

Climate and Health Outlook

ISSUED SEPTEMBER 2022

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 month(s) by climate events and provide resources to take proactive action. An [associated webpage](#) includes additional resources and information.



Northern Great Plains Drought is favored to persist or develop in Nebraska as well as parts of Montana, North Dakota, South Dakota, and Wyoming. Above normal wildland fire* potential is projected for western Montana.



Northwest: One county in Idaho is projected to have more than 5 heat exceedance days in September 2022. Drought is favored to persist in parts of southern Idaho, southern and central Oregon, and central Washington. Above normal wildland fire* potential is projected for much of Idaho, southern and central Oregon, and central and southern Washington.



Southwest: Counties in California (10), Arizona (5), and Utah (2), are projected to have more than 5 heat exceedance days in September 2022. Drought is favored to persist in California, Nevada, and Utah as well as parts of Arizona Colorado, and New Mexico. However, drought removal is favored in southern and central Arizona and much of New Mexico. Above normal wildland fire* potential is projected for northern California and north-western Nevada.



Southern Great Plains: Counties in Texas (2) are projected to have more than 5 heat exceedance days in September 2022. Drought is favored to persist in Kansas, much of Oklahoma and northern Texas. However, drought removal and improvement is favored in most of Texas and eastern Oklahoma. Above normal wildland fire* potential is projected for much of Oklahoma.



Northeast: Drought is favored to persist in parts of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. Drought is favored to develop in parts of Delaware. Above normal wildland fire* potential is projected for Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont, as well as eastern New York and the northern tips of New Jersey and Pennsylvania.



Southeast: The Atlantic basin is forecasted to have an above-average hurricane season with 14 – 20 named storms with winds of 39 mph or higher, with 6 – 10 of those possibly becoming hurricanes with winds of 74 mph or higher, and 3 – 5 possibly becoming major hurricanes with winds of 111 mph or higher. One county in Florida is projected to have more than 5 heat exceedance days in September 2022. Drought is favored to develop in parts of North Carolina and South Carolina. However, drought removal/improvement is favored in parts of Arkansas, Mississippi, and Tennessee.



Drought



Heat



Hurricane



Wildfire

*Smoke from wildfires can impact health hundreds of miles from site of the fire.

A “heat exceedance day” is when the daily maximum temperature is above the 95th percentile value of the historical temperature distribution in that county. Developed with data from the Centers for Disease Control and Prevention, National Oceanic and Atmospheric Administration, and National Interagency Fire Center.

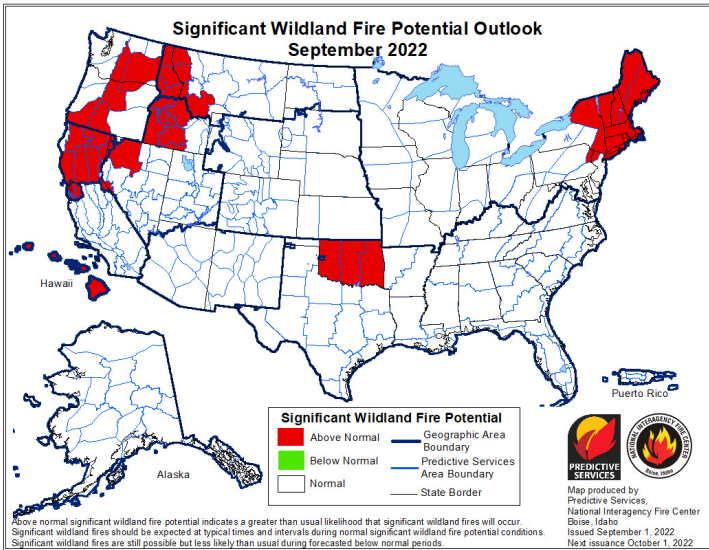


Figure. The [National Significant Wildland Fire Potential Outlook](#) identifies areas with above, below, and near normal significant fire potential using the most recent weather, climate, and fuels data available. These outlooks are designed to inform decision makers for proactive wildland fire management.

Year-to-date acres burned for the US is approximately 116% of the 10-year average, with over half of the total acres burned in Alaska alone. Above normal significant fire potential is forecast for much of the Northeast September through November due to ongoing drought. Above normal potential is also forecast for much of Oklahoma in September and October, expanding to include all of Oklahoma and Texas by December. Most of northern California, central and southwest Oregon, southeast Washington, Idaho, and far western Montana will have above normal potential in September. Lee sides of the Hawai’ian Islands will continue to have above normal potential through November before returning to normal potential in December.

