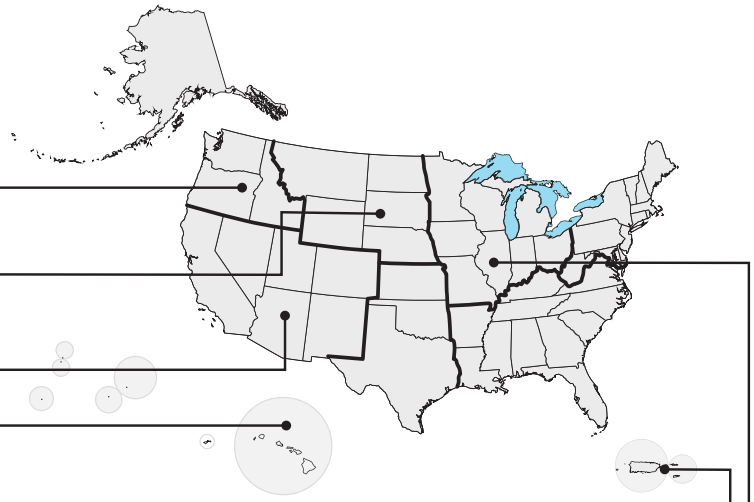
OASH | Office of Climate Change and Health Equity

Climate and Health Outlook

ISSUED FEBRUARY 2024

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. Visit the associated webpage for additional resources and information and the new Climate and Health Outlook Portal for interactive maps with county-level forecasts for the current month along with county-level data on individual risk factors that may make people more vulnerable to negative health outcomes from these climate hazards. This edition provides a retrospective look at how climate hazards affected the U.S. in 2023 as well as prospective forecasts for February 2024.



Northwest: Most of Idaho, Oregon, and Washington have modest to high probabilities of above-normal temperatures for February. Drought is favored to persist across small portions of Washington, central Oregon, and northern Idaho with improvement and removal in western Oregon.

Northern Great Plains: Above-normal temperatures are very likely for much of Montana, the Dakotas, and Nebraska. Above-normal precipitation is most likely over western Nebraska and southern South Dakota. Drought persistence is favored in western Montana, northwestern Wyoming, northern North Dakota, a small portion of southeastern South Dakota, and eastern Nebraska. Drought removal is favored in a small portion of southern Wyoming.

Southwest: Much of the Southwest including central and southern California has elevated probabilities for above-normal precipitation for February, associated with atmospheric river impacts early in the month. Multiple periods of heavy mountain snow are likely. Near-normal temperature probabilities are slightly elevated for parts of southern California and the Desert Southwest. Drought is favored to persist across most of New Mexico with improvement across Arizona, western New Mexico into parts of Colorado, southern Nevada, and eastern Utah.

Hawai'i and Pacific Islands: An elevated chance of above-normal temperatures and below-normal precipitation is forecast for February. Drought persistence and development is forecast across most of Hawai'i.

Caribbean: Drought persistence and development is forecast across most of Puerto Rico and the U.S. Virgin Islands in February. Above normal significant fire potential* is also forecast for Puerto Rico and the U.S. Virgin Islands.

Midwest: Above-normal temperatures are highly likely for Minnesota, Wisconsin, while remaining likely over the rest of the region. Modest probabilities of below-normal precipitation are forecast over the Great Lakes and Ohio Valley regions. Drought is favored to persist across most of Iowa, Missouri, Minnesota, and Michigan, along with a small portion of western Illinois and western Michigan. Drought improvement and removal is favored in southern Missouri, southern Illinois, and southern Indiana.

