Nielsen

Client report

Connecting the dots

Local U.S. television coverage of extreme weather and climate change

A collaboration with

CLIMATE
CENTRAL

Key findings

Extreme weather events increasingly affect daily lives in the U.S. and across the globe. When such events occur, local television news plays two key roles: preparing audiences for near-term hazards and informing audiences about long-term changes in extreme events due to our warming climate. Local media has a powerful role to play in keeping people safe *and* educating people to take action to reduce the impacts of climate change.

According to research published by the American Meteorological Society, local weather broadcasting is extremely effective in raising awareness about climate change [Feygina et al., 2020](). This report analyzed local television news coverage of four recent extreme weather events that had notable impacts in the U.S. to understand when and how event-related coverage discussed climate change. The five key findings are:

1. **When television segments with climate change context occur, they have high reach and impact .** Although just 5% of event-related segments provided climate change context those segments collectively reached more than **17 million people** across the **50 largest U.S. media markets**. Even when they occur at relatively low frequency, television segments that provide climate change context during extreme weather events have a large and widespread impact.

2. **Audiences surged during extreme weather events.** Local television news audiences grew dramatically in the most directly impacted media markets as extreme events unfolded, likely due to the breaking news nature of these events and the immediate threats they posed to public safety. Most notably, local television audiences **doubled** in Orlando (Hurricane Ian) and **increased 78%** in Los Angeles (Tropical Storm Hilary) compared to the week prior to each event. As extreme events occur, the public turns to local television broadcasts to stay prepared and informed.

3. **Extreme heat was connected to climate change most often, reflecting the state of the science.** The extreme July 2023 heat streak in Phoenix accounted for almost half (**48%**) of all climate-contextualized segments across all four events. Significantly higher rates of climate contextualization during extreme heat events are notable because they broadly reflect the state of the science. Scientific confidence in the attribution of extreme heat to human-induced climate change is considerably higher than for any other type of extreme weather event.

4. **Climate-contextualized segments highlight hazardous impacts.** An analysis of closed captioning text from contextualized segments found communicating the hazardous impacts extreme weather has on local communities was key. While all segments mentioned at least one event-related impact, nearly all (**96%**) climate-contextualized segments mentioned at least one major impact that fell into one of five categories: health and safety, vulnerable communities, power supply and demand, the economy, and travel disruption. The most frequently mentioned impacts were related to health and safety—consistent with the acute risks faced during extreme weather events. Contextualized segments on Canadian wildfires in June 2023 had the highest rate of health and safety mentions, reflecting the serious and widespread health risks from exposure to wildfire smoke.

5. **Local news is a critical lever for raising science-based awareness about climate change.** Local newscasters, particularly broadcast meteorologists, have daily contact with the American public. They can inform audiences about how specific weather events are connected to rising temperatures and climate change. As extreme weather increases with climate change, viewers overwhelmingly turn to local news for answers. For example, during Hurricane Ian, local news streaming apps in Orlando saw increases of over **244%** for persons aged 2 and up and **395%** for persons aged 25-54. Local broadcasters play a crucial role in keeping the public safe and empowering people to make informed decisions.

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About this report

This report yields insight into whether and how local television broadcasts in the U.S. connect the dots between climate change and extreme weather events as they occur. The results indicate that such coverage: reaches large and widespread public audiences; is most prevalent for heat-related extreme events; highlights specific hazardous impacts from climate-linked events; and rapidly incorporates the findings from event-specific attribution analysis to better inform audiences.

In a warming world with extreme weather events rising in frequency and/or intensity, local media has increasingly critical roles in both preparing audiences for near-term hazards and informing audiences about how our warming climate is driving long-term changes in extreme events.

This collaborative report by Nielsen and Climate Central quantifies the frequency and audience reach of local television news segments that provided climate change context in their coverage of four notable extreme weather events in the United States. Nielsen provided audience and closed captioning data and insights about local news audiences. Climate Central's expertise in climate science and communication were applied in data analysis, interpretation, report drafting, and data visualization.

