Climate and Health Outlook

ISSUED JULY 2023

The Climate and Health Outlook is an effort to inform health professionals and the public on how our health may be affected in the coming months by climate events and to provide resources for proactive action. An associated webpage includes additional resources and information, including more detail on the wildfire and drought outlooks and populations at risk.

Northwest: Counties in Idaho (8), Oregon (7), and Washington (4) are projected to have more than five heat exceedance days* in July. Drought is favored to persist or develop in portions of northeast and west Washington, much of Oregon, and northern Idaho. Above normal wildland fire** potential is forecast for much of Washington and Oregon, and parts of northern Idaho.

Southwest: Counties in Arizona (14), California (10), Colorado (20), Nevada (9), New Mexico (15), and Utah (14) are projected to have more than five heat exceedance days in July. Drought is favored to persist in portions of southern California, northwest Arizona, central Utah, southern Nevada, and southern New Mexico. Drought development is likely for portions of northern California and southern New Mexico. Above normal wildland fire potential is forecast in portions of Arizona, Nevada, southern Utah, and southwest New Mexico. Below normal wildland fire potential is forecast for northeast New Mexico and across much of mountainous California.

Southern Great Plains: Counties in Kansas (37), Oklahoma (36), and Texas (122) are projected to have more than five heat exceedance days in July. Drought is favored to persist or develop in much of Texas and portions of Kansas and Oklahoma. Drought improvement and removal is favored for much Kansas. Above normal wildland fire potential is forecast for parts of west Texas.

Hawai'i and Pacific Islands: The central Pacific is forecast to experience an above-average hurricane season. Drought is favored to persist or develop in parts of Hawai'i. Above normal wildland fire is forecast for the Islands of Hawai'i.
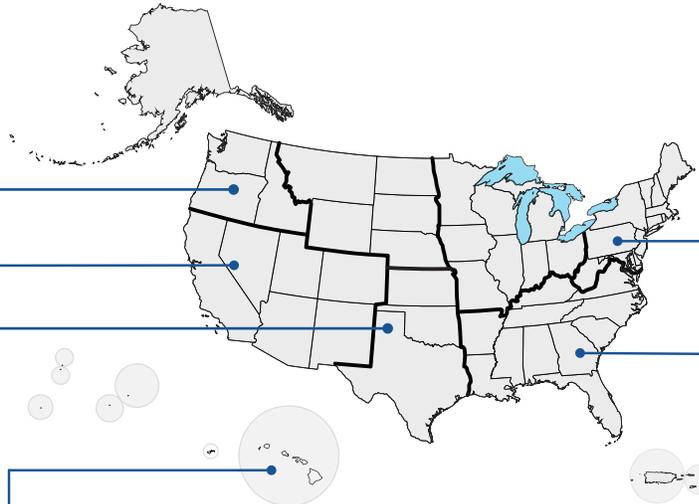
Northeast: Counties in Maryland (3), Pennsylvania (10), and West Virginia (7) are projected to have more than five heat exceedance days in July. Drought removal is likely in much of Pennsylvania and Maryland as well as parts of New Jersey, Vermont, New York, West Virginia, and Delaware. Drought improvement is likely in much of Maryland.

Southeast: The Atlantic basin is forecast to have a near-normal hurricane season. Counties in Alabama (9), Arkansas (9), Florida (1), Georgia (29), Kentucky (2), Louisiana (2), Mississippi (1), North Carolina (11), South Carolina (16), Tennessee (1), and Virginia (14) are projected to have more than five heat exceedance days in July. Drought removal is likely in parts of northern Alabama, northeast Arkansas, Kentucky, southern Louisiana, southern and eastern Tennessee, and northern Virginia.

Drought   Wildfire   Hurricane   Heat

*A "heat exceedance day" is when the daily maximum temperature is above the 95th percentile value of the historical temperature distribution in that county.
**Smoke from wildfires can impact health hundreds of miles from site of the fire.
Developed with data from the Centers for Disease Control and Prevention, the National Oceanic and Atmospheric Administration, and the National Interagency Fire Center.

We want to hear from you! Please send your feedback on ways to improve the Climate and Health Outlook to ocche@hhs.gov.