Drought Wildfire Snowfall

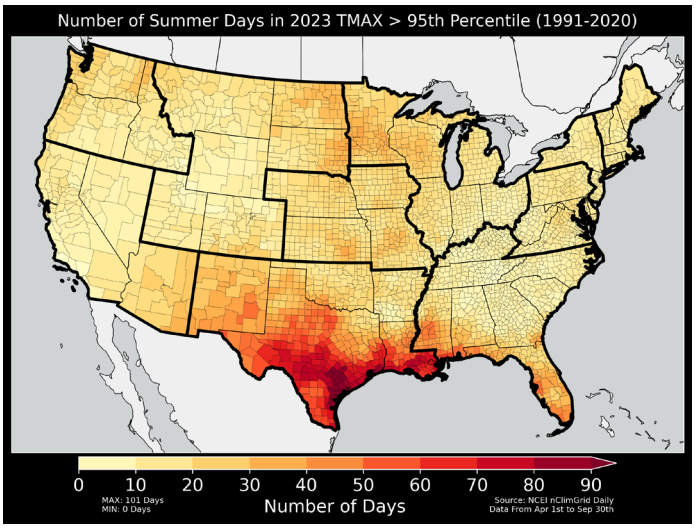
*Smoke from wildfires can impact health hundreds of miles from site of the fire.

Developed with data from 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.

2023 Climate & Health Retrospectives

Where Was Heat Abnormally High in 2023?



2023 was the 5th-warmest year on record for the contiguous U.S. (average annual temperature 2.4°F above average). Texas, Louisiana, Mississippi, New Hampshire, and Massachusetts each ranked warmest year on record while Maine, Vermont, Connecticut, Maryland, Virginia, and Florida each ranked second warmest. The map on the left depicts the number of summer days in 2023 when a county's maximum temperature exceeded its 95th percentile, thus indicating an abnormally hot day. Much of HHS Region 6, especially Texas and Louisiana, experienced more than 30 days of abnormally hot temperatures in 2023.

HHS Region 1: CT, ME, MA, NE, RI, VT
HHS Region 2: NJ, NY, PR, VI
HHS Region 3: DE, DC, MD, PA, VA, WV
HHS Region 4: AL, FL, GA, KY, MS, NC, SC, TN
HHS Region 5: IL, IN, MI, MN, OH, WI
HHS Region 6: AR, LA, NM, OK, TX
HHS Region 7: IA, KS, MO, NE
HHS Region 8: CO, MT, ND, SD, UT, WY
HHS Region 9: AZ, CA, HI, NV, AS, MP, FSM, GU, MH, PW
HHS Region 10: AK, ID, OR, WA

Figure: Temperature is calculated from NOAA's nClimGrid-Daily v1-0-0, a 5km gridded dataset aggregated into counties for the contiguous U.S. For each day from April 1st to September 30th, a county's temperature in 2023 is compared against its climatological normal from 1991–2020. Temperatures above the 95th percentile are considered abnormally hot for the region. Thick lines on the map indicate HHS regional boundaries.

Heat-Related Illness in 2023: A Case Study of Maricopa County, AZ

Maricopa County, AZ is a highly populated county that experiences some of the U.S.'s most extreme heat. In 2023, there were over 100 days when the temperature was above 100° F. It also experiences high rates of heat-related illnesses. For example, it ranks in the 99th percentile of U.S. counties for their number of heat-related Emergency Medical Services (EMS) activations according to the National EMS Information System's (NEMSIS) Heat-Related EMS Activation Surveillance Dashboard. In 2022, Maricopa suffered a record 425 confirmed heat-related deaths, after experiencing 339 confirmed in 2021. Through November 7, 2023, they had already confirmed 579 heat-associated deaths. Additional analysis gives insight into risk factors: 25% of the deaths occurred indoors, with air conditioning present but not functioning for 109 out of 146 of these cases. 45% of the deaths occurred among individuals experiencing homelessness.

Table 1. Summary of 2023 and 2022 heat-associated deaths year-to-date.

2023 Cumulative Total	Confirmed	Under Investigation	First Death
	579	56	4/11/2023
2022 Cumulative Total	Confirmed	Under Investigation	First Death
	386	51	3/13/2022

Graph 1. There have been 579 heat-associated deaths in Maricopa County as of 11/07/2023