Introduction

Extreme weather increasingly affects our daily lives. The U.S. experienced a record-shattering 28 billion-dollar weather and climate disasters in 2023—part of a rising trend in disaster frequency and costs. Often, the impacts of such events aren't equally shared. According to the Fifth National Climate Assessment, low-income communities, communities of color, and Tribes and Indigenous Peoples experience high exposure and vulnerability to extreme events.

With extreme events on the rise, public understanding of the influence of climate change on the frequency and intensity of such events is critical—as the foundation for informed decision-making to address climate change and ensure a future with fewer risky extreme events.

According to the latest survey data from Yale University and George Mason University, although most people in the U.S. (72%) are convinced that climate change is happening, only 58% know that human activities are the primary cause.

Local news is uniquely positioned to fill this knowledge gap and inform viewers—particularly during extreme weather events, when audiences spike and the risks posed by our warming climate are especially acute. Studies have shown that climate reporting by television weathercasters, for example, increases science-based public understanding of climate change (Myers et al., 2020).

This report aims to gauge whether and how such climate reporting was a part of local television coverage of notable recent extreme weather events that impacted the U.S. Specifically, this study quantifies and characterizes climate change context in U.S. local television news reporting on four recent extreme weather events, and measures the audience that viewed these segments.

This report aims to answer the following questions:

- Are local television broadcasts accurately connecting extreme weather events and climate change?
- How many people view local television broadcasts with climate change context?
- Is local news viewership impacted by extreme weather events?
- How does climate contextualization vary across different types of extreme weather events?
- How often are different event-related impacts (e.g., on health and safety, the economy, etc.) discussed in local television broadcasts?

Editor's note: In this study, **climate contextualization** or **climate-contextualized segments** refer to broadcasts that include information that accurately places an extreme weather event in the broader context of human-caused climate change (see **Methodology**).

This report analyzed U.S. local television news reporting of four notable recent extreme weather events (**Figure 1**), each representing a different event type: a hurricane, wildfires, an extreme heat streak, and a heavy rainfall event.

Using sets of keyword searches covering the duration of peak U.S. impacts from each of the four events (**Table 1**), this study identified all event-related local television news segments across four major networks (ABC, CBS, FOX, and NBC) in the top 50 U.S. Designated Market Areas (DMAs). Closed captioning data was reviewed for all climate-contextualized segments to characterize and assess the frequency of impact-related messages across five themes: health and safety, economic impacts, vulnerable communities, power supply and demand, and travel disruption. The total viewership of climate-contextualized segments on these four events was also assessed to understand their reach and impact. See **Methodology** for detailed descriptions of data sources and analysis.