Where are extremely hot days expected in July?

Estimated extremely
hot days in July:

☐ <=1   ■ >5–10 days
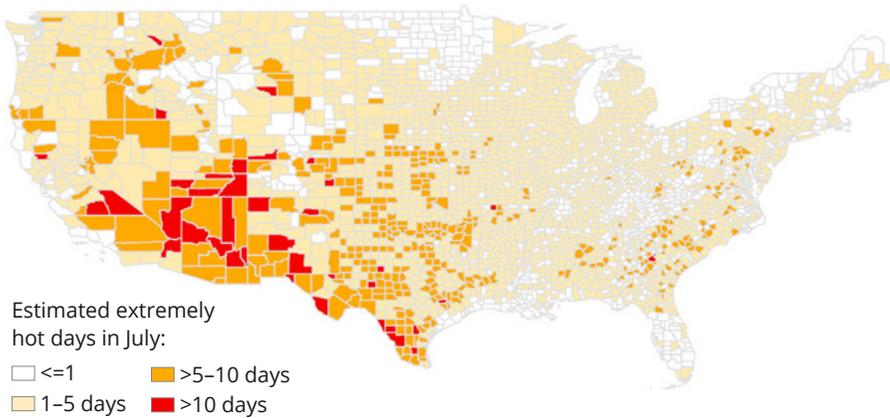■ 1–5 days   ■ >10 days

Figure: This map shows the expected number of extremely hot days in July in each county in the contiguous United States. The forecast is based on the NOAA Climate Prediction Center's probabilistic outlook of temperatures being above, below, or near normal in July. A county's 'normal' temperature is based on the 30-year average from 1991–2020. An 'extremely hot day' is when the daily maximum temperature is above the 95th percentile value of the historical temperature distribution in that county. For more information on your county, please refer to the Centers for Disease Control and Prevention (CDC) Heat and Health Tracker.

In July, **438 counties** across **32 states** are estimated to have more than five expected extremely hot days. In these counties, the total population at risk is **50,041,133 people**. Climate projections indicate that extreme heat events will be more frequent and intense in coming decades. In the U.S., an average of 702 heat-related deaths occur each year.

Heat Affects Health in Many Ways

Warmer temperatures increase the risk for a diverse range of health risks. For example:

An increased risk of **hospitalization for heart disease**.

Heat exhaustion, which can lead to **heat stroke** if not treated, can cause critical illness, brain injury, and even death.

Worsening **asthma** and **chronic obstructive pulmonary disease (COPD)** as heat increases the production of ground-level ozone.

Dehydration, which can lead to **kidney injury** and blood pressure problems. Some kidney damage can become irreversible with repeated or untreated injury.

Violence, **crime**, and **suicide** may increase with temperature, adding to the rates of depression and anxiety already associated with climate change.

Who is at high risk from heat in the counties with the most extreme heat days?

Some communities face greater health risks from extreme heat given various risk factors they face. These communities include people who: are elderly and live alone, have existing health conditions, have poor access to health-care, live in rural areas, work outdoors, make a low income, face difficulty paying utility bills, live in poor quality housing, and live in urban areas without adequate tree cover.

These risk factors vary across the 438 counties estimated to have more than 5 expected extremely hot days in July. Of these counties:

103 (24%) have a high number* of people aged 65 or over, living alone.

206 (47%) have a high number of people without health insurance.

216 (49%) have a high number of uninsured children.

112 (26%) have a high number of people living in rural areas.

99 (23%) have a high number of people with frequent mental distress.

101 (23%) have a higher number of people with diabetes.

116 (26%) have a high number of people employed in construction.

153 (35%) have a high number of people living in poverty.

88 (20%) have a high number of people spending a large proportion of their income on home energy.

107 (24%) have a high number of people with severe housing cost burden.

113 (26%) have a high number of people with electricity-dependent medical equipment and enrolled in the HHS emPOWER program.

146 (33%) have a high number of people in mobile homes.

78 (18%) have a high number of people living in areas without adequate tree cover.

174 (40%) are identified as highly vulnerable by CDC's Social Vulnerability Index.