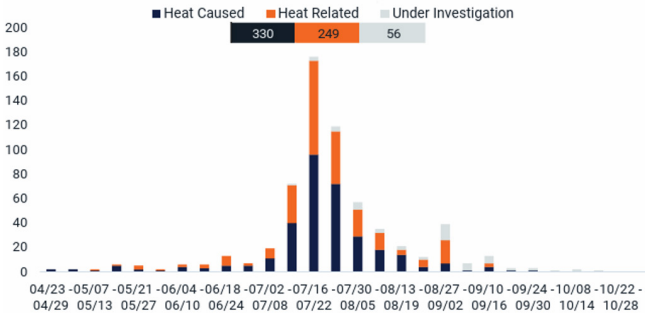


Figure: Table and plot of heat-associated deaths in Maricopa County in 2023 from the Department of Public Health's latest report. Heat-caused deaths include cases where heat is listed as a direct cause of death on the death certificate, heat-related deaths include cases where heat is listed as contributing, and under investigation includes cases where the medical examiner suspects a heat-associated death.

This high number of heat-related deaths has prompted Maricopa County to take many actions including: partnering with the Maricopa County Association of Governments, municipalities, universities, and community and faith-based organizations to form the Heat Relief Network to establish cooling centers and hydration stations; providing surveillance via the county's Department of Public Health to track heat-related illness and death in order to support heat relief planning and provide guidance for residents to protect themselves; expanding access to heat relief by increasing evening and weekend hours and funding 2-1-1 Arizona to assist in finding transportation to the nearest Heat Relief location; increasing funding to the HVAC repair and replacement fund; and partnering with the state of Arizona to sign up for heat warning alerts.

2023 Climate & Health Retrospectives

2023's Historic Winter Storms: How the HHS emPOWER Program Helped Protect At-Risk Individuals

The HHS emPOWER Program provides federal data, mapping, and artificial intelligence tools, as well as training and resources to help communities nationwide protect the health of at-risk Medicare beneficiaries. These beneficiaries include 4.5 million individuals who live independently and rely on electricity-dependent durable medical and assistive equipment and devices and/or certain essential health care services.

From December 2022 to March 2023, historic winter storms swept across the country producing severe blizzard conditions, freezing temperatures, and strong wind gusts leading to prolonged power outages/power shutoffs. At the peak of the storms in February, more than 60 million people were under winter weather alerts and nearly 1 million homes and businesses were without power.

During this time, over 2,037 users accessed the HHS emPOWER Map, a public interactive map offering a geospatial view of critical data to anticipate, plan for, and respond to the needs of at-risk Medicare beneficiaries in communities nationwide. Additionally, from December 21, 2022 to March 31, 2023, public health authorities requested more detailed emPOWER datasets to inform and support their emergency response and outreach for the winter storm and power outages/power shutoffs in their communities. For more information about HHS emPOWER Program tools and resources, visit the HHS emPOWER Program Platform.

Density of HHS emPOWER Map Users

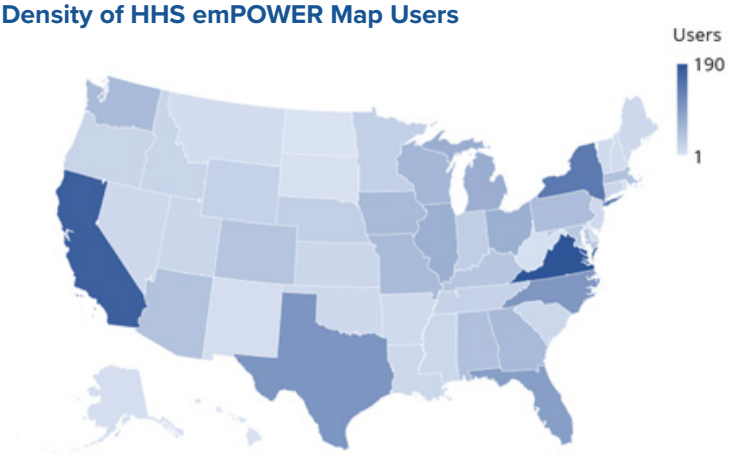


Figure: Density of HHS emPOWER Map users from December 1, 2022–March 31, 2023, using HHS emPOWER Program Platform Google Analytics. There were 2,037 users in total during this time period.

