michigan has [experienced](#) 2 periods of drought and extreme heat, totaling \$45.9 Billion in damages and 176 deaths.

HERE'S WHAT'S HAPPENING:

With Trump gutting FEMA and fighting with state governments, Michiganders should be asking [how ready the federal government is](#) to provide aide in a disaster at a time when climate change is already fueling major disasters that impact Michigan

Increased precipitation, water level rise, and earlier snowmelt are oversaturating the soil with water, leading to increased flood risk. Michigan was hard hit by the ongoing heavy rainfalls in 2019 that led to flooding that cost over \$10.8 billion in damages across the Midwest. Scientists said that climate change played a role.

This year, [it is happening all over again](#), with storms dumping 3-4 inches of rain in a short period of time over central Michigan, forcing evacuations as [two dams failed](#) in Midland County.

There are 20 toxic sites around Michigan that are at risk of spilling dangerous contaminants in a flood. One of those toxic sites is operated by Dow Chemical along the Tittabawassee River in Midland.

As the Superfund sites in Michigan are at risk of flooding, Trump and his team have worked to gut EPA's Superfund Program and put polluters in charge of national toxic cleanup nationwide. In 2018, Trump tapped Peter Wright, a former Dow Chemical industry lawyer to run EPA's Office of Land and Emergency Management (OLEM) which oversees the cleanup of the nation's superfund sites. Wright led the effort to delay cleanup of Dow's Midland, Michigan site – the same one now at risk.

Climate change is wreaking sweeping changes on the Great Lakes region: in April, the Army Corps Of Engineers [reported](#) the highest water level ever recorded in Lakes Huron and Michigan. Their projection is that these lakes, which surround Michigan, will remain 4 to 7 inches above their current level through the end of the summer, an increase [equivalent](#) to around 10 trillion gallons of water.

Driving this mammoth water level rise is a historic rise in precipitation. The 2014 National Climate Assessment [predicted](#) more frequent heavy precipitation events, and noted that over the last 7 decades, the Great Lakes region has experienced 37% more precipitation.

RESEARCH

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DAMAGES FROM CLIMATE-RELATED DISASTERS IMPACTING MICHIGAN

In The Past Decade, Michigan Has Experienced 16 Climate-Related Disasters Responsible For Over A Billion Dollars' Worth Of Damages. According to NOAA's National Centers for Environmental Information, Michigan experienced 16 climate-related disasters that were responsible for over a billion dollars' worth of damages. These 16 disasters that occurred between 2009 and 2019 include 10 severe storms, 2 winter storms, 2 droughts, and 2 flooding events. [ndcd.noaa.gov, Accessed 4/30/2020]

Since Trump Assumed The Office Of The Presidency, Michigan Has Experienced 6 Climate-Related Disasters Responsible For Over A Billion Dollars' Worth Of Damages. According to NOAA's National Centers for Environmental Information, since President Trump assumed office in 2017, Michigan has experienced 6 climate-related disasters responsible for over a billion dollars' worth of damages. [ndcd.noaa.gov, Accessed 4/30/2020]

- **All Six Climate-Related Disasters Witnessed By Michigan Since Trump Assumed The Presidency Caused A Total Of Between \$1 To \$2 Billion Dollars' Worth Of Damages And 24 Deaths.** According to NOAA's National Centers for Environmental Information, since President Trump assumed office in 2017, Michigan has experienced 6 climate-related disasters. These six climate-related disasters, including five severe storms and one flooding event, together are responsible for between \$1 and \$2 billion dollars' worth of damages and 24 deaths. [ndcd.noaa.gov, Accessed 4/30/2020]

RECENT FEMA SPENDING IN MICHIGAN

2019: FEMA Obligated No Public Funds To Michigan. According to data from the Federal Emergency Management Agency, Michigan was obligated no public funds for disaster relief in 2019. [[FEMA.Gov](https://fema.gov), Accessed 5/21/2020]