Canada Wildfires
5/23/23 - 9/23/23

Tropical Storm Hilary
8/19/23-8/21/23

Phoenix 110°F+ Heat Streak
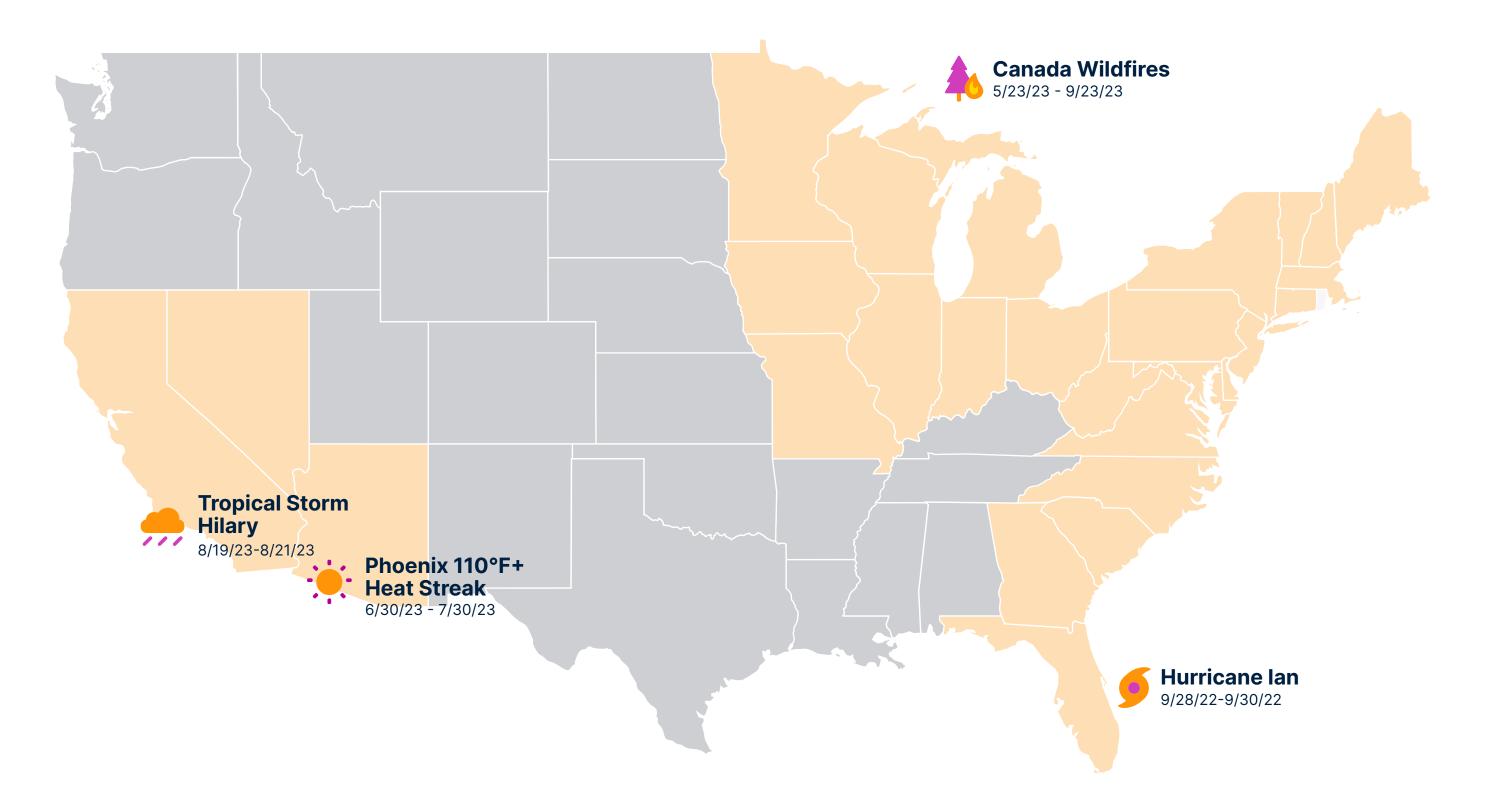6/30/23 - 7/30/23

Hurricane Ian
9/28/22-9/30/22

Figure 1. Analysis of U.S. local news reporting on four extreme weather events

Note: Orange represents most-impacted U.S. states for each of the four events analyzed. Dates indicate the duration of primary related impacts of each event in the U.S

Climate-contextualized segments: low frequency, high reach

Across the 50 largest U.S. DMAs, this analysis identified 17,202 total television segments that covered the four extreme events during their period of occurrence.

Of these, 881 segments (5% of the total) included climate change context (**Table 1**). Although the proportion of event-related segments with climate change context was relatively small, these segments were viewed by more than **17 million people**.

Table 1. Frequency of climate-contextualized segments and related attribution analyses.

Events	Event-specific attribution analysis	Dates of contextualization broadcast analysis	Total event-related segments	Event-related segments with climate change context	Total DMAs (out of top 50) with climate-contextualized segments
Hurricane Ian	Reed and Wehner, 2023 (10/6/2023)	9/27/22 - 10/2/22	8113	192 (2%)	49
Canadian wildfires	World Weather Attribution (8/22/2023)	6/6/23 - 6/9/23	2061	164 (8%)	48
Phoenix 110°F+ Heat Streak	World Weather Attribution (7/25/2023); Climate Central (July 10, with ongoing daily attribution)	7/19/23 - 7/30/23	3294	426 (13%)	50
Tropical Storm Hilary	None	8/19/23 - 8/22/23	3734	99 (3%)	38
	Total		**17202**	**881 (5%)**	

Source: Nielsen Local TV Measurement, September 2022 - August 2023

This analysis shows that, even when they air at relatively low frequency, segments with climate change context can still reach a majority of potential viewers—underscoring the potential impact and significance of immediate climate change contextualization as extreme events unfold.