HHS emPOWER Map Users Over Time

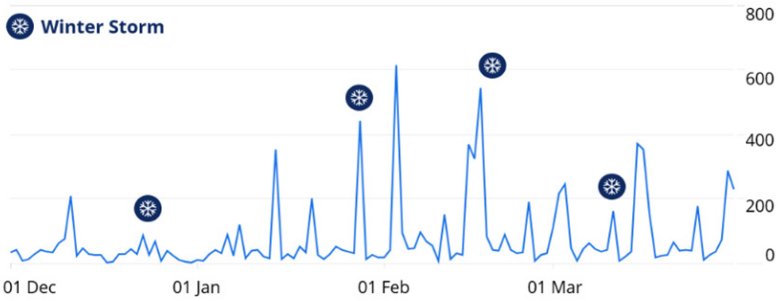


Figure: HHS emPOWER Map users over time from December 1, 2022–March 31, 2023, using HHS emPOWER Program Platform Google Analytics. This graph shows HHS emPOWER Map usage peaks and trends before and after the severe winter storms.

2023 Hurricane Season Summary

The Atlantic basin saw above-normal activity during the 2023 hurricane season — 2023 was ranked 4th for the most named storms in a year since 1950, with **20 named storms**. Seven of these storms became hurricanes, and three became major hurricanes of category 3 or higher. On average, the Atlantic basin experiences 14 named storms, seven hurricanes, and three major hurricanes per season.

The eastern Pacific basin also saw above-normal activity during the 2023 hurricane season with **17 named storms**, 10 of which became hurricanes, and eight became major hurricanes. This included Tropical Storm Hilary, which brought widespread heavy rainfall and flooding to Southern California, with some areas receiving up to 600% of their normal August rainfall. The 2023 hurricane season also featured **four tropical cyclones in the central Pacific**, which typically sees four to five tropical cyclones per year. Visit NOAA's 2023 hurricane season summary to learn more.

2023 Climate & Health Retrospectives

2023 National Fire Activity Synopsis

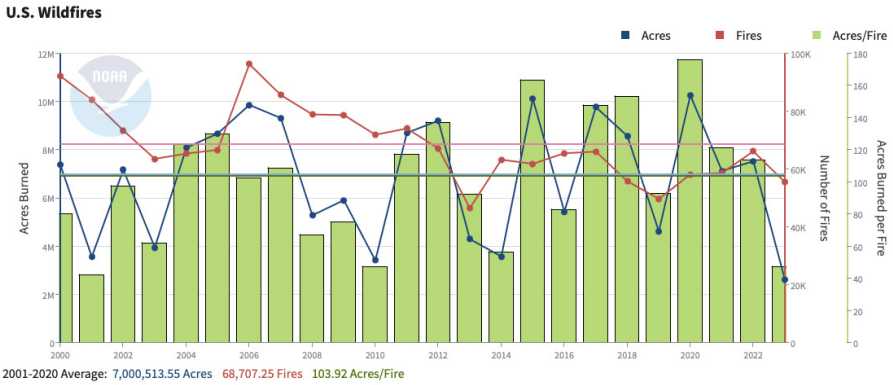


Figure: U.S. wildfire statistics from the National Interagency Fire Center (NIFC) for January 2000–December 2023 in the contiguous U.S.

Across the contiguous U.S., 56,580 wildfires were reported in 2023, which is close to the 10-year average (2013–2022). These wildfires burned nearly 2.7 million acres of land, which is well below the 10-year average. Notably, close to 300,000 acres burned in Alaska, which is less than half of the state's seasonal average. In Hawai'i, the island of Maui experienced the deadliest wildfire in the U.S. in over a century. An official County of Maui website contains vital information for those affected by the fires and FEMA provides guidance on how to help those recovering.

