

Memorandum

To Anna Nguyen, Greg Nichols (NOLA)
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Subject Task 2.1 Shared Heat Definitions Narrative, City of NOLA

The purpose of this Task 2.1 Memo is to create a shared definition of urban heat islands and extreme heat for the City of New Orleans, and a narrative of the historical and socioeconomic factors that led to present day conditions.

1. A narrative describing the historical and socioeconomic roots of present-day conditions

Heat risk impacts have historical and socioeconomic roots that impact the New Orleans community disproportionately. From health disparities to energy insecurity, marginalized residents will bear the brunt of extreme heat's health, economic, and environmental impacts. The information below illustrates the various attributes that fuel inequities and create differing experiences of heat's impacts.

Social Vulnerability and Heat

Urban heat can impact community members differently depending on factors such as income, housing quality and location, access to green spaces and social vulnerability (Mitra & Islam, Examining Social Disparities in Urban Heat Exposure in New Orleans, Us, 2023). Studies show that, "Social and economic disparities, living conditions, language barriers, and occupational exposure are among the many factors contributing to heat-susceptibility among minority ethnic groups in the United States" (Hansen A. , Bi, Saniotis, & Nitschke, Vulnerability to extreme heat and climate change: is ethnicity a factor?, 2013).

Disparities in heat risk between neighborhoods are deeply rooted in historical and socioeconomic dynamics. In New Orleans, low-income neighborhoods exhibit higher heat conditions and low vegetation cover (Mitra & Islam, Examining social disparities in urban heat exposure in New Orleans, US, 2025). Areas with higher land surface temperature and fewer trees also have a higher percentage of people without health insurance, including in Carlton, Upton, and Garden. Despite efforts to expand Medicaid across the city, marginalized groups have a higher percentage of uninsured residents. For example, 24% of Hispanic residents are uninsured, nearly four times that of Asian and white residents (New Orleans Health Department , Health Disparity Report, 2024). Aside from local exposure to extreme heat, warming temperatures due to climate change increase flood risk and sea level rise that is expected to impact low income and minority communities disproportionately (Woodwell Climate Research Center).

Historical Development Patterns

Historical redlining is the process of utilizing racist housing policies to block Black households and other communities of color from homeownership (Gerken, et al., 2023). Redlined areas in NOLA included Central City, Downtown, and the Garden District neighborhoods, previously deemed hazardous and composed majorly of Black, poor, and working-class citizens (Woodward, 2019). Currently, historically redlined areas directly correlate with heat exposure and vulnerability across the city. For example, New Orleans East has a long history as a majority Black suburb and has faced disinvestment and economic decline from deeply rooted racist systems. These systems determine community investment and health outcomes, as noted by Miller in his University of New Orleans Thesis; "New Orleans East has maintained an exaggerated narrative of suburban decline that masks and overshadows Black wealth, economic potential, and plentiful natural resources" (Miller, 2023).

Hurricane Katrina was also a catalyst for social vulnerability, flooding hundreds of thousands of homes, displacing millions, and causing over 1,800 casualties (Waters, 2025). Storm redevelopment exacerbated by historic property ownership conditions and differential access to post Katrina support, caused property values to skyrocket. This created mass gentrification and exacerbated an already inequitable wealth distribution across the city.

According to the New Orleans Health Department's analysis of neighborhood-level heat indices, Central City had a 108-degree heat index sustained on the most excessive heat warning days in 2023. Similarly, Lakefront and Lower 9th Ward experienced the highest number of hours during which a 113 degree heat index was sustained the same year (New Orleans Health Department, 2024). The Lakefront, Lower 9th Ward, Gentilly/Milneburg and Central City were also the hottest WeatherSTEM locations, with Central City showing higher sustained minimum temperatures.

Racial Disparities

Race and nationality play a large part in determining health, heat exposure, and heat mortality. Nationally, Black and African American individuals are 40-59% more likely than non-African Americans to live in high temperature-impacted areas. The EPA found that in New Orleans, an area with a prevalent Black community at around 55-50%, temperature-related mortality tied to excessive heat is exacerbated for Black and African Americans. Ten to twelve Black individuals out of 100,000 died from heat exposure (United States Environmental Protection Agency, 2021). Out of 28 heat related fatalities on excessive heat advisory warning days measured in NOLA, 43% of heat related fatalities were identified as Black/African American citizens (New Orleans Health Department, 2024).

Gender and Age Disparities

In the past 20 years, global heat-related mortality in residents over 65 has increased over 50% (Patel, et al., 2022). Of the 2023 heat-related deaths in Southeast LA, the majority were of people over 65 years of age, followed by those 50-64 years old (Louisiana Department of Health, 2023). Children are also more sensitive, given that their bodies have limited capabilities to cool down (Patel, et al., 2022). Between men and women, men are more likely to be impacted by heat mortality and morbidity, with 17 out of 21 heat related fatalities being male (New Orleans Health Department, 2024). Many underlying health conditions exacerbated by extreme heat, including cardiovascular diseases and heart conditions, are more prevalent for men (Center for Disease Control, About Men and Heart Disease, 2024). However, pregnant women are also at increased risk in extreme heat conditions. Increase body heat in pregnant women puts strain on their bodies already experiencing increase metabolism and can reduce blood flow

to the placenta which can cause preterm births in extreme cases (Early Childhood Scientific Council on Equity and the Environment, 2023).

Urban Heat Islands

Communities of color are also more often exposed to the urban heat island effect. The average person of color lives in a census tract with a higher urban heat island effect measurement than non-Hispanic whites in all but 6 of the 175 largest urban areas in the nation (Hsu, Sheriff, Manya, & Chakraborty, 2021). New Orleans is covered in dark colored roofs and pavement, especially in the city's urban hotspots (New Orleans Health Department, 2024). According to Climate Central's Urban Heat Island rankings by census tract, the UHI in New Orleans census tracts varies between 7 degrees to 10.5°F, with the average citywide heat island effect being around 8°F (Climate Central, 2023). Continued disinvestment in infrastructure can lead to less energy efficiency, waste heat, and continued expansion of impervious surfaces that exacerbate the heat island effect (New Orleans Health Department, 2024).

