

Current Climate Studies 5:

THIRD NATIONAL CLIMATE ASSESSMENT (NCA3): OVERVIEW OF REPORT FINDINGS

1. Print this file. Also answer the "Concept of the Week" questions in the *Weekly Climate News File*. (Check for additional *News* updates during the week.)
2. Complete the Investigation by responding to the *Chapter Progress Questions (Study Guide)* and the Investigations 5A and 5B from the *Climate Studies Investigations Manual*, and this *Current Climate Study*.

The *Third National Climate Assessment (NCA3) Findings*

As part of its overview, the *Third National Climate Assessment (NCA3) Highlights* document lists and briefly describes its major climate-change findings. To access *NCA3 Highlights*, go to your bookmarked *Highlights* address (if you have it bookmarked), go to the course website and click on "National Climate Assessment Highlights", or go directly to the *Highlights* report at http://www.globalchange.gov/sites/globalchange/files/NCA3_Highlights_LowRes-small-FINAL_posting.pdf. Then, go to page 12 where a list of a dozen particularly noteworthy findings begins.

1. *Finding 1* in the list states that global climate is changing and it is apparent across the United States. The finding also indicates that the global warming of the past _____ years has been primarily due to human activity, predominantly from the burning of fossil fuels.
 - 50
 - 75
 - 100
2. *Finding 2* indicates that some extreme weather events (prolonged periods of excessively high temperatures, more heavy downpours, and in some regions, more severe drought) have increased in recent decades. New and stronger evidence confirms that _____ of these increases are related to human activities.
 - none
 - some
 - all
3. *Finding 3* states that human-induced climate change is projected to continue and will accelerate if global emissions of heat-trapping gases continue to increase. Concentrations of heat-trapping gases already in the atmosphere _____ commit us to a hotter future over the next few decades.

- does
- does not

4. *Finding 4* informs us that impacts to climate change are already evident and are expected to become increasingly disruptive across the nation over the next century and beyond. There is growing evidence that harm to our country will grow over time unless global emissions of heat-trapping gases are _____.

- totally eliminated
- greatly reduced
- brought to a steady rate
- allowed to increase at a modest rate proportional to economic growth

5. According to *Finding 5*, climate change threatens human health in many ways, including _____.

- more extreme weather events
- more wildfires
- decreased air quality
- more diseases transmitted by insects, food, and water
- all of these

6. *Finding 6* indicates the damaging impacts of climate change on infrastructure is already evident and is projected to increase. Sea level rise, storm surge, heavy downpours, flooding, prolonged rains, rapid melting of snowpack, and extreme heat are listed as major causes of damage. Specifically, extreme heat is listed as damaging _____ infrastructure.

- buildings
- ports
- industrial facilities
- transportation

7. *Finding 7* states that water quality and water supply reliability are being jeopardized by climate change. Surface and groundwater supplies are already stressed in some locations due to increasing demand and declining runoff and groundwater recharge. The _____ part of the contiguous U.S. is projected to be most impacted by climate change in terms of water shortages and competition for water among its many users.

- northern
- western
- eastern
- southern

8. *Finding 8* describes climate disruptions to agriculture and the projection that such disruptions will become more severe during this century. Some U.S. regions and some

types of agricultural production are more resilient to climate change than others, at least for the next 25 years or so. From about 2050 onward, climate change is projected to have more negative impacts on crops and livestock in the _____ part(s) of the country.

- northern
- western
- eastern
- southern
- all of these

9. *Finding 9* reveals that Indigenous Peoples' health, well-being and ways of life are especially susceptible to climate change. The effects of chronic stresses, including extreme poverty, are worsened by climate-change impacts. Indigenous Peoples in _____ are highlighted as having their critical infrastructures and traditional livelihoods negatively impacted by climate change.

- Oklahoma
- Washington
- Florida
- Alaska

10. The impact of climate change on ecosystems and the benefits they provide to society, such as the buffering of extreme events, is treated in *Finding 10*. Climate-change impacts on biodiversity include _____.

- range shifts
- species extinctions
- droughts
- pest outbreaks
- floods
- wildfires
- all of these

11. *Finding 11* informs that ocean waters are warming and becoming chemically more _____, bringing about changes in ocean circulation, chemistry, ecosystem, and marine life.