FLOODING

Link to Climate Change

Scientists Have Linked Increases in Flooding to Climate Change. According to the National Climate Assessment, "Floods are caused or amplified by both weather- and human-related factors. Major weather factors include heavy or prolonged precipitation, snowmelt, thunderstorms, storm surges from hurricanes, and ice or debris jams [...] Increasingly, humanity is also adding to weather-related factors, as human-induced warming increases heavy downpours, causes more extensive storm surges due to sea level rise, and leads to more rapid spring snowmelt [...] The risks from future floods are significant, given expanded

development in coastal areas and floodplains, unabated urbanization, land-use changes, and human-induced climate change” [National Climate Assessment, Extreme Weather, [2014](#)]

Scientists Say Climate Change Played A Hand In Deadly 2019 Midwest Floods. In March of 2019, Reuters reported: “Climate change played a hand in the deadly floods in the U.S. upper Midwest that have damaged crops and drowned livestock, scientists said on Thursday, while a Trump administration official said more homework was needed before making that link. The “bomb cyclone” that dumped rain on Nebraska, Iowa and Missouri and killed at least four people now threatens a wider region downstream of swollen rivers and smashed levees. Manmade greenhouse gases trap heat in the atmosphere, warming the oceans and making the air above them more humid, scientists said. When a storm picks up and eventually spits out that moisture, it can be devastating for people caught below. ‘The atmosphere is pretty close to fully saturated, it’s got all the water it can take,’ said Michael Wehner, a senior scientist at the Lawrence Berkeley National Laboratory.” [[Reuters, 3/21/2019](#)]

2020 Season Outlook

Lakes Surround Michigan Expected To Break Record Water Levels This Year By 4-7 Inches Each Month Through July, Army Corps Of Engineers Hydrologists Say. In a blog post, weather.com wrote: “According to Lauren Fry, a hydrologist with the U.S. Army Corps of Engineers, all but Lake Ontario are expected to set records this summer. Fry also told weather.com that it could be worst for Lakes Michigan and Huron, which are forecast to break their water-level records by 4 to 7 inches each month through July.” [The Weather Company, [5/5/20](#)]

National Weather Service Predicted Higher than normal precipitation in Michigan through Summer 2020. According to the National Weather Service, precipitation in Michigan has a 33-40% chance of being higher than normal from June-August 2020, placing it in the ‘likely to be above normal’ category for precipitation. [National Weather Service, [accessed 5/23/20](#)]

Army Corps of Engineers predicts Lakes Huron and Michigan water levels to remain 3-5 inches above average through fall 2020. The 2020 Army Corps of Engineer forecast predicted that the two lakes which border Michigan, Lakes Huron and Michigan, would remain at 3-5 inches above their average level through the end of October 2020. [Army Corps of Engineers, [accessed 5/23/20](#)]

Scientists Warned Climate Change Makes Rain Likely To “Come In Bursts That Overwhelm [The Infrastructure] That Accommodate What Historically Were Normal Amounts Of Water” In Michigan. “A warming climate is causing increasingly wet weather in Michigan, he said. Instead of slow drizzles, precipitation is more likely to come in bursts that overwhelm the wetlands, storm sewer systems and rivers that accommodate what historically were normal amounts of water.” [Lansing State Journal, [2/24/20](#)]

May 2020 Flooding

5/19/2020 Freep Headline: "River Flooding Causes Evacuations In Michigan As Heavy Rain Sets Records." On May 19, 2020, the Detroit Free Press reported: "Heavy rains over the last few days doused Michigan, prompting flood warnings along rivers across the state and forcing some residents to evacuate their homes and navigate water-logged roads. At least two rivers in mid-Michigan — the Tittabawassee River in Midland and the Rifle River near Sterling — had reached their major flood stage Tuesday afternoon. Moderate flooding has been observed at a handful of other rivers in mid-Michigan as well as the west and southwest portions of the state, according to the National Weather Service. Meteorologists say areas around Midland logged 3 to 4 inches of rain since Sunday. This produced a 'tremendous' amount of runoff that the National Weather Service said is causing significant rises on the river system." [[Detroit Free Press, 5/19/2020](#)]