Tree Cover and Shade

The City of New Orleans is especially vulnerable to temperature changes due to land use change and reduced tree cover. Redlining and discriminatory housing policies have resulted in densely built environments with fewer parks and green spaces in marginalized communities. Coastal areas are more sensitive to temperature increase, and New Orleans has experienced substantial land cover changes limiting tree cover and shade (Li, Assessing heat vulnerability of New Orleans using multitemporal remote sensing and demographic data, 2021). Essential but impermeable concrete flood protection measures include flood walls, floodgates, and levees that reduce green space and exacerbate the urban heat island effect (Frank, 2019). Access to green spaces and air conditioning vary across social factors such as income and race, as evidenced by tree equity scores and socioeconomic data. A tree equity score measures a combination of tree canopy cover, Census demographic and socioeconomic data, and identifies neighborhoods that are more vulnerable to extreme heat (Woodwell Climate Research Center). In New Orleans studies show that as the percent people of color in a neighborhood increases, the tree equity score decreases.

Social Determinants of Service Utilization

Social determinants of health are influenced by structural discrimination, which limits less privileged groups' ability to be healthy (Wiley, Yearby, Clark, & Mohapatra, 2022). Socioeconomic disparities, such as age, literacy, fluency, and income levels, and lack of investment in accessible heat-relief programs, impact the ability of communities to effectively utilize public resources and provide cooling in their homes. Specifically, outdoor workers and people experiencing homelessness (PEH) lack local programs and policies that fully protect them from the heat-related hazards. PEH who experience high heat exposure and involuntary displacement face a higher risk of heat (Woolhandler, Weckstein, Cai, & Gaffney, 2025). In 2024, heat-related fatalities reported among presumed PEH was 29% higher than among the general population (New Orleans Health Department, 2024). The Office of Homeless and Strategic Services has been working to house PEH, potentially contributing to the reductions in unhoused heat-related fatalities documented in preliminary 2024 LDH heat fatality data.

Acute & Chronic Health Impacts of Heat

Extreme heat events can exacerbate existing medical conditions by imposing undue stress on the body when exposed for even a short time. (Center for Disease Control, CDC Climate and Health, 2024). Communities of color are more likely to have hypertension, high blood pressure, heart disease, cardiovascular risks, asthma, and other conditions (American Lung Association, 2024) (Yearby, 2022) (Abrahamowicz, Ebinger, Whelton, Commodore-Mensah, & Yang, 2023). This means that heat compounds disparities that exist in prevalence of asthma, hypertension, COPD, heart disease, and diabetes between zip codes in Orleans Parish (New Orleans Department of Health, 2024). According to the New Orleans Department of Health, both in 2023 and 2024, citizens 60 years old made up the majority of heat-related fatalities, and Black citizens were most likely to die due to heat related causes (New Orleans Health Department, 2024) (New Orleans Health Department, Heat and Health Review, 2023). These conditions are exacerbated in certain underserved areas of the city, where the conditions are experienced to a greater extent than the national average (CDC Places Data 2020).

Extreme heat is not only linked with increases in suicide rates and violent crime, but people with preexisting mental health conditions also have an increased risk of heat related death (Early Childhood Scientific Council on Equity and the Environment, 2023) (Union of Concerned Scientists, 2019). Social vulnerability itself is linked with mental health and substance use disorders in the US. Studies find that there is an 82% increase in the suicide rate between the most and least vulnerable communities (Niewijk, 2024).

Energy Insecurity

Heat increases the demand for cooling at the household level, exacerbating already-high energy burdens for communities. Energy insecurity impacts low-income and marginalized communities, where households may become unable to meet basic energy needs, defer maintenance and repairs due to cost, or spend large amounts of income on cooling. In the US, nearly a third of all households face energy insecurity, which can become a threat when also faced with insufficient insulation, and malfunctioning heating, cooling, or appliance systems (Khan, Hernandez, Arya, & Catalano). New Orleans follows this pattern, where, “27% of the census tracts in Orleans Parish bear a high energy burden, and low-income people make up the majority of all but two of those tracts” (Parker, 2022). The Iberville, Viavant and Venetian Isles, and Central City neighborhoods spend the highest amount of household income on energy costs.

2. Urban Heat Islands Definitions & Potential Metrics

Below, Arup proposes a few definitions of urban heat islands, based on our review of definitions adopted in other locations. These definitions will include consideration of land surface temperature and air temperature, anthropogenic heat sources such as buildings and roads, tree canopy and vegetation cover, and New Orleans’s water-bound geography, for identifying the intensity of the urban heat island. We cite relevant data to illustrate the use of potential metrics. Three definition options are provided: simplified, concise, and detailed.

2.1 Definitions – Urban Heat Islands

a. Simplified

Urban heat islands occur when cities become significantly hotter than nearby rural or natural areas. This happens because buildings, roads, and other infrastructure absorb and hold more heat than

vegetation or water. Factors like building density, lack of trees, and dark surfaces all contribute. Some neighborhoods feel this heat more than others, especially at night, and climate change is making the problem worse.

b. Concise

Urban heat islands describe the elevated temperatures in urban areas compared to surrounding rural or natural regions, driven by heat-retaining infrastructure like buildings and roads. Contributing factors include surface materials, vegetation cover, building density, and weather patterns. The effect of increasing temperatures is intensified by climate change and varies across neighborhoods, especially at night as the built environment emits absorbed heat.

c. Detailed

Urban heat islands are a phenomenon in which urban areas experience significantly warmer temperatures than their surrounding rural or less developed regions, or water bodies. This effect is largely driven by the dense concentration of buildings, roads, and infrastructure in cities, all of which tend to absorb and retain more heat than natural landscapes. Drivers of UHI include density and height of buildings, commercial or industrial activity, and the prevalence of dark impervious surfaces. The existence of vegetation (such as tree canopy) or water bodies can help reduce how much heat a city retains. Even within a single city, some neighborhoods may face more intense heat exposure depending on the urban layout, environmental features, and time of day (e.g. increased nighttime temperatures may persist as the built environment emits absorbed heat).

The urban heat island effect, a key driver of extreme heat in cities like New Orleans, is intensified by climate change, which raises average temperatures and prolongs periods of high heat.