We see the immense reach and value of climate-contextualized segments for each individual event as well. Although the overall rate of climate change contextualization (% of all event-related segments tied to climate change) is relatively low, the total audience for these segments exceeded 17 million people with contextualized segments airing in **38** (Tropical Storm Hilary) to all (Phoenix heat streak) of the top **50** largest DMAs. The wide reach of climate-contextualized segments demonstrates their large and geographically widespread audience and their immense impact, despite relatively low frequency (**Table 1**).

Further, during extreme weather events that present acute risks to health and safety, there is an increase of segments where the primary focus of coverage is expected to center around informing audiences with the latest forecasts, on-the-ground updates, and emergency preparedness information—particularly in the most directly affected areas.
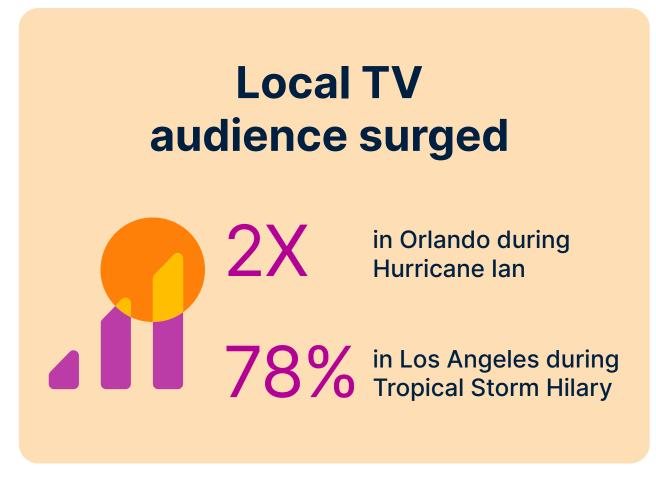
Audiences surge during extreme events

This report included a detailed analysis of audience viewership tuning into local news in the directly impacted markets for three of the four weather events: Hurricane Ian, the Canadian wildfires, and Tropical Storm Hilary.

Audiences surged in the most directly impacted DMAs as these events unfolded—particularly during both Hurricane Ian and Tropical Storm Hillary, likely due to the breaking news nature of these events and the immediate threats they posed to public safety.

During these two events, local television audiences **doubled** in Orlando (Hurricane Ian) and increased **78%** in Los Angeles (Tropical Storm Hilary) compared to the week prior to each event. Even larger audience surges were measured on local news streaming apps in Orlando, which saw increases of **over 244%** for persons aged 2 and up and **395%** for persons aged 25-54.

Local TV audience surged

2X in Orlando during Hurricane Ian

78% in Los Angeles during Tropical Storm Hilary

Source: Nielsen Local TV Measurement, September 2022 - August 2023

These dramatic audience spikes reflect the acute nature of these particular events and their direct, rapidly evolving impacts. Both events changed dynamically, posing large-scale risks to health and safety, daily functioning, private property, and public infrastructure during a relatively short time period.

Local television news audiences also increased, albeit less dramatically, in **New York (20-21%)**, **Philadelphia (9-14%)**, and **Boston (11-30%)** as the smoke from Canadian wildfires affected local air quality on June 5 and 7, 2023 (as compared to the previous week's viewership). For context, New York City had the worst air quality worldwide on June 6.