*"A high number" indicates that these counties are in the top quartile for this indicator compared to other counties

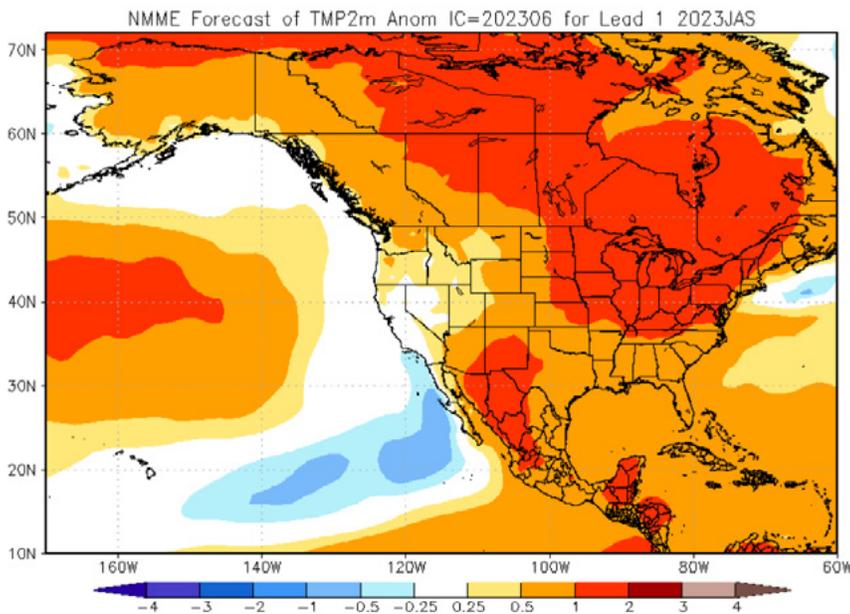# How hot will it be, and where, over the next 3 months?

Figure: The North American Multi-Model Ensemble (NMME) predicts that average temperature over the next 3 months (July–September) will be 0.45–3.6°F (0.25–2°C) hotter than average across much of the contiguous United States. For more information about this model or prediction, please refer to the NMME website.

For July–September, the North American Multi-Model Ensemble (NMME) predicts that the average temperature will be 0.45 to 3.6°F (0.25 to 2°C) above normal for most of the continental United States. However, nearly all of the Midwest and much of the Northeast regions may experience a higher 90-day average that is 3.6°F (2°C) above the normal average temperature for this period. The NMME integrates multiple forecasts of the next 90 days to build the best estimate of temperatures and precipitation over that time frame. Note that although many regions across the continental United States may expect a warmer 90-day average temperature, this is not the same as your local weather forecast, in which large fluctuations in temperature may be predicted from day to day.

Earth saw its 3rd-warmest May in 174 years

According to the National Oceanic and Atmospheric Administration, May 2023 was the world's third-warmest May on record and North America's warmest May on record. Due in part to North America's record-setting high temperatures, several hundred wildfires broke out across Canada in May, burning over 6 million acres and causing widespread air quality deterioration across much of Canada and the United States. Elsewhere in the world, Antarctic sea ice extent hit a record low in May and tropical cyclone Mocha made a devastating landfall as a Category 4 Cyclone in Myanmar on May 14. Earth's ocean surface temperatures also set a record high for the second month in a row.

Federal Heat-Related Funding Opportunities

A new resource from the National Integrated Heat Health Information System and the White House Extreme Heat Interagency Working Group highlights federal funding opportunities that are relevant to heat made available through the Inflation Reduction Act and the Bipartisan Infrastructure Law. These opportunities are open for applications from state, local, territorial, and Tribal governments; nonprofit organizations; manufacturers; and more. The webpage will be updated weekly as new funding opportunities become available.

Protecting Vulnerable Patient Populations from Climate Hazards: A Referral Guide for Health Professionals

The Office of Climate Change and Health Equity's new Referral Guide summarizes federal resources that can address patients' social determinants of health and mitigate health harms related to climate change. These resources include social services and assistance programs to which patients can be referred, as well as references for anticipatory guidance and counseling to help patients prepare for potential hazards.