These definitions take into account how various sources and entities define the urban heat island effect, as indicated by Table 1 **Table 1: Definitions of Urban Heat Islands Error! Reference source not found..**

2.2 Metrics – Urban Heat Islands

Land surface temperature: Land surface temperatures at night can be compared at the Census block group scale against the regional average to identify areas with higher urban heat island effects.¹ In Phoenix, neighborhood land surface temperature baselines were derived from NASA ASTER satellite imagery and NASA LANDSAT satellite imagery.

The Trust for Public Land’s Climate Smart Communities geodatabase identifies urban heat island severity within the City of New Orleans with elevated daytime land surface temperature (LST) averaging at least 1.25 degrees Fahrenheit above the mean land surface temperature of the whole city.²

Urban heat island index: quantifies the additional heat attributable to features of the built environment. In New Orleans, the citywide urban heat island index shows areas can be up to 8 degrees Fahrenheit hotter than less developed zones.³ Climate Central measured the urban heat island effect in

¹ Heat Action Planning Guide for Neighborhoods of Greater Phoenix. Available: [Heat Action Plan](#)

² The UHI model results were derived from LANDSAT satellite data, which provides a 30m land surface temperature during the summer of 2022.

³ Climate Central analysis. [Climate Central Urban heat islands city rankings UHI by census tract.xlsx](#)

New Orleans using the approach used by Sangiorgio et al. (2020) which accounts for land cover type, building height, and population density.⁴

Imperviousness: The National Land Cover database includes urban impervious surfaces as a percentage of developed surface over every 30-meter pixel in the Conterminous U.S.⁵ NOAA’s new high-resolution land cover data for the nation’s coastal areas, including New Orleans, include 1-meter products for impervious surfaces.⁶

Tree Canopy Cover: Tree canopy can be derived from the National Land Cover database which includes the spatial resolution of the Tree Canopy Cover, derived from Landsat satellite imagery of a region’s landscape. NOAA’s new high-resolution land cover data includes tree canopy.⁷

Table 1: Definitions of Urban Heat Islands

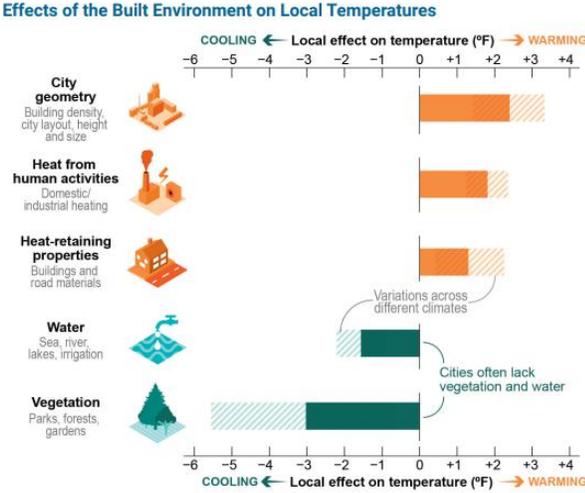
Source	Definition	Link
National Integrated Heat Health Information System	<i>The term “urban heat island” refers to the fact that cities tend to get much warmer than their surrounding rural landscapes, particularly during the summer. This temperature difference occurs when cities’ unshaded roads and buildings gain heat during the day and radiate that heat into the surrounding air. As a result, highly developed urban areas can experience mid-afternoon temperatures that are 15°F to 20°F warmer than surrounding, vegetated areas.</i>	https://www.heat.gov/pages/urban-heat-islands
EPA	<i>The <u>urban heat island effect</u> is a measurable increase in ambient urban air temperatures resulting primarily from the replacement of vegetation with buildings, roads, and other heat-absorbing infrastructure. The heat island effect can result in significant temperature differences between rural and urban areas.</i> <i>Structures such as buildings, roads, and other infrastructure absorb and re-emit the sun’s heat more than natural landscapes such as forests and water bodies. Urban areas, where these structures are highly concentrated and greenery is limited, become “islands” of higher temperatures relative to outlying areas. These pockets of heat are referred to as “heat islands.” Heat islands can form under a variety of conditions, including during the day or night, in small or large cities, in suburban areas, in northern or southern climates, and in any season.</i> <i>Heat islands occur when a developed area experiences higher temperature than nearby rural areas, or when areas experience hotter temperatures within a city.</i>	https://www.epa.gov/heat-islands
USGS	<i>One of the changes associated with urbanization is the change of landscape features to structures such as buildings, roads, and other infrastructure that absorb and re-emit the heat of the sun more than</i>	https://www.usgs.gov/publications/characterizing-urban-heat-islands-

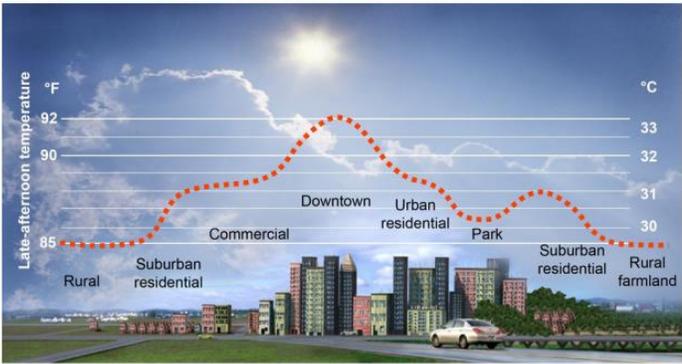
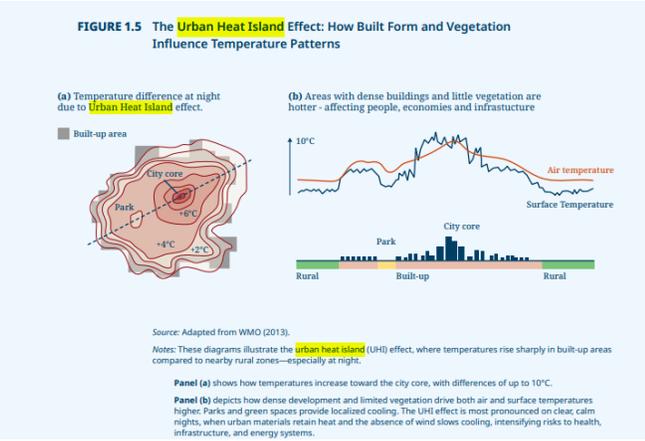
⁴Methodology for estimate urban heat island (UHI) index at the census tract level:
https://assets.ctfassets.net/cxgxtsp8r5d/4bC51rbb2pjRfvsjHu81zV/9774cc03062b3bb44e5fd11533cf28c8/Methodology_for_estimating_UHI_at_the_Census_tract_level.pdf

