Texas Temperature Trends Dashboard Indicators: Definitions and Importance

Extreme Heat

Definition: In the dashboard, extreme heat refers to high temperatures equal to or above certain threshold values (90°F, 95°F, or 100°F). The number of extreme heat days for each year indicates how many days in that year had high temperatures at or above these thresholds.
Importance: Hot days bring increased risks of heat stress, heat-related illnesses (such as heat stroke), and respiratory issues. Extreme heat can also affect agriculture and crops, worsen droughts, and increase the amount of energy needed for cooling.
Resources: https://medialibrary.climatecentral.org/extreme-weather-toolkits/extreme-heat, https://www.cdc.gov/climateandhealth/pubs/EXTREME-HEAT-Final_508.pdf

Extreme Cold

Definition: In the dashboard, extreme cold refers to low temperatures equal to or below certain threshold values (40°F, 32°F, or 20°F). The number of extreme cold nights for each year indicates how many nights in that year had low temperatures at or below these thresholds.
Importance: Decreasing extreme cold over time can reduce cold stress but can also have environmental and economic effects. For example, cold-sensitive organisms may be able to expand their ranges into new locations as the frequency of cold nights decreases in those areas.
Resources: https://medialibrary.climatecentral.org/resources/fewer-cold-nights-2016

Warm Nights

Definition: In the dashboard, warm nights refer to low temperatures equal to or above certain threshold values (70°F, 75°F, or 80°F). The number of warm nights for each year indicates how many nights in that year had low temperatures at or above these thresholds.
Importance: When nights are very warm, it is more difficult for people to cool off and recover from the heat of the day. Warm nights can thus increase the risk of heat-related illnesses during heat waves, particularly for vulnerable populations and those who lack air conditioning in their homes. Warm nights can also affect plants and agriculture and may also elevate wildfire risk.
Resources: https://medialibrary.climatecentral.org/resources/warm-nights-2017

Spotlight: extreme heat adaptation

Ensuring access to air conditioning and other methods of cooling is a critical strategy for mitigating the health effects of extreme heat. Communities can create cooling centers, where members of the public can gather and escape the heat, as well as make sure that all residents have access to adequate water to stay hydrated during high temperatures. Other strategies, like planting trees or creating green roofs (roofs with plants on top) can also help reduce both outdoor and indoor temperatures.

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Heating and Cooling Degree Days

Definition: Degree days are used to approximate the energy needed for heating and cooling and are defined by comparing the average temperature for a day to the threshold temperature of 65°F. If the average temperature is higher than this threshold temperature, then the day counts as cooling degree days equal to the difference between the two values. Similarly, if the average temperature is lower than this threshold temperature, then the day counts as heating degree days equal to the difference between the two values. For example, a day with an average temperature of 80°F would count as 15 cooling degree days: 80 (average temperature) - 65 (threshold temperature) = 15. A day with an average temperature of 40°F would count as 25 heating degree days: 65 (threshold temperature) - 40 (average temperature) = 25.
Importance: Heating and cooling degree days approximate the amount of energy needed to heat and cool buildings. Energy use has economic and environmental implications; thus, calculations of heating and cooling degree days can inform about spending on energy, carbon emissions from the energy sector, and strain on the energy grid. It is important to note, however, that energy use can also be affected by a variety of other factors (such as changes in energy efficiency, individual behavior, and the prevalence of cooling technologies), and therefore this indicator only provides a general approximation of energy demand and its effects.
Resources: https://www.epa.gov/climate-indicators/climate-change-indicators-heating-and-cooling-degree-days, https://www.eia.gov/energyexplained/units-and-calculators/degree-days.php

Seasonal Averages

Definition: The seasonal average high (or low) temperatures are calculated as the averages of the high (or low) temperatures of all days in each season. For example, the spring average high temperature for a specific year is the average of the high temperatures of all the days in March, April, and May of that year.
Importance: Comparing trends in average high and low temperatures for different seasons can provide information about whether temperatures are warming more significantly during certain seasons relative to others. Differences in seasonal trends can, in turn, indicate in which times of year it may be particularly important to take mitigation actions. For example, if spring temperatures are warming faster than summer ones, communities may want to identify ways to ensure that adequate cooling resources are available earlier in the year.

Seasonal Extremes

Definition: The seasonal average extreme high (or low) temperatures are calculated as the averages of the extreme maxima (or minima) of each month in each season. For example, the spring average extreme high temperature for a specific year is the average of the maximum daily high temperature in March, the maximum daily high temperature in April, and the maximum daily high temperature in May of that year.
Importance: Changes in extreme conditions may differ from changes in average conditions, and seasonal temperature extremes provide information about short-term temperature conditions that may have acute impacts. For example, an increasing trend in summer average extreme high temperatures indicates that the hottest summer days are getting hotter, which may have important implications for heat exposure and heat stress.

Yearly Averages

Definition: The average temperature for a year is calculated by taking the average of the temperature values of all the days in the year.
Importance: A trend in average temperatures provides an overall assessment of how temperature conditions have changed over time at a particular location.

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