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Federal Administration Issues Climate Report

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Issuance of the Fourth National Climate Assessment

On November 23, 2018, the Federal Administration released a major scientific report on the climate impacts to the United States. The report, the [Fourth National Climate Assessment Volume 2, Impacts, Risks, and Adaptation in the United States](#),¹ predicts that if significant steps are not taken, the damage caused by climate change will significantly impact the American economy by century's end. It lays out a detailed picture of how communities across the country are already feeling the effects of climate change.

Volume 1 of the NCA4, known as the [Climate Science Special Report \("CSSR"\)](#),² was published in November 2017. It summarized the state-of-the-art knowledge about how climate is affecting temperatures, water resources, sea-level rise, and other natural systems around the country. The CSSR provided information on how and why the country's climate is changing – from the human fingerprint on observed increases in extreme heat, to more frequent large wildfires out West, to more intense hurricanes in the North Atlantic since the 1970s.

Together, Volumes 1 and 2 of the Fourth National Climate Assessment (collectively, the "NCA4") is the most comprehensive scientific assessment of the state of climate change in the United States. In combination with the recently issued reports described below, it provides an explanation of past trends and the current state of climate change, the basis of the knowledge of climate change, and how scenarios and modeling are used to explain, avoid and prepare for possible futures.

This article is the first of a series intended to help the reader explore and use the NCA4 report. In the near future, we will provide additional analysis of impacts and possible responses.

Context of Other Climate Reports

The NCA4 report meets the requirements of the Global Change Research Act of 1990, which mandates a quadrennial assessment of our understanding of global change and its impacts on the United States to "assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change." Although required every four year, previous reports were only issued in 2000 and 2009 and 2014.

The May 2014 report, the [Third National Climate Assessment \(NCA3\)](#), concluded that the [tangible impacts of climate change had already started to cause damage across the country](#). The NCA3 report helped inform the Obama administration as it adopted the Clean Power Plan and played a lead role in brokering the Paris Agreement. The NCA4 departs from the NCA3 in that the NCA4 focuses on costs. The costs assessed range from household expenses to the availability and pricing of food, energy, and other goods people use in modern society.

Unlike the NCA3 report, the NCA4 report was not produced by a federal advisory committee. Instead, development of both volumes of NCA4 reports was led by federal employees with contributing authors

¹ Recommended citation: USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA. doi: 10.7930/NCA4.2018.

² Recommended citation: Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, B. DeAngelo, S. Doherty, K. Hayhoe, R. Horton, J.P. Kossin, P.C. Taylor, A.M. Waple, and C.P. Weaver, 2017: Executive summary. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 12-34, doi: 10.7930/10DJ5CTG.

from national laboratories, universities and the private sector. Volume 2 was overseen by a steering committee comprised of representatives from the 13 U.S. Global Change Research Program (“USGCRP”) agencies.³

The NCA₄ Volume 2 report was released on the heels of the [*Intergovernmental Panel on Climate Change \(IPCC\) Special Report on Global Warming of 1.5°C*](#) issued in September 2018. The IPCC’s report [provided](#) the world with the closest look to date at how climate change is likely to manifest in the near-term, and the measures necessary to limit warming to 1.5°C and 2°C – the targets of the Paris Agreement. That report made it clear that while a certain level of warming is inevitable, a wide range of serious impacts can be avoided, from hundreds of millions of additional people being regularly exposed to extreme heat waves worldwide to the complete loss of warm water coral reefs, if we can contain warming to 1.5°C instead of 2°C. The IPCC will be presenting the findings of the report to diplomats attending the international climate treaty talks scheduled to take place in Poland on December (CPO₂₄). Co-Chairs of the three IPCC Working Groups will present the findings of the new IPCC report entitled Unpacking the new scientific knowledge and key findings in the [*IPCC Special Report on Global Warming of 1.5°C*](#).

The NCA₃ federal advisory committee adopted a report entitled [*Preparing the Nation for Change: Building a Sustained National Climate Assessment Process*](#). In 2016, in response to this report, NOAA convened a federal advisory committee to explore and recommend ways to accelerate progress in implementing a sustained national climate assessment. The federal advisory committee was allowed to sunset in 2017. However, with support from the State of New York, Columbia University and the American Meteorological Society, individual members of the federal advisory committee reconvened as the Independent Advisory Committee on Applied Climate Assessment (IAC). The IAC’s goal is to encourage individuals and groups with an interest in improving climate resilience and preparedness through collaboration in implementing adaptation measures. The IAC expects to issue its report in early 2019.

Topline Findings of the NCA₄ Volume 2 Report

The NCA₄ Volume 2 report is organized in chapters that are centered on Key Messages regarding the risks to natural and/or human systems and measures that can be taken to minimize those risks within 10 regions of the United States and across 16 nation-wide topics. Using economic estimates and scenarios of plausible futures, two additional chapters assess the science of adaptation and mitigation.

While the NCA₄ Volume 2 report sets out 12 Summary Findings, this article blends those into 7 messages.