⁵ [National Land Cover Database | U.S. Geological Survey](#)

⁶ [C-CAP High-Resolution Land Cover](#)

⁷ [C-CAP High-Resolution Land Cover](#)

Source	Definition	Link
	<p><i>natural landscapes such as forests and water bodies. This land-cover transition can result in an urban surface temperature that is higher than in a non-urban area, which is defined as a surface urban heat island (SUHI). A SUHI has a profound effect on the lives of urban residents and can exacerbate the risk of heat-related mortality associated with global climate change. The change of urban landscapes and climate conditions can affect the SUHI intensity.</i></p>	<p>across-50-major-cities-united-states</p>
<p>National Climate Assessment</p>	<p>Figure 12.4.</p>  <p><i>Cities are often warmer than their surroundings because of the urban heat island effect—the prevalence of higher air temperatures in urban areas because of the overall density of buildings, heat absorbed and emitted by buildings and asphalt, and heat from commercial, industrial, and household activities. The hatched portions of the bars show how the effects of warming or cooling of each factor vary depending on the local climate context. For example, vegetation has a stronger cooling effect in temperate and warm climates. Adapted with permission from FAQ 10.2, Figure 1 of Doblas-Reyes et al. 2021.</i></p> <p><i>The tendency for higher air temperatures to persist in urban areas because of heat absorbed and emitted by buildings and asphalt, tending to make cities warmer than the surrounding countryside.</i></p>	

Source	Definition	Link
	<p>The Urban Heat Island Effect</p>  <p>Urban heat islands are most prominent in dense downtown areas with little access to open space.</p> <p>Figure 12.5. The figure illustrates temperature fluctuations across natural and built environments in a typical late afternoon in the summertime. Downtown areas with dense high-rise buildings experience the heat island effect because concrete and asphalt absorb and retain heat. Waste heat from cars, air-conditioning, and other human activities also contribute to the heat island effect. Cooler temperatures are found around urban parks, green spaces, open land, and in suburbs and rural areas. The temperature lines are shown for illustrative purposes and do not represent the climate in a particular city. Figure credit: ©Heat Island Group, Lawrence Berkeley National Laboratory. Adapted with permission.</p>	
Climate Central	An analysis from Climate Central measures that New Orleans has a citywide urban heat island effect of 8 degrees Fahrenheit. The methodology references the EPA definition of the urban heat island above.	Climate Central Urban heat islands city rankings UHI by census tract.xlsx
World Bank Group (via Unlivable report)	<p><i>The urban heat island (UHI) effect can make cities several degrees hotter than their rural surroundings, especially at night.</i></p> <p><i>As shown in Figure 1.5, on thermal maps, cities can show up as islands of heat, with temperatures as much as 10°C higher than in surrounding rural areas under some conditions.¹² That difference is called the urban heat island (UHI) effect. It is most pronounced at night, as human-made surfaces retain heat longer and cool more slowly than natural landscapes. Weather conditions play a key role: UHI intensity peaks on clear, calm nights after a hot, sunny day without enough wind flow to dissipate the heat. The denser the urban development, the higher the temperatures generally are.</i></p>  <p>FIGURE 1.5 The Urban Heat Island Effect: How Built Form and Vegetation Influence Temperature Patterns</p> <p>(a) Temperature difference at night due to Urban Heat Island effect.</p> <p>(b) Areas with dense buildings and little vegetation are hotter— affecting people, economies and infrastructure</p> <p>Source: Adapted from WMO (2013). Notes: These diagrams illustrate the urban heat island (UHI) effect, where temperatures rise sharply in built-up areas compared to nearby rural zones—especially at night.</p> <p>Panel (a) shows how temperatures increase toward the city core, with differences of up to 10°C. Panel (b) depicts how dense development and limited vegetation drive both air and surface temperatures higher. Parks and green spaces provide localized cooling. The UHI effect is most pronounced on clear, calm nights, when urban materials retain heat and the absence of wind slows cooling, intensifying risks to health, infrastructure, and energy systems.</p>	https://openknowledge.worldbank.org/bitstreams/651aa4ee-57b0-409b-aa0d-54784772faa5/download

Source	Definition	Link
	<i>In densely built neighborhoods with limited tree cover or green space, building design interacts with the urban heat island effect to intensify heat exposure indoors. Surface materials such as dark roofs and asphalt paving further amplify ambient temperatures, reducing the capacity of buildings to cool down at night.</i>	

3. Extreme Heat Definitions & Potential Metrics

3.1 Definitions – Extreme Heat

Below, we provide three options for defining extreme heat based on definitions put forward by federal sources, such as the National Weather Service, NOAA, and FEMA, and with consideration of how the nature of heat waves are changing over time.

We also identify common metrics for extreme heat, in relation to these definitions.

a. Simplified

Extreme heat refers to periods when temperatures rise well above what is typical for a given location and time of year. It can be measured by actual air temperature or by how hot it feels when humidity and other factors are considered. Even when temperatures are not at their highest, heat can still pose serious health risks, especially for vulnerable populations.

b. Concise

Extreme heat refers to periods when air temperature or heat index values rise significantly above normal. While ambient air temperature is commonly used, metrics like heat index or wet bulb globe temperature better reflect how heat is experienced. Relying solely on a single threshold may overlook health risks at lower temperatures.

c. Detailed:

Extreme heat refers to timeframes where air temperature or heat indexes (a combined measure of air temperature and humidity that refers to perceived heat) reach unusually high levels or much higher than average levels.

Temperature is a primary indicator for extreme heat, though various metrics exist to capture the lived experience of heat. Ambient air temperature and land surface temperature provide measures of absolute temperature, but heat index or wet blub global temperature (which factors in wind, cloud cover, and sun angle) may better describe the heat perceived by community members. Generally, ambient air temperature or the heat index are the variables referenced when identifying thresholds for heat-related morbidity and mortality, though using this single threshold alone discounts heat-related mortality and morbidity that is possible at lower temperatures.