5/19/2020: Floodwaters Caused A Dam To Fail, Forcing Evacuations In Midland County. On May 19, 2020, The Weather Channel reported: "Residents in two central Michigan towns were told to evacuate immediately Tuesday evening after floodwaters caused a dam to fail. Emergency officials in Midland County, about 150 miles north of Detroit, had earlier warned residents along Wixom and Sanford lakes that the Edenville Dam was in danger of failure. They told residents to leave immediately around 6:15 p.m. EST when the dam could no longer hold back the water flowing through its flood gates." [[The Weather Channel, 5/19/2020](#)]

CNN Headline: "Thousands In Michigan Evacuate After 2 Dams Are Breached, And The Governor Warns City Could Soon Be Under '9 Feet Of Water'" On May 20, 2020, CNN reported: "A rain-swollen river has breached two dams and flooded fields and streets in parts of mid-Michigan, forcing evacuation orders for thousands amid a coronavirus pandemic that's posing safety challenges Wednesday for officials trying to provide shelter. Parts of the city of Midland and surrounding areas were virtual lakes Wednesday morning, and it could get worse. Downtown in Midland, a city of about 41,000 people downstream of the dams, could eventually be 'under approximately 9 feet of water' on Wednesday, Gov. Gretchen Whitmer said the prior night." [[CNN, 5/20/2020](#)]

New York Times Headline: "Dam Disaster Threatens Major Dow Chemical Complex and Superfund Project." On May 20, 2020, the New York Times reported: "Floodwaters from two breached dams in Michigan on Wednesday surged toward a sprawling Dow chemical complex and a vast Superfund toxic-cleanup site downriver, raising concerns of wider environmental fallout from the dam disaster and historic flooding. The compound, which also houses the chemical giant's world headquarters, lies on the banks of the Tittabawassee River in Midland, a city that emergency officials say could soon be under as much as nine feet of water. Kyle Bandlow, a Dow spokesman, confirmed that floodwaters had reached the site's outer boundaries and were entering ponds designed to hold runoff of water used on the site." [[New York Times, 5/20/2020](#)]

2019 Floods

March 2019: Missouri River And North Central Flooding Caused \$10.9 Billion In Damages And Resulted In 3 Deaths. According to NOAA's National Centers for Environmental Information, flooding of the Missouri River and in the North Central U.S., which hit Michigan in March 2019, caused \$10.9 billion in damages and resulted in 3 deaths. [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

- **Michigan Was One Of Eight States Most Effected By The Historic Midwest Flooding, Which Was One Of The Costliest U.S. Inland Flooding Events On Record.** According to NOAA's National Center for Environmental Information, "Historic Midwest flooding inundated millions of acres of agriculture, numerous cities and towns, and caused widespread damage to roads, bridges, levees, and dams. The states most affected were Nebraska, Iowa, Missouri, South Dakota, Minnesota, North Dakota, Wisconsin and Michigan. This flood was triggered by a powerful storm with heavy precipitation that intensified snow melt and flooding. [...] This historic flooding was one of the costliest U.S. inland flooding events on record." [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

2014 Floods

August 2014: Michigan And Northeast Flooding Caused \$1.1 Billion In Damages And Two Deaths. According to NOAA's National Centers for Environmental Information, flooding in Michigan and across the Northeast caused \$1.1 billion in damages and two deaths. [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

- **Heavy Rainfall In Excess Of Five Inches Caused Significant Flooding Across Michigan, Damaging Thousands Of Automobiles, Businesses, Homes And Other Infrastructure.** According to NOAA's National Centers for Environmental Information, "Heavy rainfall in excess of 5 inches caused significant flooding in cities across Michigan damaging thousands of cars, business, homes and other infrastructure. Flooding also occurred across Maryland and New York's Long Island, as the slow-moving storm system delivered 24-hour rainfall exceeding 6 and 12 inches, respectively, creating more flood damage." [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