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

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, **312** counties across **17** states are projected to have above-normal wildfire potential in August. In these counties, the total population at risk is **54,742,313** people:

- 68 (22%)** have a high number of people aged 65 or over, living alone.
- 81 (26%)** have a high number of people without health insurance
- 84 (27%)** have a high number of uninsured children.
- 60 (19%)** have a high number of people with frequent mental distress.
- 103 (34%)** have a high number of adults with asthma.
- 61 (20%)** have a high number of adults with coronary heart disease.
- 48 (16%)** have a high number of people living in poverty.
- 114 (37%)** have a high number of people with electricity-dependent medical equipment and enrolled in the HHS emPOWER program.
- 42 (14%)** have a high number of people in mobile homes.
- 77 (25%)** have a high number of people with one or more disabilities.
- 70 (23%)** 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.

Real-Time Tracking of Respiratory Outcomes Linked to Wildfire Smoke

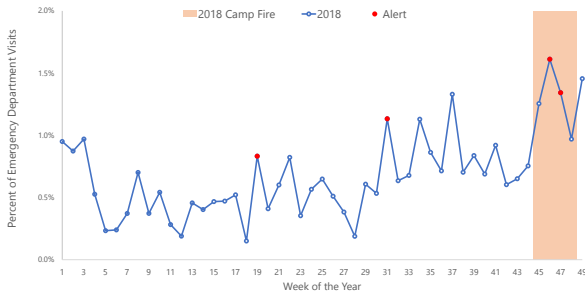


Figure. This graph overlays the percentage of Emergency Department (ED) visits due to asthma or reactive airway disease (RAD) in San Mateo County during the 2018 Camp Fire. It uses Morbidity and Mortality Weekly Report weeks, which begin with 1 for the first week of the year. Each red dot indicates an instance where the percent of ED visits due to asthma or RAD is exceptionally high. You can learn more on the [CDC’s website](#).

As wildfires continue to threaten the public’s health across the country, agencies are demonstrating the utility, reliability, and timeliness of syndromic surveillance data for monitoring and characterizing health impacts. During the first two weeks of the 2018 Camp Fire in California, there were higher-than-expected increases in 24-hour particulate matter (PM2.5) concentrations in San Mateo County, which reached unhealthy levels. San Mateo County public health officials monitored for acute respiratory health effects and, in collaboration with the [CDC National Syndromic Surveillance Program](#) and the [California Department of Public Health](#), they demonstrated an increase in the weekly percentage of ED visits for asthma or reactive airway disease (RAD) exacerbation, and an increase in the number of visits for smoke exposure or smoke inhalation. Among participating EDs, the county’s safety net hospital had the highest average daily percentage of ED visits for all respiratory syndromes, excluding influenza-like illness and pneumonia.

Wildfire Smoke’s Biggest Health Concern

PM10
● ≤ 10 μm

Particulate Matter (PM)

HUMAN HAIR
50-70 μm

PM2.5
● ≤ 2.5 μm

CARB

PM is the most concerning pollutant from short-term exposure to wildfire smoke. Particles can be <2.5 microns (μm) in diameter and can be inhaled into the deepest parts of the lungs causing heart and lung effects.

Source: <https://ww2.arb.ca.gov/protecting-yourself-wildfire-smoke>

Wildfire Smoke Can Travel Far Distances

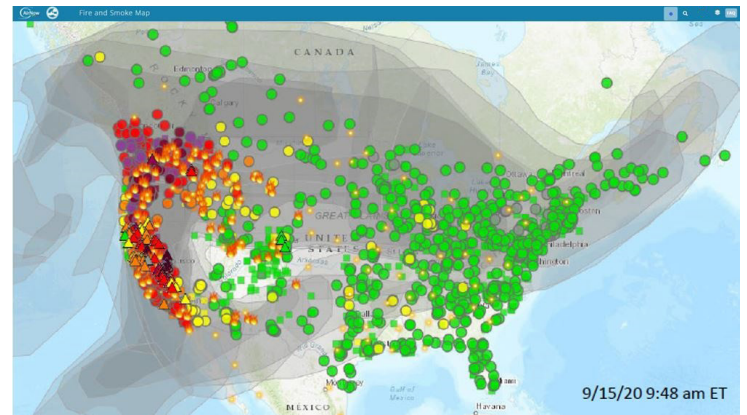


Figure: Example of the [AirNow](#) Fire and Smoke Map run by U.S. EPA and the U.S. Forest Service. This screenshot, from September 15, 2020, shows the far distances smoke can travel from the location of wildfires. The map also shows the U.S. Air Quality Index (AQI) from hundreds of air quality monitors and more than 10,000 privately owned air sensors. Green symbols indicate a good AQI; yellow indicates moderate; orange indicates unhealthy for sensitive groups; red indicates unhealthy for everyone; and purple indicates very unhealthy. The flame symbols indicate a large fire incident, and the small yellow spark symbols indicate unverified satellite fire detections.