1. Climate change is happening now and it is not an abstract problem.

Global average temperature has increased by about 1.8°F from 1901 to 2016. Ocean surface waters have warmed on average $1.3^{\circ} \pm 0.1^{\circ}\text{F}$ ($0.7^{\circ} \pm 0.08^{\circ}\text{C}$) globally between 1900 and 2016, and more than 90% of the extra heat linked to carbon emissions is contained in the ocean. This warming impacts sea levels, ocean circulation, stratification (density contrast between the surface and deeper waters), productivity, and, ultimately, entire ecosystems. Changes in temperature in the ocean and in the atmosphere alter ocean currents and wind patterns, which influence the seasonality, abundance, and diversity of phytoplankton and zooplankton communities that support ocean life. In the Arctic, annual average temperatures have increased more than twice as fast as the global average, accompanied by thawing permafrost and loss of sea ice and glacier mass. Since the 1960s, sea level rise has already increased the frequency of high tide flooding by a factor of 5 to 10 for several U.S. coastal communities. Annual precipitation since the beginning of the last century has increased across most of the northern and eastern United States and decreased across much of the southern and western United States.

³ The 13 Federal agencies comprising the USGCRP are: the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration (“NOAA”); the Departments of Defense, Energy, Commerce, Agriculture, Interior, State, Health and Human Services, and Transportation; the National Science Foundation, the US Agency for International Development, and the Smithsonian Institution.

2. Climate change is affecting everyone, with the elderly, young, low income and communities of color being particularly vulnerable to the impacts of climate change.

More frequent and/or more intense extreme events, including drought, wildfires, heavy rainfall, floods, storms, and storm surge, are expected to adversely affect population health. Climate change is expected to alter the geographic range, seasonal distribution, and abundance of disease vectors, exposing more people to Lyme disease, West Nile, chikungunya, dengue, and Zika viruses. Increasing water temperatures are projected to alter the seasonality of growth and the geographic range of harmful algae and coastal pathogens, and runoff from more frequent and intense rainfall is projected to increasingly compromise recreational waters and sources of drinking water.

3. Americans are already paying for climate change.

Economic losses from climate change could reach hundreds of billions, annually, for some sectors. Economic impacts and projections are discussed for each sector and region. For example, in the energy sector, repairs to electricity generation, transmission, and distribution systems from recent hurricane events are costing billions of dollars. Con Edison and Public Service Electric and Gas invested over \$2 billion (in 2014 dollars) in response to Superstorm Sandy. An estimate to build back Puerto Rico's electricity systems in response to Hurricanes Irma and Maria is approximately \$17 billion (in 2017 dollars). The 2017 Atlantic Hurricane season alone is estimated to have caused more than \$250 billion in damages and over 250 deaths throughout the U.S. Caribbean, Southeast, and Southern Great Plains. More than 30 inches of rain fell during Hurricane Harvey, affecting 6.9 million people. In the coastal sector, although storms, floods, and erosion have always been hazards, in combination with rising sea levels they now threaten approximately \$1 trillion in national wealth held in coastal real estate.

4. Human activity, primarily burning fossil fuels, is causing climate change.

Global average temperature has increased by about 1.8°F from 1901 to 2016, and observational evidence does not support any credible natural explanations for this amount of warming; instead, the evidence consistently points to human activities, especially emissions of greenhouse or heat-trapping gases ("GHG") as the dominant cause.

5. The future depends on human response.

Using scenarios based on human responses to reduce GHG emissions, the authors explain climate projections for a range of plausible futures. The climate will continue to change over this century and beyond. How much the climate changes will depend primarily on global emissions of GHG and on the response of Earth's climate system to warming. With significant reductions in emissions, global temperature increase by 2100 could be limited to 3.6°F or less compared to preindustrial temperatures. Without significant reductions, annual average global temperatures could increase by 9°F or more by the end of this century compared to preindustrial temperatures. The resulting range of projections reflects, in part, the uncertainty that comes with quantifying future human activities and their influence on climate.

6. Americans are already responding to the climate change impacts.

The response chapters assess the science of adaptation and mitigation. In terms of mitigation, the NCA₄ assesses recent advances in research that have improved understanding of how potential mitigation pathways can avoid or reduce the long-term risks of climate change within the United States. The authors note that the earliest effective date of formal withdrawal of the U.S. from the Paris Agreement is November 4, 2020 and that mitigation-related activities are taking place across the U.S. at the federal, state, and local levels as well as in the private sector. The potential roles for carbon sinks (or storage) in mitigation are discussed in NCA₄ Volume 2, Land Cover & Land-Use Change. In terms of adaptation, while efforts are occurring across the country, climate adaptation efforts are not yet common place, have been hindered by the assumption that climate conditions are and will be similar to those in the past, and are often too incremental given the challenge faced. Substantial changes are required in

organizational practices and procedures, in institutions, in individual and societal expectations and norms, in capital investment planning and in laws.

7. The world is interconnected.

The NCA₄ authors express concern about growing threats to global trade, supply chains, and the price of goods. Other international issues addressed beyond trade include the impact of climate change on international aid investments, increase in the need for humanitarian assistance and disaster relief, the exacerbation of conflict, the impact to U.S. military infrastructure, and transboundary resources, such as fish, water and minerals managed jointly by neighboring countries.

The NCA₄ will likely be a highly referenced set of reports regarding scientists' current observations in the U.S. and the scenarios for plausible futures. These reports will likely become a standard for assessments and a starting point for planning for mitigation and adaptation at the state and local levels and with businesses nationwide.

Van Ness Feldman will publish additional articles in the near future to help you get the most of out of the NCA₄ report and to keep you abreast of developments.

For more information

If you are interested in additional information regarding the issues discussed above, or would like to discuss the implications climate change resilience and adaption, please contact [T.C. Richmond](#) or any member of the firm's [Climate Adaption and Resilience Team](#) at (206) 623-9372.

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