SEVERE STORMS

Link to Climate Change

Heavy Rainstorms Have Become Heavier And More Frequent In The U.S. In The Past Three To Five Decades. According to the National Climate Assessment, "Heavy downpours are increasing nationally, especially over the last three to five decades. The heaviest rainfall events have become heavier and more frequent, and the amount of rain falling on the

heaviest rain days has also increased. ” [National Climate Assessment, Extreme Weather, [2014](#)]

- **The Midwest And Northeast Have Seen A 30% Increase In Very Heavy Precipitation Over The 1901-1960 Average - The Largest Increase In The Nation. According to the National Climate Assessment, "Since 1991, the amount of rain falling in very heavy precipitation events has been significantly above average. This increase has been greatest in the Northeast, Midwest, and upper Great Plains – more than 30% above the 1901-1960 average. There has also been an increase in flooding events in the Midwest and Northeast, where the largest increases in heavy rain amounts have occurred." [National Climate Assessment, Extreme Weather, [2014](#)]**

Scientists Have Linked An Increase in Heavy Downpours To Climate Change. According to the National Climate Assessment, "Global analyses show that the amount of water vapor in the atmosphere has in fact increased due to human-caused warming. This extra moisture is available to storm systems, resulting in heavier rainfalls." [National Climate Assessment, Extreme Weather, [2014](#)]

Winter Storms Have Increased In Frequency And Intensity Since 1950. According to the National Climate Assessment, "Winter storms have increased in frequency and intensity since the 1950s, and their tracks have shifted northward over the United States." [National Climate Assessment, Extreme Weather, [2014](#)]

Scientists Have Linked Increases In Heavy Snowfall Events to Climate Change. According to Climate Signals (a project of the nonprofit Climate Nexus), climate change is responsible for "increasing the frequency of extreme snowfall events." [Climate Signals, [accessed 5/21/20](#)]

2020 Season Outlook

National Weather Service Predicted Higher than normal precipitation in Michigan through Summer 2020. According to the National Weather Service, precipitation in Michigan has a 33-40% chance of being higher than normal from June-August 2020, placing it in the 'likely to be above normal' category for precipitation. [National Weather Service, [accessed 5/23/20](#)]

Army Corps of Engineers predicts Lakes Huron and Michigan water levels to remain 3-5 inches above average through fall 2020. The 2020 Army Corps of Engineer forecast predicted that the two lakes which border Michigan, Lakes Huron and Michigan, would remain at 3-5 inches above their average level through the end of October 2020. [Army Corps of Engineers, [accessed 5/23/20](#)]

U Mich Scientists Predicted That Climate Change Would Decrease Non-Lake Effect Snow In Michigan, But "Increase Lake-Effect Snowfall And An Expansion Of The Lake-Effect Zone." According to a study from the Great Lakes Integrated Sciences & Assessments, a department of both NOAA and U Michigan, climate change is likely to cause the following changes in

Michigan snowfall: "There is a lot of evidence that snow is changing in the Great Lakes region, but the changes are not uniform. While snowstorms that impact the entire region are decreasing, lake-effect snowfall is increasing around Lakes Superior and Michigan. Snow depths going into spring are decreasing as warming occurs, and earlier spring snowmelt is occurring. We have a situation where there is more snow during storms, but the faster melting means that snow cover is less in late winter and early spring. Projections of future climate in the Great lakes, and especially future snow, have a lot of uncertainty. Global climate models are not a reliable source of information for lake-effect snowfall, and regional climate and weather models play a role in filling that gap. [...] Lake ice cover has been decreasing in recent years, which has been accompanied by increases in lake water temperature (due to increasing air temperatures). Models run under these conditions predict increasing lake-effect snowfall and an expansion of the lake-effect zone, which is consistent with what has already been observed." [Great Lakes Integrated Sciences & Assessments, [accessed 5/25/20](#)]