The Guide also includes case stories illustrating how these resources can be used in practice. For example,

La Maestra Community Health Centers cared for a patient who, because of her utility insecurity, age, and social isolation, was at risk for health harms from extreme heat exposure. She also required access to refrigeration for essential medications, making her additionally vulnerable to utility disruptions. The patient's health risk from these climate-related hazards was reduced by La Maestra's care team's interventions to address her unmet health-related social needs, including referrals to HHS's Low Income Home Energy Assistance Program, Department of Energy's Weatherization Assistance Program, and Medicare resources for essential equipment.
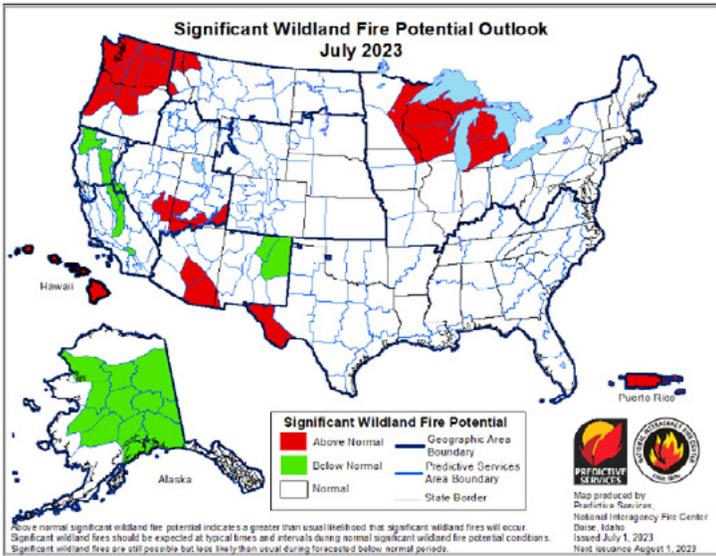
Figure: The National Significant Wildland Fire Potential Outlook identifies areas with above, below, and near normal significant fire potential using the most recent weather, climate, and fuels data available. These outlooks are designed to inform decision makers for proactive wildland fire management.

Above normal significant fire potential is expected to expand across much of Washington and portions of Oregon, Nevada, Idaho, and Montana in July. Above normal significant fire potential is also expected in parts of the Great Lakes and eastern Texas in July due to recent drying and forecast dry conditions. Below normal significant wildfire potential is forecast for much of the Alaskan Interior and south-central Alaska. Below normal significant fire potential continues across the Sierra and northwest California mountains in July. Wildfire smoke can impact the health of people close to the fire and at distances far from fire impacted areas, depending on meteorological conditions, such as wind speed and direction.

Who is at high risk in the counties with above normal wildland fire potential in July?

Wildland fires are occurring more frequently in the United States and present a health hazard for populations living close to a fire. As indicated in the map to the left, **319 counties** across **16 states** are projected to have above-normal wildfire potential in July. In these counties, the total population at risk is **42,515,102 people**. Of these counties:

94 (29%) have a high number* of people aged 65 or over, living alone.

22 (7%) have a high number of people without health insurance.

38 (12%) have a high number of uninsured children.

30 (9%) have a high number of people with frequent mental distress.

99 (31%) have a high number of adults with asthma.

64 (20%) have a high number of adults with coronary heart disease.

29 (9%) have a high number of people living in poverty.

91 (29%) have a high number of people with electricity-dependent medical equipment and enrolled in the HHS emPOWER program.

39 (12%) have a high number of people in mobile homes.

64 (20%) have a high number of people with one or more disabilities.

39 (12%) are identified as highly vulnerable by CDC's Social Vulnerability Index.

*"A high number" indicates that these counties are in the top quartile for this indicator compared to other counties.

Wildfires Affect Health in Many Ways

Wildland fire increases the risk for a diverse range of health outcomes from both the fire itself and smoke. For example:

Due to the nature of their work, firefighters are at risk of developing severe heat-related illness (such as **heat stroke**) and rhabdomyolysis (**muscle breakdown**).

Wildfire can cause **burns** through contact with flames and hot surfaces as well as chemical and electrical burns.