3.2 Metrics - Extreme Heat

Heat Danger Days: Over the next century, New Orleans is projected to experience an increased number of “heat danger days”⁸, which represent days where the heat index is 103°F or higher, leading to higher possibility of heat stress, exhaustion, or stroke if people are undertaking outdoor physical activity. The number of heat danger days is projected to increase from a 2000-2020 baseline of 39 days per year to about 89 days per year during 2040-2060, and to an estimated 128 days during 2070-2090.

Maximum and minimum daily heat index: WeatherSTEM stations track the heat index hourly for over twenty neighborhoods, which may be used to assess maximum and minimum daily heat index and inform temperature thresholds to communicate around extreme heat.

Frequency of heatwaves: Heatwaves refer to prolonged periods (e.g. multiple days) of extreme heat that are significantly above average. As shown in **Error! Reference source not found.**, FEMA’s National Risk Index puts New Orleans heat wave risk as relatively high compared to the rest of the United States, based on high exposure of infrastructure and people to heat (based on historic National Weather Service alerts related to heat) as well as higher degrees of social vulnerability compared to other regions in the US.

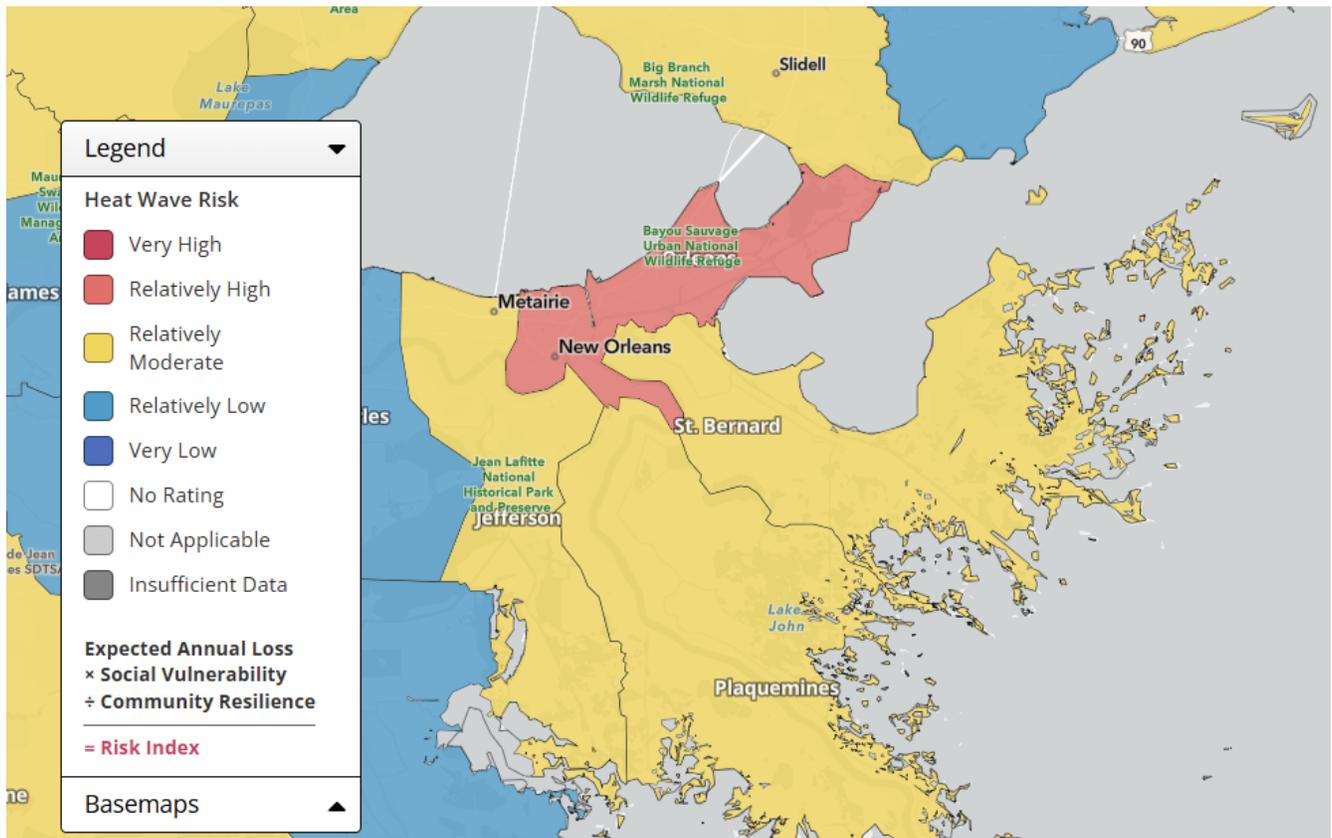


Figure 1: Screenshot of the FEMA National Risk Index for Heat Waves for the City of New Orleans and surrounding regions

⁸ [Climate Risk Assessment for New Orleans, LA](#) [to be cited like previous memos]

Activation Thresholds:

The City of NOLA communicates on extreme heat, via NOLA Ready communications and emergency alerts. There is not a single adopted threshold though often these communications occur during Excessive Heat Warnings, when the forecasted heat index⁹ is higher than 113°F or the forecasted temperature is higher than 105°F for at least 2 days.

Notably, the City is interested in evaluating alert frequency and the key information to share during alerts (e.g., resource center availability and hours, public transit notices, etc.).

In addition, the New Orleans Health Department has drafted Recommended Activation Thresholds for Extreme Heat for NOHSEP Consideration in 2023.¹⁰