Heavy Precipitation Events Projected To Increase Nationwide. According to the 2014 National Climate Assessment, "Projections of future climate over the U.S. suggest that the recent trend towards increased heavy precipitation events will continue. This is projected to occur even in regions where total precipitation is projected to decrease, such as the Southwest." [National Climate Assessment, [2014](#)]

2020 Severe Storms

January 2020: Southeastern Tornadoes And Northern Storms And Flooding Caused \$1.1 Billion In Damages And 10 Deaths. According to NOAA's National Centers for Environmental Information, Southeastern Tornadoes and Northern Storms and Flooding, which hit Michigan in January 2020, caused \$1.1 billion in damages and resulted in 10 deaths. [[ncdc.noaa.gov](#), [Accessed 4/30/2020](#)]

- **Michigan Was Impacted By Storms And Severe Flooding That Caused Significant Damage Along The Shoreline Of Lake Michigan.** According to NOAA's National Centers for Environmental Information, "More than 80 tornadoes and severe storms caused damage across many southeastern states (AL, AR, GA, IL, IN, KY, LA, MS, MO, NC, OH, SC, TN, TX, VA, WI). Storms and severe flooding also impacted northern states including Michigan, Wisconsin and New York. Significant damage occurred along the shoreline of Lake Michigan to roads, the foundation of homes and to Port Milwaukee. These powerful waves were generated by high winds and a lack of seasonal ice cover." [[ncdc.noaa.gov](#), [Accessed 4/30/2020](#)]

2018 Severe Storms

May 2018: Central And Northeastern Severe Weather Caused \$1.4 Billion In Damages And Zero Deaths. According to NOAA's National Centers for Environmental Information, severe weather across Central and Northeastern U.S. that hit Michigan in May 2018 caused \$1.4 billion in damages and zero deaths. [[ncdc.noaa.gov](#), [Accessed 4/30/2020](#)]

April 2018: Southern And Eastern Tornadoes And Severe Weather Caused \$1.4 Billion In Damages And 3 Deaths. According to NOAA's National Centers for Environmental Information, Southern and Eastern Tornadoes and Severe Weather that hit Michigan in April 2018 caused \$1.4 billion in damages and 3 deaths. [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

- **Michigan Was One Of Fifteen States That Experienced Damage From Tornadoes And Severe Storms With Large Hail.** According to NOAA's National Centers for Environmental Information, "Tornadoes and severe storms with large hail cause widespread damage across many Southern and Eastern states (AR, FL, GA, LA, MD, MI, MS, MO, NJ, NY, NC, PA, SC, TX, VA) over a multi-day period [...] This same system also caused winter storm impacts of high wind and ice accumulation in northeastern states." [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

2015 Severe Storms

June 2015: Central And Northeast Severe Weather Caused \$1.3 Billion In Damages And One Death. According to NOAA's National Centers for Environmental Information, Central and Northeast Severe Weather that hit Michigan in June 2015 caused \$1.3 billion in damages and one death. [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

- **Michigan Was One Of 12 Impacted By Severe Storms, Widespread Hail And High Wind Damage.** According to NOAA's National Centers for Environmental Information, "Severe storms across numerous Central and Northeast states (CO, CT, IA, IL, MD, MI, NJ, NY, PA, SD, VA, WI) with widespread hail and high wind damage." [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

April 2015: Midwest/Ohio Valley Severe Weather Caused \$1.7 Billion In Damages And Two Deaths. According to NOAA's National Centers for Environmental Information, Midwest/Ohio Valley Severe Weather that hit Michigan in April 2015 caused \$1.7 billion in damages and two deaths. [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

- **Michigan Was One Of Several States Impacted By Storms Across The Midwest And Ohio Valley.** According to NOAA's National Centers for Environmental Information, "Severe storms across the Midwest and Ohio Valley including the states (AR, IA, IL, IN, KS, KY, MI, MO, NC, OH, OK, PA, TN, TX, WI, WV). Large hail and high winds created the most damage across Missouri and Illinois." [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