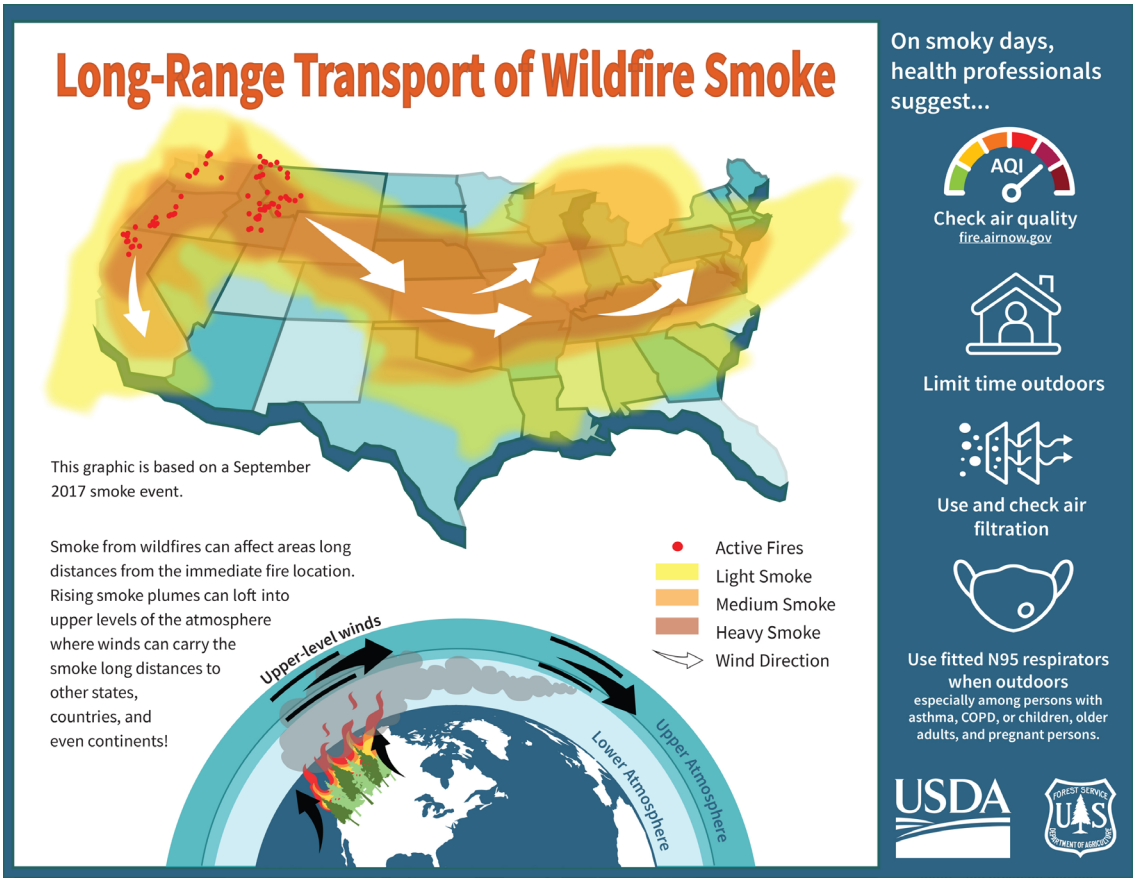


Figure: This infographic from US Forest Service Research and Development illustrates wildland fire smoke transport and dispersion.

Smoke from wildfires in Canada caused significant air quality issues for millions in the Northeast and Great Lakes in the summer of 2023. Around 100 million people across 16 states were under air quality alerts from this smoke and it led to New York City and Chicago reporting the worst air quality of major cities in the world.

2023 Climate & Health Retrospectives

Average Drought Level Across the U.S. in 2023

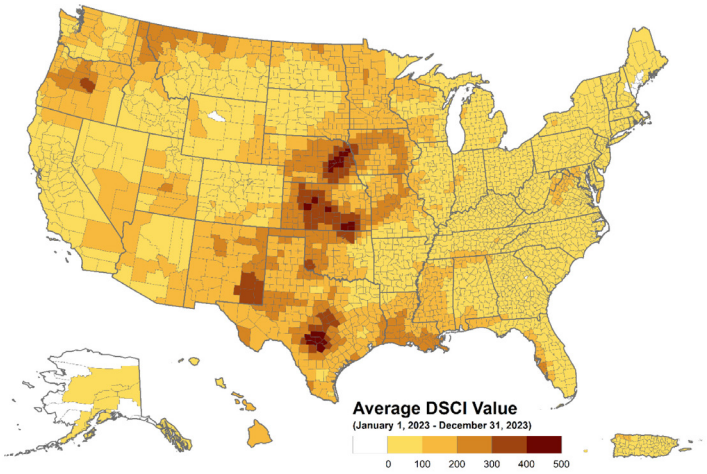


Figure: This map shows the Drought Severity and Coverage Index (DSCI) values for the U.S. from January 1, 2023–December 31, 2023. The DSCI is an experimental method for converting drought levels from the U.S. Drought Monitor map to a single value for a county.