Table 2: Extreme Heat Activation Thresholds

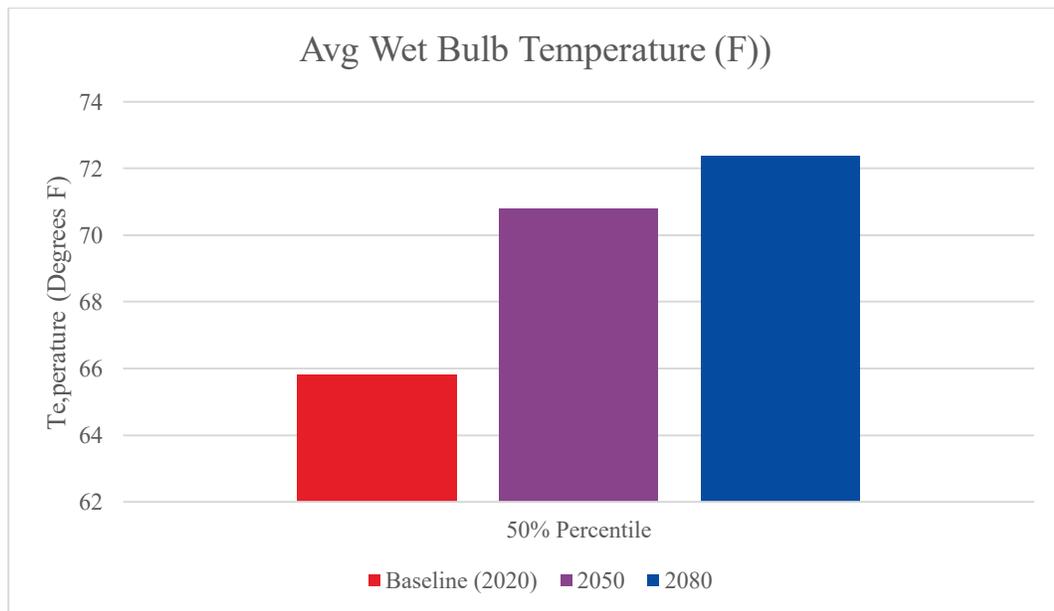
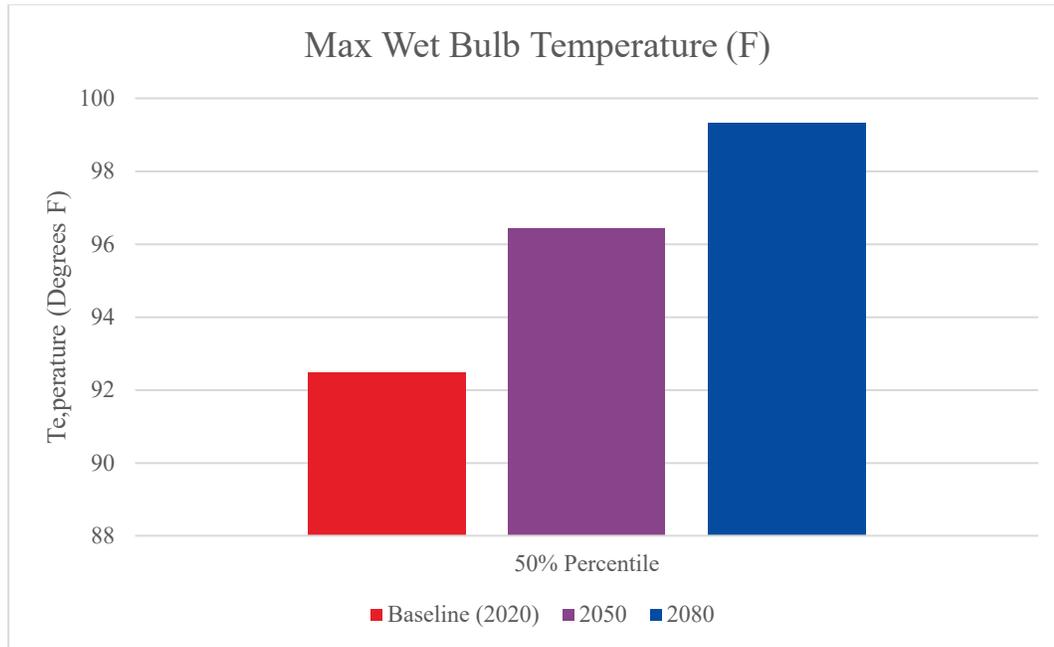
Level 0 Recovery & Mitigation	Time frame from November to March when temperatures are not likely to meet a high heat threshold in southeast Louisiana.	No emergency declaration
Level 1 Daily Monitoring & Preparedness	Time frame from April to October when temperatures are at their peak in southeast Louisiana (but when not under an advisory).	No emergency declaration
Level 2 Increase Awareness	When NWS New Orleans office issues an excessive heat watch or warning.	No emergency declaration
Level 3 Local Action	Single-day daily temperature high feels like >108°F AND feels like low >85°F while in a heat watch or warning	Expand services without local declaration, unless conditions warrant limited or targeted declaration
Level 4 Extreme Heat Wave	Three or more consecutive days with a high of feels like 105°F and feels like low of >85°F while NWS New Orleans heat watch or warning is in effect.	Consider local emergency declaration (see below for considerations)
Level 5 Extreme Danger	Extended, widespread power outage during hurricane season (June 1 to November 30)	Local emergency declaration