February 2015: Central And Eastern Winter Storms And A Cold Wave Caused \$3.3 Billion In Damages And 30 Deaths. According to NOAA's National Centers for Environmental Information, Central and Eastern Winter Storms and an associated cold wave that hit Michigan in February 2015 caused \$3.3 billion in damages and 30 deaths. [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

- **Michigan Was One Of Nineteen States Impacted By A Large Winter Storm And Associated Wave Of Cold Weather.** According to NOAA's National Centers for

Environmental Information, "A large winter storm and associated cold wave impacted many central, eastern and northeastern states (CT, DE, GA, IL, KY, MA, MD, ME, MI, NC, NH, NJ, NY, OH, PA, RI, SC, TN, VA)." [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

2014 Severe Storms

January 2014: Winter Storms Caused \$2.4 Billion In Damages And 16 Deaths. According to NOAA's National Centers for Environmental Information, a winter storm across the Midwest, Southeast and Northeast which hit Michigan in January 2014 caused \$2.4 billion in damages and 16 deaths. [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

- **Michigan Was One Of 17 States Impacted By Winter Storms That Caused Widespread Damage.** According to NOAA's National Centers for Environmental Information, "Winter storm caused widespread damage across numerous Midwest, Southeast and Northeastern states (AL, GA, IL, IN, KY, MD, MI, MO, MS, NC, NJ, NY, OH, PA, SC, TN, VA)." [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

2011 Severe Storms

July 2011: Severe Weather Across The Rockies And Midwest Caused \$1.4 Billion In Damages And Two Deaths. According to NOAA's National Centers for Environmental Information, severe weather across the Rockies and Midwestern states, which hit Michigan in July 2011, caused \$1.4 billion in damages and two deaths. [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

June 2011: Tornadoes And Severe Weather Across The Midwest And Southeast Caused \$1.8 Billion In Damages And Three Deaths. According to NOAA's National Centers for Environmental Information, tornadoes and severe weather across the Midwest and Southeast United States, which hit Michigan in June 2011, caused \$1.8 billion in damages and three deaths. [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

WILDFIRES

Link to Climate Change

Climate Change Is Increasing The Severity, Frequency, And Extent Of Wildfires. According to a report from the EPA: "Higher temperatures and drought are likely to increase the severity, frequency, and extent of wildfires in Colorado, which could harm property, livelihoods, and human health. In 2013, the Black Forest Fire burned 14,000 acres and destroyed over 500 homes. Wildfire smoke can reduce air quality and increase medical visits for chest pains, respiratory problems, and heart problems. The size and number of western forest fires have increased substantially since 1985." [[Environmental Protection Agency, "What Climate Change Means for Colorado" August 2016](#)]

Acres Burned By Wildfire Doubled In Recent Decades Due To Climate Change. According to the 2018 National Climate Assessment Report: "Wildfire is a natural part of many ecosystems in the Southwest, facilitating germination of new seedlings and killing pests. Although many ecosystems require fire, excessive wildfire can permanently alter ecosystem integrity. Climate change has led to an increase in the area burned by wildfire in the western United States. Analyses estimate that the area burned by wildfire from 1984 to 2015 was twice what would have burned had climate change not occurred. Furthermore, the area burned from 1916 to 2003 was more closely related to climate factors than to fire suppression, local fire management, or other non-climate factors." [National Climate Assessment, Chapter 25, 2018]

2020 Season Outlook

National Interagency Fire Center Predicts 'Normal' Risk of Wildland Fire In Michigan Through the End of Summer 2020. According to data from the National Interagency Fire Center, Michigan is forecast to have a 'normal' risk of wildland fire through August 2020. [National Interagency Fire Center, [accessed 5/25/20](#)]

National Weather Service Outlook Forecasts 33-40% Chance Of Higher Than Average Temperatures In Michigan June-August 2020. According to data from the National Weather Service, Michigan is likely to have higher than average temperatures between June and August 2020, with odds of higher than average temperatures at 33-40%. [National Weather Service, [accessed 5/23/20](#)]