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. As wildfires burn, they generate smoke that is comprised of a mixture of particulate matter (PM) (also referred to as particle pollution) and gaseous pollutants (e.g., carbon monoxide). The pollutant of most concern to public health during a smoke event is fine particulate matter, or PM2.5, because these particles can penetrate deep into your lungs and cause adverse health effects.

Resources to Reduce Health Risks Associated with Wildfire and Smoke

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.

[Pregnant people](#) should take actions to reduce their exposure to wildfire smoke, which could affect the developing fetus. Other groups like young children, the elderly, those with pre-existing heart and lung disease, and outdoor workers also should take extra care to reduce their exposures to wildfire smoke. Monitor fires and air quality in your area through [AirNow](#) and follow instructions about exercise and going outside for “sensitive individuals.”

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

Valid for September 2022
Released August 31, 2022

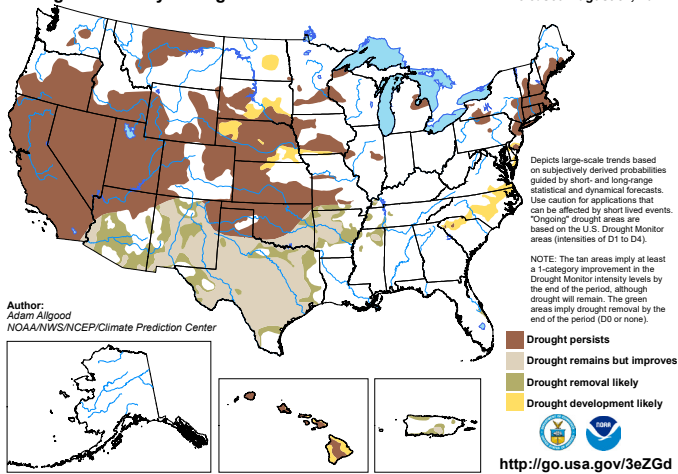


Figure: The National Weather Service Climate Prediction Center's Monthly Drought Outlook is issued at the end of each calendar month and is valid for the upcoming month. The outlook predicts whether drought will persist, develop, improve, or be removed over the next 30 days or so. For more information,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

For September, drought expansion is favored for portions of the Plains and western Corn Belt. However, above-average rainfall in the southwest is favored, raising the potential for further drought reduction across the southern Four Corners region from the Monsoon. Forecasted heavy rain across Texas and the Gulf Coast states favors further drought improvements and a potential for flooding. Drought persistence remains favored across the Northeast and drought conditions are favored to continue expanding across Hawai'i. Drought conditions are favored to improve across Puerto Rico.

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 September?

As indicated in the map to the left, **1294** counties across **42** states are projected to have persistent/remaining drought or drought development in September. In these counties, the total population at risk is **157,164,458** people and, of those, **1,612,440** people work in agriculture. Of these counties:

- 368 (29%)** have a high number of people aged 65 or over, living alone.
- 362 (28%)** have a high number of people living in rural areas.
- 247 (19%)** have a high number of people living in poverty.
- 200 (16%)** have a high number of people with frequent mental distress.
- 195 (15%)** have a high number of adults with asthma.
- 439 (34%)** have a high number of people without health insurance.
- 519 (40%)** have a high number of uninsured children.
- 187 (15%)** have a high number of Black or African American persons.
- 320 (25%)** have a high number of people with severe housing cost burden.
- 246 (19%)** have a high number of people in mobile homes.
- 251 (19%)** have a high number of people with one or more disabilities.
- 301 (23%)** 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 like **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** like mosquitos as well as viruses and bacteria.

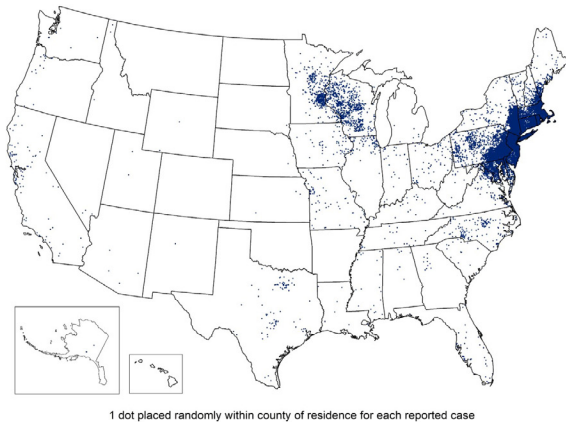
- Drought's complex economic consequences can increase **mood disorders, domestic violence, and suicide**.