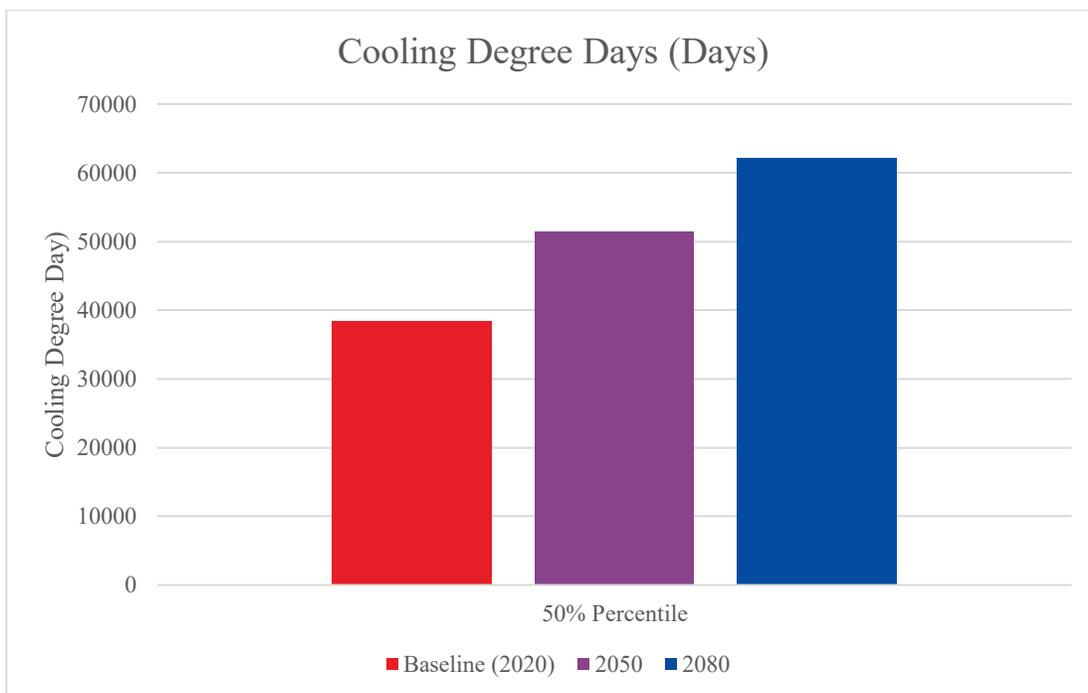
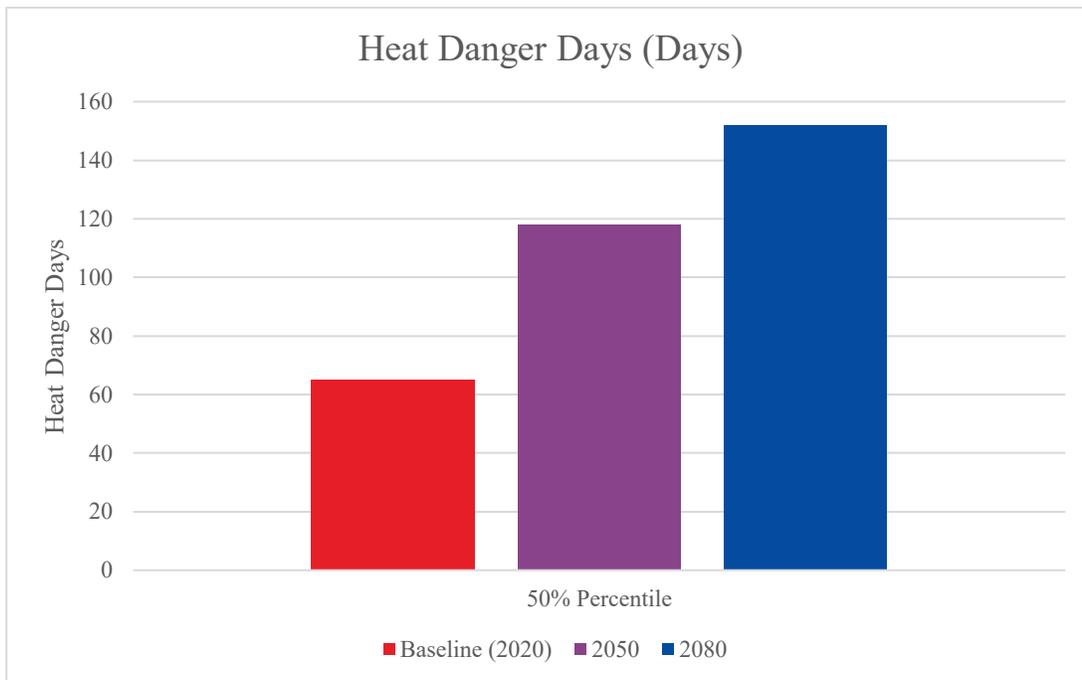
⁹ Heat Index: how hot it feels when relative humidity is added to air temperature

¹⁰ Shared by the City via the following document: [Extreme Heat Activation Threshold Recommendations.docx](#)

3.3 Climate Projections

Arup analyzed heat variables for a baseline, mid-century, and end-of-century time horizons include estimated Wet Bulb Globe Temperature (Maximum and Average), cooling degree days, and heat danger days, using climate projections (Representative Concentration Pathway 8.5). Below we show each of these variables in the future (with the 50th percentile projections) at 2050 (2040-2060) and 2080 (2070-2090) time horizons against present-day baseline (~2020).





3.4 National Definitions of Extreme Heat & Heat Waves

Definitions of extreme heat and heatwaves used by federal and national sources are summarized in Table 3: Federal/National Definitions of Extreme Heat and Table 4: Definitions of Heat Waves and Heat Advisory Thresholds.