The year 2023 was the 3rd driest for the contiguous U.S. on record. From January 1, 2023 – December 31, 2023, the majority of the U.S. experienced some level of abnormal dryness as measured by the Drought Severity and Coverage Index (DSCI). The DSCI values range from 0 to 500, where 0 means that none of the area was on average abnormally dry or in drought, and 500 means that all of the area was on average in exceptional drought. The Northwest, Midwest, Northern Great Plains, and Southern Great Plains generally had the highest levels of drought. 23 U.S. counties (six in Kansas, ten in Nebraska, and seven in Texas) had DSCI values in the highest range (>400), meaning they experienced exceptional drought. Additional counties in those states along with one in Oklahoma ranked in the top 50 for drought in the past year. Only 18 out of the 3,231 counties for which we have measurements experienced an average DSCI value of zero.

Vector-Borne Diseases in the U.S. in 2023

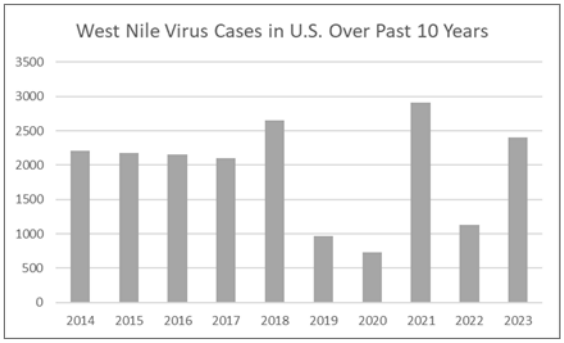
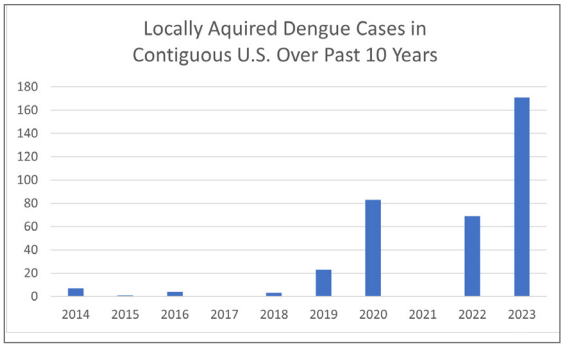


Figure: Number of West Nile virus human disease cases in the United States over the past decade. Data from CDC *(2023 data are preliminary and subject to change)*.



Climate change is one of several factors that can influence the distribution and prevalence of vector-borne diseases. Among vector-borne diseases in 2023, Lyme disease (tickborne) as well as West Nile virus, dengue, and malaria (mosquito-borne) were of public health concern in the United States. Lyme disease is the most common vector-borne illness in the United States, with an estimated 476,000 people diagnosed and treated each year. Traditional Lyme disease surveillance data are available through 2021 from CDC. In 2023, 2,406 West Nile virus disease cases were identified across 47 jurisdictions, including 1,599 neuroinvasive disease cases. There were also 2,556 dengue cases across 52 jurisdictions, including **locally acquired dengue cases in Florida (n=168), California (n=2), Texas (n=1)**, and Puerto Rico (n=933, where it is endemic (i.e., regularly occurring)). The vast majority of malaria cases in the United States are travel-related, usually by people who travel to countries where malaria is endemic. During May–October of 2023, though, the United States had a total of 10 cases of locally acquired malaria **reported in Florida, Texas, Maryland, and Arkansas** (as of October 19, 2023).

Figure: Number of locally acquired dengue cases in the contiguous U.S. over the past decade. Locally acquired cases occurred among people with no history of travel to a dengue-endemic region in the two weeks before illness onset. Data from CDC *(2023 data are preliminary and subject to change)*.

