TO: Adrienne Thomas, NOAA PRA Officer
FROM: Juanita Constible, Senior Climate and Health Advocate, NRDC
DATE: March 6, 2023
RE: OMB Control Number 0648-XXXX

On behalf of our more than three million members and online activists, the Natural Resources Defense Council (NRDC) offers its strong support for the National Weather Service's (NWS) proposed Extreme Heat Social and Behavioral Sciences Research (OMB Control Number 0648-XXXX).

Heat is already the deadliest form of extreme weather in the United States.[1] The threat is only continuing to grow as the climate changes, the U.S. population ages, and many of the socioeconomic disparities that increase heat risks continue to trend in the wrong direction.[2,3,4] But despite the clear and growing danger of rising temperatures, most Americans have a relatively low perception of heat risks.[5,6] This may be starting to change in the wake of mass casualty events such as the 2021 Heat Dome in the Pacific Northwest.[7] Nevertheless, **NWS needs to better understand how the public perceives and responds to the health threats of heat to fulfill its mission of protecting life and property from the ravages of extreme temperatures.**

NWS has the opportunity with this research to fill many critical knowledge gaps, including:

- **Ranking heat waves.** The idea of ranking and/or naming heat waves has recently gained traction in the United States and around the world.[8] California became an early leader in this space with a 2022 law that directs the state Environmental Protection Agency to develop an extreme heat ranking system by 2025.[9] However, a recent technical brief by the World Meteorological

[1] U.S. Environmental Protection Agency, "Climate Change Indicators: Heat-Related Deaths," updated August 22, 2022, https://www.epa.gov/climate-indicators/climate-change-indicators-heat-related-deaths (accessed February 15, 2023).

[2] Juanita Constible, "How to Survive and Thrive on a Hotter Planet," NRDC, August 11, 2021, https://www.nrdc.org/experts/juanita-constible/how-survive-and-thrive-hotter-planet.

[3] Juanita Constible, "Lancet Offers Grim Assessment of Climate Change and Health," NRDC, October 26, 2021, https://www.nrdc.org/experts/juanita-constible/lancet-offers-grim-assessment-climate-change-and-health.

[4] E.g., "Trends in Income and Wealth Inequality," Pew Research Center, January 9, 2020, https://www.pewresearch.org/social-trends/2020/01/09/trends-in-income-and-wealth-inequality/.

[5] Jennifer Marlon et al., "Heatwave Risk Perceptions," Yale Program on Climate Change Communication, March 8, 2019, https://climatecommunication.yale.edu/visualizations-data/heatwave-risk-perceptions/.

[6] Peter D. Howe et al., "Geographic and Demographic Variation in Worry About Extreme Heat and Covid-19 Risk in Summer 2020," *Applied Geography* 152 (2023): 102876, https://www.sciencedirect.com/science/article/pii/S0143622823000073.

[7] Rachel H. White et al., "The Unprecedented Pacific Northwest Heatwave of June 2021," *Nature Communications* 14 (2023): 727, https://www.nature.com/articles/s41467-023-36289-3.

[8] Margaret Osborne, "'Zoe' Becomes the World's First Named Heat Wave," *Smithsonian Magazine*, August 2, 2022, https://www.smithsonianmag.com/smart-news/zoe-becomes-the-worlds-first-named-heat-wave-180980512/.

[9] California Department of Insurance, "California Leads World With New Heat Wave Ranking Law to Protect From Deadly Effects of Climate Change," September 9, 2022, hcttps://www.insurance.ca.gov/0400-news/0100-press-releases/2022/release065-2022.cfm.

Organization cautions there is no "convincing evidence" that ranking or naming heat waves would increase public safety.[10] For example, it is not clear how such a system would (a) translate across geographies; (b) interact with warnings from the NWS or other authorities; or (c) positively influence real-world household or institutional behavior.[11] NWS should shed light on these critical issues and help forestall potential messaging conflicts that could hurt heat preparedness and response efforts.