The relatively smaller audience surge during the Canadian wildfires likely reflects the distinct nature of this event: the primary, acute impacts (i.e., burned areas in Canada) were relatively remote and the secondary impacts (i.e., smoke transport to U.S. cities), while posing serious and immediate health risks, were diffused over a large U.S. region.
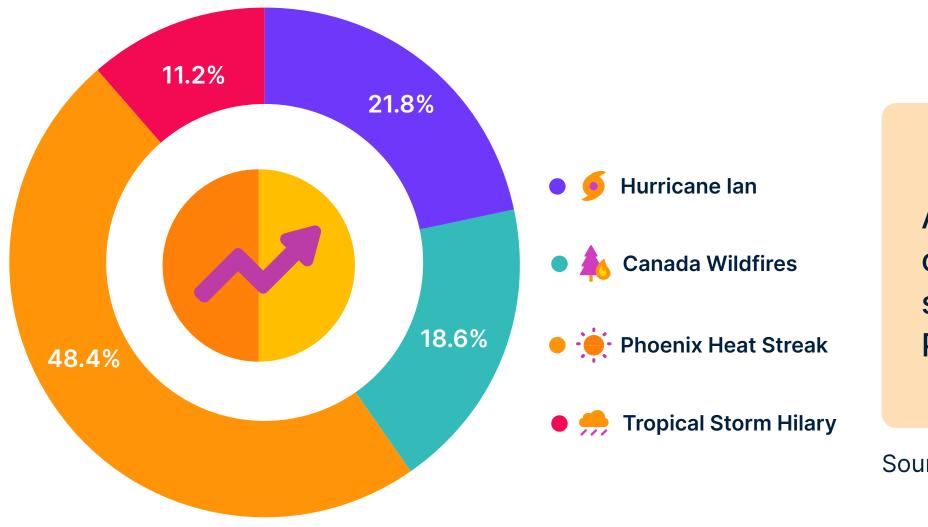
Extreme heat was connected to climate change most often

The range of different event types included in this analysis provides an opportunity to better understand the extent to which local television broadcasts are currently connecting different types of extreme weather events to climate change.

Notably, the Phoenix extreme heat streak accounted for almost half (426, or **48%**) of all 881 climate-contextualized segments across all four events (**Figure 2**).

Local television broadcasts covering the Phoenix heat streak also had a *significantly higher* rate of climate contextualization (13% of all event-related segments) than any other event (**Table 1**). The next highest rate of climate contextualization (8% of event-related segments) was measured for the Canadian wildfires.

Event-related segments with climate context

Legend:
- Hurricane Ian
- Canada Wildfires
- Phoenix Heat Streak
- Tropical Storm Hilary

21.8% — 11.2% — 48.4% — 18.6%

About **48%** of all climate-contextualized segments were about the Phoenix heat streak
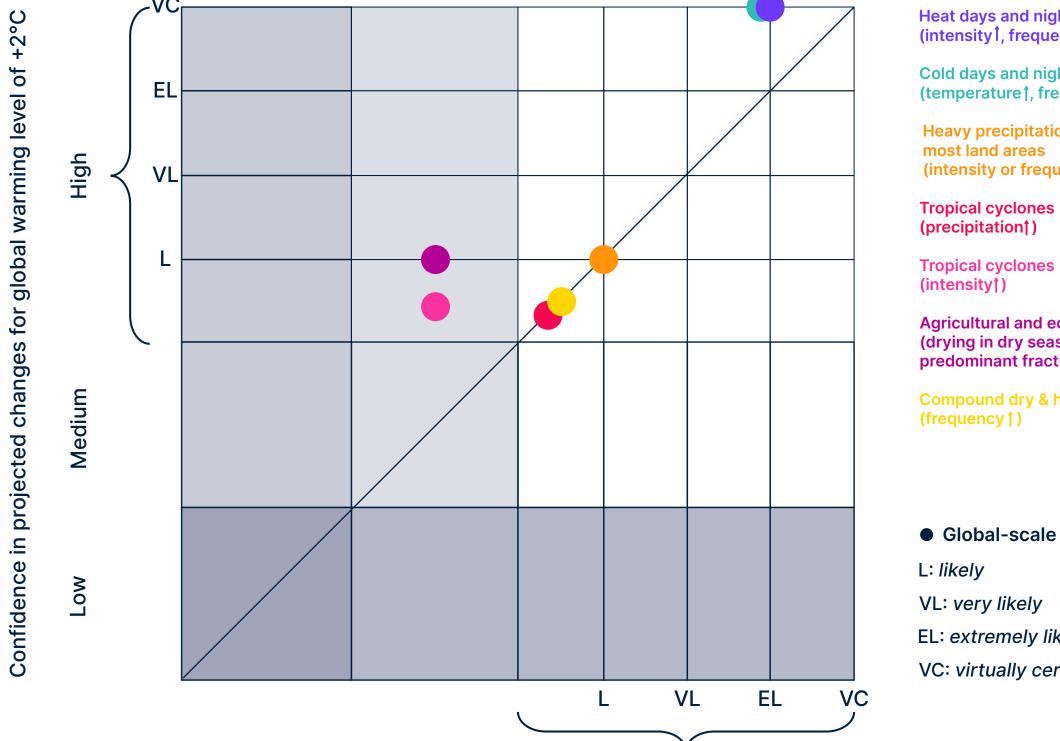
Source: Nielsen Local TV View