National Weather Service Outlook Forecasts 40-50% Chance Of Higher Than Average Temperatures In Michigan September-November 2020. According to data from the National Weather Service, Michigan is likely to have higher than average temperatures between September and November 2020, with odds of higher than average temperatures at 40-50%. [National Weather Service, [accessed 5/23/20](#)]

The National Climate Assessment Has Found That The Number Of Wildfires Is Likely To Increase As The Climate Warms And Could Induce "Profound Changes To Certain Ecosystems." In August of 2018, The Atlantic reported: "As if there wasn't enough evidence of that. Last year, the National Climate Assessment—written by a panel of scientists in the military, federal civilian agencies, and private universities—reviewed the complete scientific literature on climate change and wildfires. They concluded that the number of large blazes had increased since the early 1980s. They also said the number of wildfires 'is projected to further increase in those regions as the climate warms.' They warned this could induce 'profound changes to certain ecosystems.'" [The Atlantic, [8/10/18](#)]

Recent History

In 2017, 736 Acres Of Land Were Burned Due To Wildfire In Michigan. According to the National Interagency Fire Center's 2017 report, 736 acres of land were burned in 270 fires across Michigan in 2017. [[National Interagency Fire Center, National Report of Wildland Fires and Acres Burned by State, 2017 Report](#)]

In 2018, 3,786 Acres Of Land Were Burned Due To Wildfire In Michigan. According to the National Interagency Fire Center's 2018 report, 3,786 acres of land were burned in 431 fires across Michigan in 2018. [[National Interagency Fire Center, National Report of Wildland Fires and Acres Burned by State, 2018 Report](#)]

In 2019, 1,128 Acres Of Land Were Burned Due To Wildfire In Michigan. According to the National Interagency Fire Center's 2019 report, 1,128 acres of land were burned in 361 fires across Michigan in 2019. [[National Interagency Fire Center, National Report of Wildland Fires and Acres Burned by State, 2019 Report](#)]

DROUGHT & EXTREME HEAT

Link to Climate Change

Scientists Have Linked Prolonged Heat Waves To Climate Change. According to the 2014 National Climate Assessment Report: "Analyses show that human-induced climate change has generally increased the probability of heat waves." [National Climate Assessment, Extreme Weather, [2014](#)]

Recent Heat Waves "Unprecedented" Since Records Began Over One Hundred Years Ago. According to the 2014 National Climate Assessment Report: "prolonged (multi-month) extreme heat has been unprecedented since the start of reliable instrumental records in 1895." [National Climate Assessment, Extreme Weather, [2014](#)]

National Climate Assessment Showed That Climate Change Is Affecting Us Now, Not Just In The Future. According to CNN, "An analysis by the environmental advocacy group the Sierra Club, released Monday, found nine instances in which Wheeler's statements about the delayed impact of climate change were directly contradicted in the National Climate Assessment, a government-sponsored climate analysis authored by scientists from 13 federal agencies that was released in November. (there is no link to this analysis because they gave it to us exclusively)" [CNN, [4/22/19](#)]

- **Higher Temperatures.** According to CNN, "Between 1901 and 2016, the global average temperatures 'have increased by 1.8 degrees Fahrenheit,' and there is no evidence that the rise in temperature has been caused by any 'natural explanation,' according to the report. 'The evidence consistently points to human activities, especially emissions of

greenhouse or heat-trapping gases, as the dominant cause,' the report states." [CNN, [4/22/19](#)]

- **Hotter Years.** According to CNN, "Each decade has been the hottest on record in succession over the past 30 years. Seventeen of the 18 hottest years on record have occurred since 2001, according to the report." [CNN, [4/22/19](#)]