February 2024 Prospective Forecasts

Winter Weather Outlook

El Niño remains a primary driver of temperature and precipitation patterns over North America in the near future, and factors heavily into the latest outlooks. Importantly, El Niño acts alongside long-term trends (due in part to climate change) to impact seasonal temperatures and El Niño is forecast to persist through May. Areas where El Niño historically favors below-normal temperatures can also have long-term warming trends, such as the southern U.S. and the North Slope of Alaska. For February 2024, above-normal temperatures are more likely across Alaska, much of the northern and central Contiguous U.S., and the Hawaiian Islands. The greatest chance (70-80%) for above-normal temperatures exists for the Northern Plains and Upper Midwest. Near-normal temperatures are favored for parts of the Desert Southwest and the Southeast, including Florida. The remainder of the U.S. has equal chances for below-, near-, or above-normal seasonal temperatures.

For February 2024, odds of above-normal precipitation are elevated for much of the Southwest including California, the central and southern Plains, the Southeast Coast, and parts of southern Alaska. Southern California and adjacent regions of Nevada and Arizona are most likely to have above-normal precipitation (60-70%). Below-normal precipitation is favored for the Pacific Northwest, the Hawaiian Islands, and from the Great Lakes south to the Ohio Valley, and eastward into much of the Northeast. The remainder of the U.S. will see equal chances for below-, near-, or above-average seasonal precipitation.

For updated winter weather forecasts, please visit WPC Winter Weather Forecasts | NOAA and CPC Week-2 U.S. Hazards Outlooks.

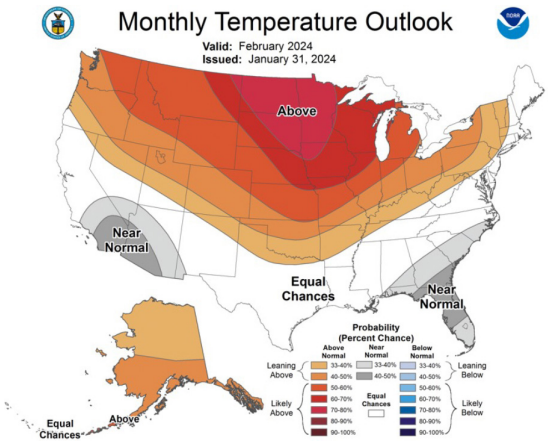


Figure: This NOAA Climate Prediction Center February temperature outlook shows the most likely outcome in terms of probabilities, but this is not the only possible outcome.

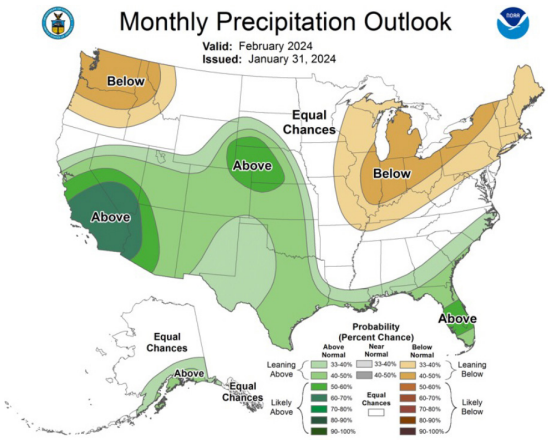


Figure: This NOAA Climate Prediction Center February precipitation outlook shows the most likely outcome in terms of probabilities. Higher probabilities mean higher confidence, but this is not the only possible outcome.

Winter Weather Affects Health in Many Ways

Winter can bring extreme cold, freezing rain, snow, ice, and high winds which can last a few hours or several days.

Those with inadequate indoor heating or clothing coverage, and those who work outdoors are at greater risk of **hypothermia** and **frostbite** with prolonged exposure to excessive cold.

Winter storms can lead to **outages of power, heating, and communication systems** which can pose safety hazards, especially for people who critically depend on electricity-dependent medical equipment.

Using space heaters, fireplaces, or appliances that are not meant for heating, such as ovens or stoves, can increase the **risk of fire** and **worsen indoor air quality**.