- **Minimizing warning fatigue.** High temperatures do not have to occur during a heat wave to cause significant health harms.[12] But what should heat warnings look like in a world where *every* day during the heat season may be too hot for some communities—especially along the U.S.-Mexico border? As baseline temperatures increase and multi-day heat waves become more frequent, longer lasting, and more severe under a changing climate, NWS should investigate how to minimize warning fatigue while still getting timely and actionable information into the hands of communities.[13]
- **Maximizing warning effectiveness during compound events.** Warm-season events such as hurricanes and wildfires are increasingly coinciding with, or occurring in close succession to, potentially deadly heat waves. NWS should consider investigating how best to ensure that disaster survivors will also be prepared for extreme heat, especially when there is a significant risk of power and water outages.
- **Improving heat information equity.** There are myriad stories of extreme weather warnings gone wrong, such as during the 2017 Thomas Fire in California when officials failed to issue Spanish-language alerts.[14] Even when severe weather warnings *are* provided in multiple languages or formats, they may not carry the same meaning or level of urgency.[15,16] Furthermore, households with lower adaptive capacity (e.g., because of insufficient funds or lack of social connections) may not be able to take advantage of "boilerplate" recommendations to keep themselves safe.[17] NWS should, in partnership with state and local officials, assess how

[10] World Meteorological Organization, "Considerations Regarding the Naming of Heatwaves," SERCOM 2, October 2022, https://library.wmo.int/index.php?lvl=notice_display&id=22190#.Y-1a2nbMKUl.

[11] Niall McLoughlin et al., "Changing Behavioral Responses to Heat Risk in a Warming World: How Can Communication Approaches be Improved?" *WIREs Climate Change* Early View (2023): e819, https://doi.org/10.1002/wcc.819.

[12] World Meteorological Organization, "Considerations Regarding the Naming of Heatwaves," SERCOM 2, October 2022, https://library.wmo.int/index.php?lvl=notice_display&id=22190#.Y-1a2nbMKUl.

[13] S.E. Perkins-Kirkpatrick and S.C. Lewis, "Increasing Trends in Regional Heatwaves," *Nature Communications* 11 (2020): 3357, https://doi.org/10.1038/s41467-020-16970-7.

[14] Tyler Hayden, "Ventura Farmworkers, Spanish Speakers Left Out of Thomas Fire Emergency Response," *Santa Barbara Independent*, December 11, 2017, https://www.independent.com/2017/12/11/ventura-farmworkers-spanish-speakers-left-out-thomas-fire-emergency-response/.

[15] Christina Caron, "Sign Language Interpreter Warned of 'Pizza' and 'Bear Monster' at Irma Briefing," *New York Times*, September 2017, https://www.nytimes.com/2017/09/17/us/sign-language-interpreter-irma.html.

[16] Joseph E. Trujillo-Falcón et al., "¿Aviso o alerta? Developing Effective, Inclusive, and Consistent Watch and Warning Translations for U.S. Spanish Speakers," *Bulletin of the American Meteorological Society* 103, no. 12 (2022): E2791–E2803, https://doi.org/10.1175/BAMS-D-22-0050.1.

[17] M. Guardaro et al., "Adaptive Capacity to Extreme Urban Heat: The Dynamics of Differing Narratives," *Climate Risk Management* 35 (2022): 100415, https://linkinghub.elsevier.com/retrieve/pii/S2212096322000225.

to provide clearer information in multiple languages and formats on protective actions that the most at-risk households can feasibly take.[18,19]

- **Protecting workers from heat.** The lack of information equity is particularly acute in workplaces that depend heavily on Indigenous employees whose languages are mainly oral, not written.[20] Furthermore, employers often restrict use of personal cell phones or other electronic devices in a bid to reduce injuries or to increase productivity.[21] NWS should research how to best design and convey sector-specific occupational heat warnings for employers and workers that address these equity issues, and that will be most relevant to the level of heat risk people face in particular jobs.[22]

Thank you for the opportunity to comment on NWS's proposed heat research, which has the potential to improve lives and livelihoods in a warming climate. Please let us know if you have questions or desire further information.

[18] Ibid.

[19] Kristin VanderMolen et al., "Recommendations for Increasing the Reach and Effectiveness of Heat Risk Education and Warning Messaging," *International Journal of Disaster Risk Reduction*, 82 (2022): 103288, https://www.sciencedirect.com/science/article/pii/S2212420922005076?via%3Dihub.

[20] Teniope Adewumi-Gunn and Juanita Constible, *Feeling the Heat: How California's Workplace Heat Standards Can Inform Stronger Protections Nationwide*, NRDC, 2022, https://www.nrdc.org/resources/feeling-heat-how-californias-workplace-heat-standards-can-inform-stronger-protections.

[21] Kate Gibson, "Did Deadly Tornado Upend Amazon's Plan to Revive Cellphone Ban?" *CBS News*, December 17, 2021, https://www.cbsnews.com/news/amazon-cell-phone-ban-tornado/.

[22] Shouro Dasgupta and Elizabeth J. Z. Robinson, "The Labour Force in a Changing Climate: Research and Policy Needs," *PLOS Climate* 2, no. 1 (2023): e0000131, https://journals.plos.org/climate/article?id=10.1371/journal.pclm.0000131.