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

The Distribution of Lyme Disease

Reported Cases of Lyme Disease -- United States, 2003



Reported Cases of Lyme Disease -- United States, 2019

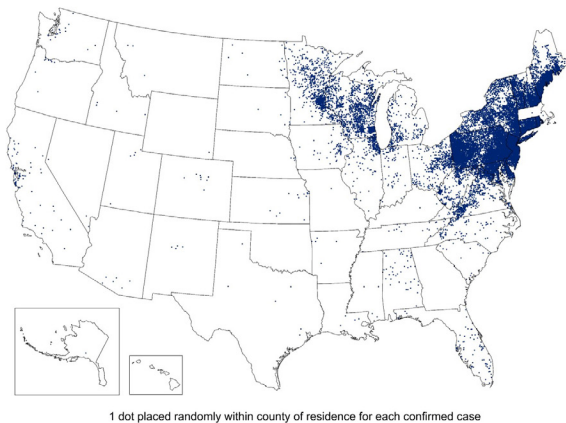


Figure: Lyme disease occurs primarily in the upper midwestern, mid-Atlantic, and northeastern United States. It is transmitted by blacklegged or “deer” ticks, which also transmit the agents of anaplasmosis, babesiosis and Powassan virus disease. The lack of dots in Massachusetts in 2018 is due to a difference in reporting standards, not an absence of Lyme disease.

An estimated 476,000 Americans are diagnosed and treated for Lyme disease each year. It is the most common vector-borne disease in North America. The incidence of Lyme disease in the United States has nearly doubled since 1991, from 3.74 reported cases per 100,000 people to 7.21 reported cases per 100,000 people in 2018. Maine, Vermont, and New Hampshire have experienced the largest increases in reported case rates. Climate is one of several factors that define when and where Lyme and other tickborne diseases are most likely to occur. Mild winters and warmer early spring temperatures are expanding the seasons when ticks are active, resulting in more weeks of the year that Americans are at risk of tick encounters. Expansion of the range of infected ticks puts an increasing number of communities at risk for Lyme and other tickborne diseases.

Which Seasons Are People Most Often Bitten by Blacklegged Ticks?

Tick Bites by Week/Month

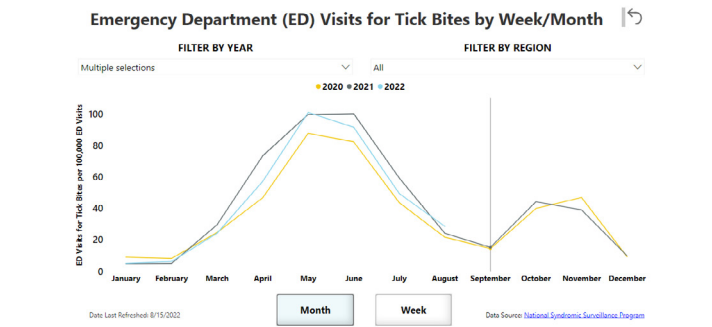


Figure: Emergency department (ED) visits for tick bites by month for 2020 – 2022. This graph shows 2022 following a [similar pattern to previous years](#), with tick bites spiking in the spring. If this trend continues, there may also be a second, smaller spike in the fall

In areas in the eastern US where Lyme disease cases are common, people are most likely to be bitten by black-legged ticks at two times of year: from April through July when nymphs are active, and in September through November when adults are active. Nymphal ticks, which feed in late spring and early summer, pose a particularly high risk due to their abundance and small size (about the size of a poppy seed), which makes their detection difficult. However, adult deer ticks can also transmit the infection and may be more likely to be infected themselves. However, owing to their larger size (about the size of sesame seed), adult ticks are often detected and removed from people before disease transmission can occur. Lyme disease can be prevented by avoiding tick bites and prompt removal of ticks on people.

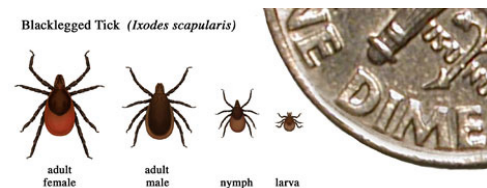


Figure: The different sizes of the blacklegged tick through 4 stages: egg, larvae, nymph, and adult.

Resources to Reduce Health Risks Associated with Lyme Disease

The Centers for Disease Control and Prevention (CDC) [Lyme Disease](#) site has information on how to avoid Lyme Disease, common symptoms, and treatment. The [Tick Bite Bot](#) can assist you in removing attached ticks and seeking health care, if appropriate, after a tick bite. CDC’s [Tickborne Diseases of the United States](#) offers information on tick identification, tickborne diseases, and treatment.

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



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