Figure 2. Event-related segments with climate change context

Significantly higher rates of climate contextualization during heat-related extreme events are notable because they broadly reflect the state of climate change attribution science.

According to the latest reports from the Intergovernmental Panel on Climate Change (**Figure 3**), scientific confidence in the attribution of observed trends in more frequent and intense extreme heat events is higher than for trends in other types of extreme weather.

Figure 3. Overview of observed changes for cold, hot, and wet extremes and their potential human contribution. Shown are the direction of change and the confidence in 1) the observed changes in cold and hot as well as wet extremes across the world; and 2) whether human-induced climate change contributed to causing these changes (attribution). Reproduction of Figure 11.5 in IPCC, 2021: Chapter 11. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. doi: *10.1017/9781009157896.013*

Scientific confidence in the attribution of other event types to human-induced climate change is still high—including for increased frequency or intensity of heavy precipitation events (e.g., Tropical Storm Hilary), higher rainfall rates during tropical cyclones (e.g., Hurricane Ian), and the increased frequency of compound hot and dry conditions (e.g., Canadian wildfires)—albeit relatively less so than for extreme heat events like the Phoenix heat streak.

Higher observed rates of climate contextualization for heat-related events in this case study reflect higher relative scientific confidence in the attribution of more frequent and intense heat-related extremes to human-caused climate change at a global scale.

Climate-contextualized segments highlight hazardous impacts on local communities

Detailed closed captioning text analysis provides further insight into how local television broadcasts connected the dots between extreme weather and climate change for viewers (**Table 2**).

Text analysis found that nearly all—**96%**—of the 881 total climate-contextualized segments mentioned at least one major impact that the extreme weather event was having on: health or safety; power supply and demand; the economy; vulnerable communities; and/or travel disruption. This is significant because it indicates that, when local television coverage of extreme weather events provides climate change context, they help underscore the widespread hazardous or disruptive impacts that such climate-linked events have on people.

Table 2. Impact messages in climate-contextualized segments

Climate-contextualized segments mentioning	Huricane Ian	Canadian Wildfires	Phoenix 110°F+ Heat Streak	Tropical Storm Hilary	Total Segments	Percent of all contextualized segments
The phrase "climate chage"	169 (88%)	125 (76%)	319 (75%)	50 (50%)	663	75%
Mention human-caused climate change	2 (1%)	2 (1%)	34 (8%)	3 (3%)	41	5%
Health or safety impacts	46 (23%)	126 (78%)	140 (33%)	27 (27%)	399	39%
Power grid impacts	25 (13%)	1 (1%)	55 (13%)	16 (16%)	99	11%
Economy or finance impacts	25 (13%)	69 (42%)	63 (15%)	16 (16%)	173	20%
Vulnerable communities impacts	19 (10%)	58 (35%)	106 (25%)	7 (7%)	190	22%

Source: Nielsen Local TV View

75% of climate-contextualized segments during extreme weather events mentioned climate change.

5% mentioned it was human-caused.

In climate-contextualized segments across all four events, *the most frequently mentioned impacts were related to health and safety*—a result consistent with the acute risks faced during extreme weather events. Contextualized segments on the Canadian wildfires had the highest rate of health and safety mentions, reflecting the serious and widespread health risks from exposure to wildfire smoke.

The vast majority of climate-contextualized segments also included the phrase "climate change," ranging from 50% of contextualized Tropical Storm Hilary segments to 88% of contextualized Hurricane Ian segments. Direct mentions of climate change occurred at approximately the same rate for the Phoenix heat streak and Canadian wildfires (75-76% of contextualized segments, respectively).