Wildfire smoke can lead to disorders including **reduced lung function**, **bronchitis**, exacerbation of **asthma**, and cardiovascular effects like **heart failure**.

For pregnant people, smoke exposure may increase the risk of **reduced birth weight** and **preterm birth**.

Wildfire smoke may affect the immune system, potentially leading to increased vulnerability to **lung infections** like COVID-19.

Smoke from wildfires can travel downwind and affect air quality hundreds of miles away from the fire.

Pediatric Health Experts Respond to Wildfire Smoke

The Pediatric Environmental Health Specialty Units (PEHSUs) are a federally funded national network of experts in the prevention, diagnosis, management, and treatment of health issues that arise from environmental exposures in children. The PEHSU network is managed by the American Academy of Pediatrics and follows a regional model, with a PEHSU in each of the 10 HHS regions.

When wildfire smoke from Canada blanketed the East Coast in early June 2023, the Region 2 PEHSU located in New York City at the Icahn School of Medicine at Mount Sinai quickly disseminated information about the health impacts of wildfire smoke on children and ways to reduce exposure. They collaborated with PEHSU regions out west that have more experience with wildfire events, as well as with local partners at the New York State Children's Environmental Health Centers network and the National Institute for Environmental Health Sciences research centers both at Mount Sinai and nationally, allowing them to tailor existing messaging to meet local needs and rapidly provide resources.

The Region 2 PEHSU collaborates closely with the New York City Department of Health and Mental Hygiene, which provides syndromic surveillance data on asthma cases. On June 7th, when the wildfire smoke was at its worst, these data showed about **100 more asthma emergency department visits** than expected for this time of year, similar in magnitude to the increase seen during high pollen days. These data help to quantify the impacts of exposure to hazards like wildfire smoke and pollen, which are anticipated to worsen as climate change continues.

Wildfire smoke exposure is particularly harmful for children, who breathe more air relative to their size and are more active than adults. The PEHSU network's rapid response to provide families with information about safeguards for their children is a great example of how the environmental health community collaborates in real time to protect the health of a particularly vulnerable population during a hazard event.

Resources to Reduce Health Risks Associated with Wildfires

The Ready.gov Wildfires site, Centers for Disease Control and Prevention (CDC) Wildfires site, and Environmental Protection Agency (EPA) Smoke-Ready Toolbox for Wildfires include information about how to prepare for wildfires, stay safe during a fire, and return home after a fire.

The AirNow Fire and Smoke Map, a joint project of EPA and the U.S. Forest Service, provides information on fire locations, smoke plumes, and air quality, using the color-coding of the Air Quality Index (AQI), along with recommended actions to take to reduce smoke exposure. The AirNow Wildfires site provides additional information on steps to protect your health. The Map is also available in the AirNow app.

Download the Federal Emergency Management Agency (FEMA) App to receive real-time weather and emergency alerts from the National Weather Service. The App can also help you find a nearby shelter if you need to evacuate to a safe space. You can also text SHELTER and your ZIP code to 43362 (e.g., Shelter 12345) to find up to emergency shelters or FEMA Disaster Recovery Centers nearby.

The EPA and CDC continuing education program Wildfire Smoke and Your Patients' Health can help educate healthcare professionals about the health effects of wildfire smoke and highlights actions that individuals can take to reduce exposure. This printable card contains additional information about the course.

If you do not have health insurance and are in a federally-identified disaster, the Emergency Prescription Assistance Program can help you get the prescription drugs, vaccinations, medical supplies, and equipment that you need. If you have Medicare and your medical device is damaged or lost due to an emergency or disaster, Medicare may cover the cost to repair or replace your equipment or supplies. You can locate and access your electronic health records from a variety of sources by using the U.S. Department of Health and Human Services' online tool.

Smoke Sense is a crowdsourcing, participatory science research project developed by EPA researchers focused on increasing public awareness and engagement related to wildfire smoke health risks.