Running a generator indoors or outdoors without adequate ventilation can cause carbon monoxide [CO] exposure, which can lead to **loss of consciousness** and **death**. Over 400 people die each year from accidental CO poisoning.

February 2024 Prospective Forecasts

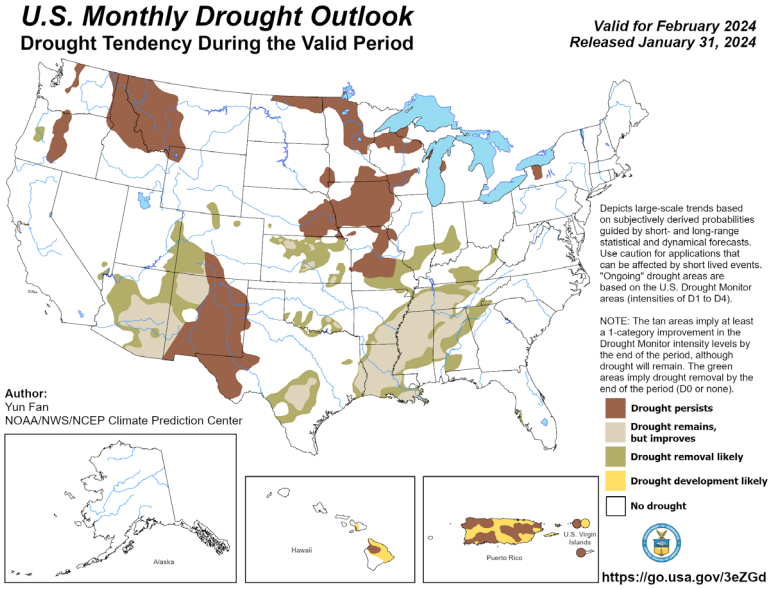


Figure: The National Weather Service Climate Prediction Center's Monthly Drought Outlook is issued at the end of each calendar month and is valid for the upcoming month. The outlook predicts whether drought will persist, develop, improve, or be removed over the next 30 days or so. For more information,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

During February, drought improvement is favored for all drought areas in the Southeast, portions of the Southwest, Southern Great Plains, and the Midwest, as well as in small areas of western Oregon and southern Wyoming. Drought development is likely across large areas of Puerto Rico and Hawai'i and drought persistence is forecasted across portions of the Northwest, Southwest, Southern Great Plains, Northern Great Plains, Midwest, Puerto Rico, the U.S. Virgin Islands, and in parts of Hawai'i and western New York. 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 February?

As indicated in the map to the left, **492 counties** across **21 states** are projected to have persistent/remaining drought or drought development in February. In these counties, the total population at risk is **24,483,674 people** and, of those, **499,032 people** work in agriculture. Of these counties:

177 (36%) have a high number* of people aged 65 or over, living alone.

147 (30%) have a high number of people living in rural areas.

68 (14%) have a high number of people living in poverty.

63 (13%) have a high number of people with frequent mental distress.

61 (12%) have a higher number of adults with asthma.

72 (15%) have a high number of people without health insurance.

106 (22%) have a high number of uninsured children.

5 (1%) have a high number of Black or African American persons.

79 (16%) have a high number of people with severe housing cost burden.

56 (11%) have a high number of people in mobile homes.

69 (14%) have a high number of people with one or more disabilities.

67 (14%) 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.

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

Administration for Children & Families

CDC

EPA United States Environmental Protection Agency

NHTSA National Highway Traffic Safety Administration

NOAA

USDA

Forest Service U.S. Department of Agriculture

VA U.S. Department of Veterans Affairs

NIDIS

NIHHIS National Integrated Heat Health Information System

National Interagency Fire Center Boise, Idaho

California Air Resources Board

Maricopa County Public Health

SAMHSA Substance Abuse and Mental Health Services Administration

Predictive Services

Oregon Health Authority

San Mateo County Health Public Health, Policy & Planning

California Department of Public Health

AAAAI American Academy of Allergy Asthma & Immunology www.aaaai.org

USGS science for a changing world

USA npn National Phenology Network

PEHSU Pediatric Environmental Health Specialty Unit Region 2: NJ | NY | PR | USVI