Mentions of human-caused climate change were considerably lower—ranging from 1% to 8% (for the Phoenix heat streak) of contextualized segments on each event. Despite relatively low mention rates, we again observed local broadcasts reflecting the relatively higher rates of scientific confidence in attributing extreme heat events to human-caused climate change. A total of 34 contextualized segments covering the Phoenix heat streak mentioned human-caused climate change—approximately five times more than the combined mentions of human-caused climate change across the other three events.

Methodology

Weather events

Climate Central selected four extreme weather events for analysis based on 1) the [event's connection to climate change](#) based on attribution science or physical, evidence-based conclusions (e.g., warmer air holds more water) and 2) the significance of the event's impacts. They were also chosen for a balance of events and geography, as well as capacity constraints. Each event was analyzed for climate contextualization by Climate Central and audience viewership data by Nielsen.

Closed captioning data

Our contextualization research covered local news broadcasts airing in the [top 50 Designated Market Areas](#), or DMAs, of the "Big 4" broadcast networks: ABC, CBS, FOX, and NBC. Local news closed captioning data for each event was searched using specific dates and two sets of keywords: event keywords and climate keywords. Since we were searching for segments connecting the event to climate change, the phrase "climate change" was in the climate-related keywords list. With Nielsen's Grabix tool, Cision, and general online research, two groups of segments were identified: **event-related** and **potentially contextualized**. Event-related segments include any local segment that mentions the event keywords. Potentially contextualized segments include any local segment that mentions the event keywords and at least one climate keyword within 220 words.

Nielsen **Designated Market Areas** is a term used by Nielsen Media Research to identify an exclusive geographic area of counties where the home market television stations hold a dominance of total hours viewed.

Text analysis for climate contextualization

In this study, climate contextualization refers to information that helps place a given extreme weather event in the broader context of human-caused climate change. Climate contextualization can take many forms, including climate statistics or trends, interviews with climate experts, related findings from peer-reviewed research, or discussion of local impacts and solutions. The depth of contextualization may vary and can be either direct or indirect.

We did not consider a segment to include climate contextualization if the speaker(s) presented factually incorrect or intentionally misleading information or solely presented personal opinion. Additionally, segments that only mentioned climate change in passing or as part of a teaser or segment promotion were not considered.

Once all segments were evaluated, the percent of contextualized segments was calculated by dividing the total number of contextualized segments by the total number of event-related segments. The percentage of contextualized segments was also assessed by day and market. Additionally, contextualized segments were reviewed to assess how often broadcasters discuss the impacts of extreme weather on daily life, which most fell broadly into one of five categories: health and safety, vulnerable communities, power supply and demand, the economy, and travel disruption (see Table 2).

An important caveat is that closed captioning data can sometimes contain errors that lead to misspelled or misinterpreted words or incomplete or scrambled text. While efforts were made to account for such errors, some local segments may have been excluded for those reasons.

Audience analysis

Nielsen provided the audience analysis for the four events for the Top 50 Nielsen Designated Market Areas in the United States.

Viewership, or reach, was determined using Nielsen Local TV View (NLTV) data. NLTV gives access to Local television ratings analyses that serve a wide range of needs in the media industry - including programming, buying, selling, promoting, and evaluating station performance. NLTV is an online tool that allows users to analyze viewing within and across all measured Nielsen Designated Market Areas (DMAs).

NLTV data also provided the number of **impressions** for both event-related weather event segments and contextualized segments for the major markets most closely impacted by the weather event. Impressions are the number of individuals or households exposed to a media schedule.

About Climate Central

Climate Central is a non-advocacy, non-profit science and news organization providing authoritative information to help the public and policymakers make sound decisions about climate and energy.

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About Nielsen

Nielsen shapes the world's media and content as a global leader in audience measurement, data and analytics. Through our understanding of people and their behaviors across all channels and platforms, we empower our clients with independent and actionable intelligence so they can connect and engage with their audiences—now and into the future. Nielsen operates around the world in more than 55 countries. Learn more at www.nielsen.com and connect with us on social media.

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