Table 3: Federal/National Definitions of Extreme Heat

Source	Definition	Link																																																																																																																																																																																																																																																																
NWS	<p><i>The heat index, also known as the apparent temperature, is what the temperature feels like to the human body when the relative humidity is combined with the air temperature.</i></p> <div data-bbox="310 533 927 898" style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">NWS Heat Index</p> <table border="1" style="width: 100%; text-align: center; font-size: 8px;"> <thead> <tr> <th colspan="2"></th> <th colspan="14">Temperature (°F)</th> </tr> <tr> <th colspan="2"></th> <th>80</th><th>82</th><th>84</th><th>86</th><th>88</th><th>90</th><th>92</th><th>94</th><th>96</th><th>98</th><th>100</th><th>102</th><th>104</th><th>106</th><th>108</th><th>110</th> </tr> </thead> <tbody> <tr> <th rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">Relative Humidity (%)</th> <th>40</th> <td>80</td><td>81</td><td>83</td><td>85</td><td>88</td><td>91</td><td>94</td><td>97</td><td>101</td><td>105</td><td>109</td><td>114</td><td>119</td><td>124</td><td>130</td><td>136</td> </tr> <tr> <th>45</th> <td>80</td><td>82</td><td>84</td><td>87</td><td>89</td><td>93</td><td>96</td><td>100</td><td>104</td><td>109</td><td>114</td><td>119</td><td>124</td><td>130</td><td>137</td><td></td> </tr> <tr> <th>50</th> <td>81</td><td>83</td><td>85</td><td>88</td><td>91</td><td>95</td><td>99</td><td>103</td><td>108</td><td>113</td><td>118</td><td>124</td><td>131</td><td>137</td><td></td><td></td> </tr> <tr> <th>55</th> <td>81</td><td>84</td><td>86</td><td>89</td><td>93</td><td>97</td><td>101</td><td>106</td><td>112</td><td>117</td><td>124</td><td>130</td><td>137</td><td></td><td></td><td></td> </tr> <tr> <th>60</th> <td>82</td><td>84</td><td>88</td><td>91</td><td>95</td><td>100</td><td>105</td><td>110</td><td>116</td><td>123</td><td>129</td><td>137</td><td></td><td></td><td></td><td></td> </tr> <tr> <th>65</th> <td>82</td><td>85</td><td>89</td><td>93</td><td>98</td><td>103</td><td>108</td><td>114</td><td>121</td><td>128</td><td>136</td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <th>70</th> <td>83</td><td>86</td><td>90</td><td>95</td><td>100</td><td>105</td><td>112</td><td>119</td><td>126</td><td>134</td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <th>75</th> <td>84</td><td>88</td><td>92</td><td>97</td><td>103</td><td>109</td><td>116</td><td>124</td><td>132</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <th>80</th> <td>84</td><td>89</td><td>94</td><td>100</td><td>106</td><td>113</td><td>121</td><td>129</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <th>85</th> <td>85</td><td>90</td><td>96</td><td>102</td><td>110</td><td>117</td><td>126</td><td>135</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <th>90</th> <td>86</td><td>91</td><td>98</td><td>105</td><td>113</td><td>122</td><td>131</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <th>95</th> <td>86</td><td>93</td><td>100</td><td>108</td><td>117</td><td>127</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <th>100</th> <td>87</td><td>95</td><td>103</td><td>112</td><td>121</td><td>132</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </tbody> </table> <p style="text-align: center; font-size: 8px;">Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity</p> <div style="display: flex; justify-content: center; gap: 10px; font-size: 8px;"> □ Caution □ Extreme Caution □ Danger □ Extreme Danger </div> </div>			Temperature (°F)																80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110	Relative Humidity (%)	40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136	45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137		50	81	83	85	88	91	95	99	103	108	113	118	124	131	137			55	81	84	86	89	93	97	101	106	112	117	124	130	137				60	82	84	88	91	95	100	105	110	116	123	129	137					65	82	85	89	93	98	103	108	114	121	128	136						70	83	86	90	95	100	105	112	119	126	134							75	84	88	92	97	103	109	116	124	132								80	84	89	94	100	106	113	121	129									85	85	90	96	102	110	117	126	135									90	86	91	98	105	113	122	131										95	86	93	100	108	117	127											100	87	95	103	112	121	132											<p>https://www.weather.gov/ama/heatindex</p>
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<p>Heat Alerts</p> <ul style="list-style-type: none"> ▪ Extreme Heat Warning—Take Action! An Extreme Heat Warning is issued when extremely dangerous heat conditions are expected or occurring. Avoid outdoor activities, especially during the heat of the day. If you must be outside, be sure to drink plenty of water and take frequent breaks in the shade. Stay indoors in an air-conditioned space as much as possible, including overnight. Check on family and neighbors. ▪ Extreme Heat Watch—Be Prepared! An Extreme Heat Watch is issued when conditions are favorable for an extreme heat event but its occurrence and timing is still uncertain. Plan to suspend all major outdoor activities if a warning is issued. If you do not have air conditioning, locate the nearest cooling shelter or discuss staying 																																																																																																																																																																																																																																																																		

with nearby family or friends who have air conditioning.

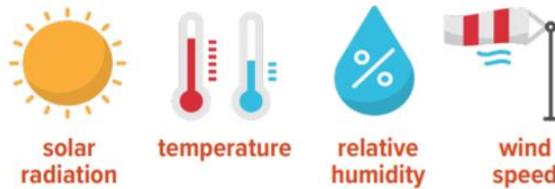
- **Heat Advisory—Take Action!** A Heat Advisory is issued for dangerous heat conditions that are not expected to reach warning criteria. Consider postponing or rescheduling outdoor activities, especially during the heat of the day. If you must be outside, be sure to drink plenty of water and take frequent breaks in the shade. Stay in a cool place, especially during the heat of the day and evening.

NWS / NOAA

Wet Bulb Global Temperature (WBGT) - The Wet Bulb Globe Temperature (WBGT) is an indicator of heat related stress on the human body at work (or play) in direct sunlight. It takes into account multiple atmospheric variables, including: temperature, humidity, wind speed, sun angle, and cloud cover.

<https://www.weather.gov/ict/WBGT>

	WBGT	HEAT INDEX
Measured in the sun	●	●
Measured in the shade	●	●
Uses temperature	●	●
Uses relative humidity	●	●
Uses wind	●	●
Uses cloud cover	●	●
Uses sun angle	●	●



National Climate Assessment

Changes in temperature extremes in recent decades are driven primarily by trends toward warmer conditions rather than any changes in variability.

<https://repository.library.noaa.gov/view/noaa/61592>

EPA

Extreme heat conditions are defined as weather that is much hotter than average for a particular time and place—and sometimes more humid, too.

<https://www.epa.gov/sites/default/files/2016-10/documents/extreme-heat-guidebook.pdf>

Ready.gov (US Department of Homeland Security)	<i>Extreme heat is a period of high heat and humidity with temperatures above 90 degrees for at least two to three days.</i>	Extreme Heat Ready.gov
Woodwell Climate Research Center	<i>Heat danger days, defined as days when combined temperature and humidity result in a “feels like” temperature of 103°F or higher, represent a level of heat stress with heat exhaustion likely, and heat stroke possible, for anyone engaging in physical activity outdoors.</i>	Climate Risk Assessment – New Orleans, LA

Table 4: Definitions of Heat Waves and Heat Advisory Thresholds

Source	Definition	Link
NWS/NOAA	<i>A heat wave is a period of abnormally hot weather generally lasting more than two days. Heat waves can occur with or without high humidity. They have potential to cover a large area, exposing a high number of people to hazardous heat. Heat can be very taxing on the body;</i>	https://www.weather.gov/safety/heat-during
FEMA	<i>[Heatwave]: Prolonged period of excessive heat, often combined with excessive humidity. A Heat Wave is a period of abnormally and uncomfortably hot and unusually humid weather typically lasting two or more days with temperatures outside the historical averages for a given area.</i>	https://www.fema.gov/pdf/areyouready/natural_hazards_2.pdf https://hazards.fema.gov/nri/heat-wave
City of New Orleans	<i>The City of NOLA indicates the following thresholds for communication around extreme heat. Heat Advisory: the forecasted heat index* is higher than 108°F or the forecasted temperature is higher than 103°F for 1 to 2 days Excessive Heat Warning: the forecasted heat index is higher than 113°F or the forecasted temperature is higher than 105°F for at least 2 days *Heat Index: how hot it feels when relative humidity is added to air temperature</i>	https://ready.nola.gov/plan/heat/