- basic
- acidic

12. *Finding 12* confirms that planning for climate-change adaptation and mitigation is becoming more widespread, but current implementation efforts are insufficient. Actions reducing heat-trapping gas emissions, increasing carbon uptake, taking adaptive measures, and increasing resilience to unavoidable impacts are steps that can improve _____.

- public health
- economic development
- ecosystem protection
- quality of life
- all of these

Evidence of Climate Change Continues to Grow

Subsequent to the publication of the *Third National Climate Assessment (NCA3)*, a number of updated climate publications have been published. For example, the World Meteorological Organization (WMO) released its latest annual *Greenhouse Gas Bulletin (GGB)* as of this writing in November 2015 (http://library.wmo.int/pmb_ged/ghg-bulletin_11_en.pdf). The report confirmed that atmospheric concentrations of greenhouse gases had reached a record high in 2014 with the average global abundance of carbon dioxide (CO₂) measured at 397.7 ppm. This value was 143% of the atmospheric concentration of CO₂ in preindustrial time (1750). [The Carbon Dioxide Information Analysis Center (CDIAC) of the U.S. Department of Energy reports that in July 2016 the monthly mean CO₂ measurement at Mauna Loa, HI was 404.39 ppm. (<http://cdiac.ornl.gov/>).]

According to the *GGB*, the NOAA *Annual Greenhouse Gas Index* in 2014 reported a 36% increase in total radiative forcing – the warming effect on climate - by all long-lived greenhouse gases since 1990 and a 1.2% increase from 2013 to 2014). This acceleration in the impact of greenhouse gas emissions is basic to the increased sense of urgency for action against “potentially devastating climate change.”

For the first time, the previous *GGB* issued in November 2014 included a section on ocean acidification. It reported that about a quarter of the total greenhouse gas emissions into the atmosphere due to fossil fuel combustion are absorbed by the ocean. This slows the increase in their atmospheric concentrations while making seawater more acidic. This current rate of ocean acidification appears to be the greatest during at least the last 300 million years, and is already causing destructive impacts on calcifying marine organisms and their ecosystems.

The contents of the recent issues of the WMO *GGB* are consistent with the contents of other recent climate-related publications, including the *NCA3*, except they indicate the possibility the CO₂ uptake by Earth’s biosphere has been reduced. If so, this would result in higher atmospheric CO₂ concentrations, greater climate change due to accelerated warming, and even more dire consequences.

13. The 2014 WMO *GGB indicated* that between 1990 and 2013, the radiative forcing (warming effect) resulting from increases in greenhouse gas concentrations in the atmosphere increased _____.

- 36%
- 121%
- 142%
- 253%

14. About a quarter of the total greenhouse gas emissions from the burning of fossil fuels that enter the atmosphere are absorbed by the ocean. This has resulted in _____.

- the lowering of greenhouse gas concentrations from what they would have been with no ocean absorption
- an increase in the acidity of the ocean
- both of these

Summary

Studying modern climate and climate change requires, as does all scientific research, the continuous updating and revising of the knowledge base of the discipline under study. The brief overview of findings published by the WMO in its *GGB* exemplifies this iterative process.

The *National Climate Assessment (NCA)* is a quadrennial report that summarizes the impacts of climate change on the United States, now and in the future. The third and most recent *National Climate Assessment (NCA3)* released by the U.S. Global Change Research Program (USGCRP) in May 2014 drew from a large body of scientific research to produce its findings. In this *Current Climate Studies*, the synthesis of important results of the *NCA3* is presented by briefly examining many of its major findings. These findings will be revisited in detail as the course progresses.

NCA3 serves as the scientific foundation on which a *Climate Resilience Toolkit* has been developed “that provides a framework for understanding and addressing the climate issues that impact people and their communities.” The *Toolkit* is a website developed by the National Oceanic and Atmospheric Administration (NOAA) and other federal agencies. You can visit the *Toolkit* by going to: <http://toolkit.climate.gov/>.

Instructions for Communications with Mentor:

Transmit this week’s work to your LIT mentor by Monday, 3 October 2016, or as coordinated with your mentor. Include:

- **Chapter Progress Response Form** from the *Study Guide* or the *RealTime Climate Portal* website.
- **Investigations Answer Form** for 5A and 5B from the *Study Guide* or *RealTime Climate Portal* website.
- **Current Climate Studies Answer Form** from *RealTime Climate Portal* website.

©Copyright 2016, American Meteorological Society.