U.S. Monthly Drought Outlook
Drought Tendency During the Valid Period

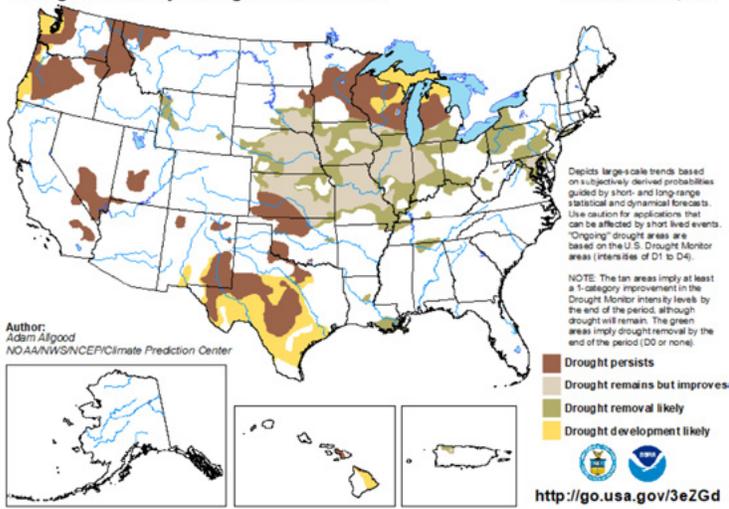Valid for July 2023
Released June 30, 2023

Figure: The National Weather Service Climate Prediction Center's Monthly Drought Outlook is issued at the end of each calendar month and is valid for the upcoming month. The outlook predicts whether drought will persist, develop, improve, or be removed over the next 30 days or so. For more information, please refer to drought.gov.

For July, drought reductions are favored for portions of the Plains, the Midwest, and the entire Northeast region. Dryness early in July may promote further drought expansion across the Great Lakes region, while persistent excessive heat and drier conditions favor more widespread drought expansion for much of Texas. Outside of the contiguous United States, drought is likely to develop on the eastern side of the Big Island of Hawai'i and persistence remains on the island of Maui. Drought removal is favored in the small area of northwest Puerto Rico, while Alaska has no drought, and none is expected. Drought can have direct and indirect impacts on health—increasing incidence of illness among those living in the affected area and worsening mental health outcomes as livelihoods are challenged.

Who is at high risk in the counties projected to have drought in July?

As indicated in the map to the left, **561 counties** across **18 states** are projected to have persistent/remaining drought or drought development in July. In these counties, the total population at risk is **60,842,153 people** and, of those, **668,157 people** work in agriculture. Of these counties:

165 (29%) have a high number* of people aged 65 or over, living alone.

142 (25%) have a high number of people living in rural areas.

89 (16%) have a high number of people living in poverty.

67 (12%) have a high number of people with frequent mental distress.

103 (18%) have a high number of adults with asthma.

215 (38%) have a high number of people without health insurance.

248 (44%) have a high number of uninsured children.

34 (6%) have a high number of Black or African American persons.

107 (19%) have a high number of people with severe housing cost burden.

90 (16%) have a high number of people in mobile homes.

131 (23%) have a high number of people with one or more disabilities.

118 (21%) are identified as highly vulnerable by CDC's Social Vulnerability Index.

*"A high number" indicates that these counties are in the top quartile for this indicator compared to other counties.

Drought Affects Health in Many Ways

Drought increases the risk for a diverse range of health outcomes. For example:

Low crop yields can result in rising food prices and shortages, potentially leading to **malnutrition**.

Dry soil can increase the number of particulates such as **dust and pollen** that are suspended in the air, which can irritate the bronchial passages and lungs.

Dust storms can spread the fungus that causes coccidioidomycosis (**Valley Fever**).

If there isn't enough water to flow, waterways may become stagnant breeding grounds for **disease vectors** such as mosquitoes as well as viruses and bacteria.

Drought's complex economic consequences can increase **mood disorders, domestic violence,** and **suicide**.

Long-term droughts can cause **poor-quality drinking water** and leave inadequate water for hygiene and sanitation.

We want to hear from you! Please send your feedback on ways to improve the Climate and Health Outlook to ocche@hhs.gov.

THANK YOU to the partners who provide invaluable information, expertise, and data for the Climate and Health Outlook series:

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