NASA Research Showed Human Activity Has Been Influencing Global Patterns Of Drought, With Increased Drought Occurring In Response To Greenhouse Gas Emissions. According to NASA, "Warming temperatures and changing precipitation patterns can lead to droughts, and NASA research shows that humans have been influencing global patterns of drought for nearly a century. Kate Marvel and Ben Cook, researchers at NASA's Goddard Institute for Space Studies and Columbia University in New York City, investigated humans' influence on 20th-century drought patterns using historical weather data and drought maps calculated from tree rings. They found that a data 'fingerprint' – a drying and wetting pattern predicted to occur in response to greenhouse gas emissions – was visible as far back as the early 1900s." [[climate.nasa.gov, 6/13/2019](#)]

Climate Change Is Already Affecting Global Patterns Of Drought, And Such Trends Are Expected To Continue. According to NASA, "Demonstrating that humans influenced global drought patterns in the past is an important part of understanding how we may influence them in the future, said Cook. 'Climate change is not just a future problem,' he said. 'This shows it's already affecting global patterns of drought, hydroclimate, trends, variability — it's happening now. And we expect these trends to continue, as long as we keep warming the world.'" [[climate.nasa.gov, 6/13/2019](#)]

2020 Season Outlook

National Weather Service Outlook Predicted Michigan Would Not Experience Seasonal Drought In The Summer Of 2020. According to data from the National Weather Service's Drought Outlook, Michigan is not expected to experience seasonal drought in the summer of 2020. [National Weather Service, [accessed 5/26/20](#)]

National Weather Service Outlook Forecasts 33-40% Chance Of Higher Than Average Temperatures In Michigan June-August 2020. According to data from the National Weather Service, Michigan is likely to have higher than average temperatures between June and August 2020, with odds of higher than average temperatures at 33-40%. [National Weather Service, [accessed 5/23/20](#)]

National Weather Service Outlook Forecasts 40-50% Chance Of Higher Than Average Temperatures In Michigan September-November 2020. According to data from the National Weather Service, Michigan is likely to have higher than average temperatures between September and November 2020, with odds of higher than average temperatures at 40-50%. [National Weather Service, [accessed 5/23/20](#)]

2013 Drought & Heatwave

Spring – Fall 2013: Western Plains Drought And Heatwave Caused \$11.7 Billion In Damages And 53 Deaths. According to NOAA's National Centers for Environmental Information, droughts and heatwaves across the Western Plains, that impacted Michigan in the Spring and Fall of 2013, caused \$11.7 billion in damages and 53 deaths. [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

- **Michigan Was One Of 22 States That Experienced Moderate To Extreme Drought.** According to NOAA's National Centers for Environmental Information, "The 2013 drought slowly dissipated from the historic levels of the 2012 drought, as conditions improved across many Midwestern and Plains states. However, moderate to extreme drought did remain or expand into western states (AZ, CA, CO, IA, ID, IL, KS, MI, MN, MO, ND, NE, NM, NV, OK, OR, SD, TX, UT, WA, WI, WY). In comparison to 2011 and 2012 drought conditions the US experienced only moderate crop losses across the central agriculture states." [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

2012 Drought & Heatwave

2012: Nationwide Droughts And Heatwaves Caused \$34.2 Billion In Damages And 123 Deaths. According to NOAA's National Centers for Environmental Information, drought and heatwaves across the U.S. in 2012 caused \$34.2 billion in damages and 123 deaths. [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]

- **The 2012 Drought Impacted Over Half Of The U.S. And Was The Most Extensive Drought In America Since The 1930s.** According to NOAA's National Centers for Environmental Information, "The 2012 drought is the most extensive drought to affect the U.S. since the 1930s. Moderate to extreme drought conditions affected more than half the country for a majority of 2012. The following states were affected: CA, NV, ID, MT, WY, UT, CO, AZ, NM, TX, ND, SD, NE, KS, OK, AR, MO, IA, MN, IL, IN, GA. Costly drought impacts occurred across the central agriculture states resulting in widespread harvest failure for corn, sorghum and soybean crops, among others. The associated summer heatwave also caused 123 direct deaths, but an estimate of the excess mortality due to heat stress is still unknown." [[ncdc.noaa.gov](https://www.ncdc.noaa.gov), Accessed 4/30/2020]