Climate Change and Ohio
Summary of Projected Changes in Climate and Associated Impacts

Changes in Temperature

- Average annual temperatures for the southern Great Lakes region have increased by 1.3°F since 1895[1]
- By mid-century, annual temperatures are expected to rise by 3°F to 4°F, with the greatest increases in winter and spring[2]
- By end of the century, average summer temperatures could rise by 12°F (Figure 1)[2].

These changes in temperature would mean that:

- Cincinnati would experience more than 85 days per year with highs over 90°F and almost a month of days over 100°F. Cleveland would experience more than 60 days over 90°F and three weeks of days over 100°F[2]
- Air quality would deteriorate as hotter weather causes more severe smog. This would have serious consequences for public health, including a greater incidence of asthma attacks and other respiratory conditions[2]

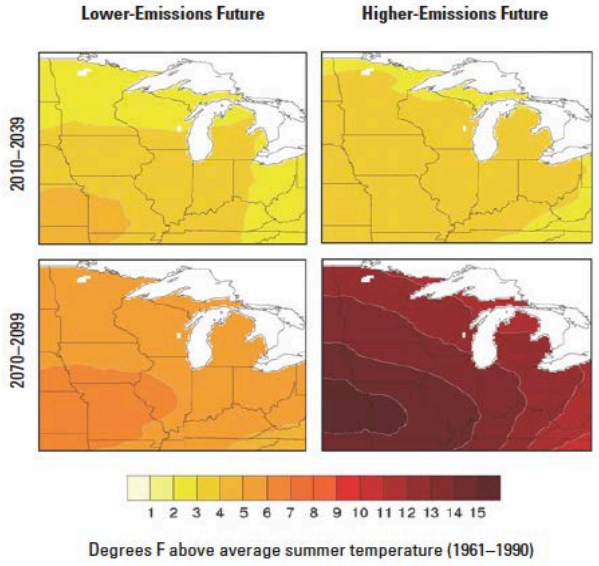

Figure 1: Degrees Fahrenheit above the average of 1961-1990 summer temperatures

- Increasing temperatures could result in range shifts and altered fish habitat – which could affect recreational and commercial fishing and hunting. Some effects could be positive, many will be negative[2]
- Cincinnati would face at least two heat waves per summer like the ones that killed hundreds in Chicago in 1995. Cleveland would face at least one heat wave of this magnitude per summer[2]
- Crops and livestock would face substantially more heat stress, decreasing crop yields and livestock productivity[2]
- Warmer winters and a growing season up to six weeks longer would enable pests to expand their range[2]

- Summers are projected to be as or more humid than the historical average, meaning that the way it feels outside could more closely resemble the climate of Virginia or Arkansas, depending on the greenhouse gas emissions scenario (Figure 2[3])
  - Warming will cause a 28 percent drop in the number of clean air days per summer in Columbus[4]

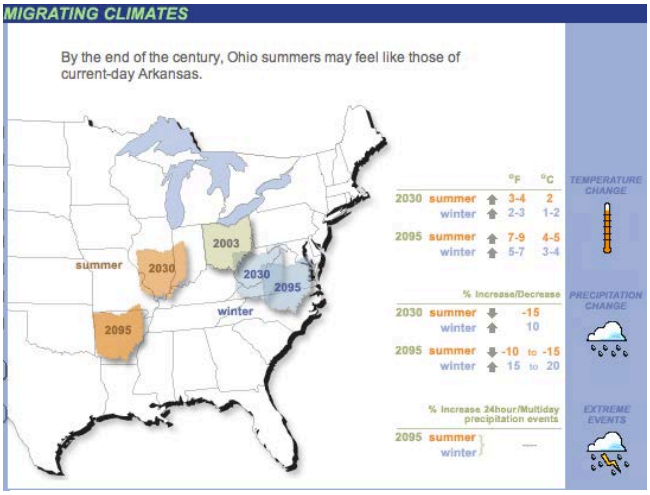

Figure 2: Map indicating what summers in Ohio might "feel" like under a low and high greenhouse gas emissions scenario

Changes in Precipitation

- Across Ohio, winters, springs, and falls will be wetter, but summers will be drier**.** Summers will see 5 percent less rain[2]
- Spring and winter rainfall is projected to increase almost 15 percent over the next several decades and about 30 percent toward the end of the century (under a high-emissions scenario)[2] (Figure 3[9])

These changes in precipitation may lead to:

- More flooding, delays in the planting of spring crops, and declining water quality in rivers, streams, and storage reservoirs[2]
- Crop production would be inhibited by changing rain patterns such as wetter springs (which delay planting and increase flood risk) and less rain during the increasingly hot summers[2]

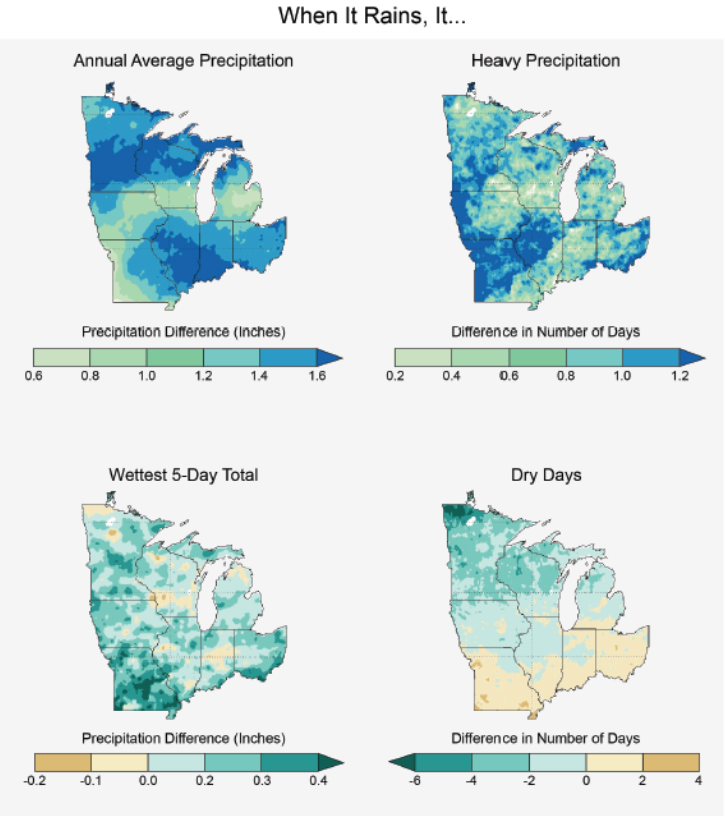

Figure 3: Projected changes in precipitation per the draft 2013 Midwest Chapter of the U.S. National Climate Assessment

Changes in Extreme Precipitation Events

- The future 100-year flood for Dayton will most likely increase by 10-20% with a high likelihood of an increase in annual peak flow[8]
- Precipitation is more likely to come in the form of heavy rains. Heavy downpours are already twice as frequent in the Midwest as they were a century ago[5]
- Under the higher-emissions scenario Cincinnati is projected to experience a 30 percent increase in heavy rainfalls (defined as more than two inches of rain in one day) over the next few decades. Toward the end of the century, heavy rainfalls are projected to occur more than twice as frequently under the higher-emissions scenario[2]

Figure 4: With changing precipitation patterns comes an increased likelihood of storm water management issues

More heavy rainfall events would lead to:

- A greater incidence of flash flooding[2]
- An increase in the value of the property at risk and the costs of emergency response systems and flood control measures[2]
- More combined sewer overflows (CSOs)

- Ohio could also face longer periods without rainfall[6]
  - This can create a greater risk of short and medium-term drought
  - About 80% of the state's counties now face higher risks of water shortages by mid-century as the result of climate change[7]

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Cross-Cutting Impacts

- Flooding and erosion damage transportation infrastructure, interfere with traffic, and cause economic disruption. More frequent flooding also poses numerous public health concerns
- Although precipitation is projected to increase, higher temperatures will cause more surface water evaporation and snow melt, reducing Ohio's surface water levels during the next century
- Decreased water availability (lower groundwater recharge) timed with increased demand (due to rising temperatures) could lead to new or enhanced water conflicts[9]
- Reduced soil moisture can cause changes in tree species composition, geographic range, and overall forest health and productivity, leading to a decline in Ohio's forests of up to 50 percent. A decline of 50 percent of existing forest cover would amount to $8 billion in economic costs and the loss of tens of thousands of jobs[10]
- Warmer temperatures may increase some crop yields, however, higher ozone and severe weather could decrease overall productivity[11]
- Climate change will worsen smog and causes plants to produce more pollen, thereby increasing respiratory health threats, particularly for people with allergies and asthma[12]
- Residents will experience greater health risks from increasing dangerous heat waves, storms and flooding, waterborne illnesses, infectious diseases, declining air quality, and drought[12]

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