

## **Background Information on Climate Change and Costly Damages in California**

California is suffering from the costly effects of climate change largely from burning coal, oil, and gas, plus deforestation. At the same time, some fossil fuel companies – including BP, Chevron, ConocoPhillips, ExxonMobil and Shell – have been deceiving the public about climate science. They have done so despite decades of evidence, including from their own scientists, that global annual average surface temperature and sea levels are rising in large part from emissions from fossil fuels (IPCC). The National Academy of Sciences affirmed in March 2016 that it is possible to estimate the influence of climate change on some types of specific extreme events, in particular: heat waves, cold snaps, droughts and heavy precipitation (NAS).

This UCS backgrounder summarizes official state assessments, research and other sources about the current and projected impacts of sea level rise and extreme weather in California. In a few cases noted below, these impacts have been directly studied for the portion attributable to human-caused climate change. For costs, further research on exposure and vulnerability can refine contributing factors (IPCC Figure).

### **SEA LEVEL RISE**

- Sea level along California’s coastline has risen about seven inches in the last century. It could be 10-18 inches higher in 2050 than in 2000, and, conservatively, 31-55 inches higher by the end of the century, affecting up to 32 million residents in coastal counties. This represents a four- to eightfold increase in the rate of sea-level rise over that observed in the last century (*Our Changing Climate 2012*, p. 9).
- If population and development were kept at today’s levels, a 100-year flood in 2100, after a 55-inch sea-level rise, would put at risk 480,000 people and \$100 billion of property (in 2000 dollars) along San Francisco Bay and the California coast (*Our Changing Climate 2012*, p. 9).
- As early as 2050, today’s 100-year storm could occur once every year, given current projections of sea-level rise (*Our Changing Climate 2012*, p. 9).
- Rising tides could also damage infrastructure, including water supply and delivery, energy, transportation, ports and fire-fighting systems (*From Boom to Bust? Climate Risk in the Golden State*, p. 4).

### **WATER AND DROUGHT**

- Global warming has measurably worsened the ongoing California drought. While scientists largely agree that natural weather variations have caused a lack of rain, rising temperatures are making things worse by driving moisture from plants and soil into the air. One study estimates that increased temperatures have driven up water demands by as much as twenty-five percent (Williams et al. 2015). In 2015 alone, the drought imposed an estimated \$2.7 billion in costs to the California economy (UC Davis).
- The average early spring snowpack in the Sierra Nevada decreased by about 10 percent during the last century, a loss of 1.5 million acre-feet of snowpack storage (*Managing an Uncertain Future: Climate Change Adaptation Strategies for California’s Water*, p. 3).

### **HEALTH**

- The July 2006 heat wave caused 140 heat-related deaths in California. Heat-related illnesses—such as heat stroke, electrolyte imbalance, acute renal failure, kidney disease, diabetes and cardiovascular diseases—resulted in more than 16,000 excess emergency department visits (*Indicators of Climate Change in California*, pp. 124-26).
- Mortality from cardiovascular conditions on extremely hot days is estimated to be up to 28 percent higher than normal. The elderly, infants and African Americans are at higher risk for hospitalization for stroke, diabetes, acute kidney failure, dehydration and pneumonia. Preterm delivery is more likely for all pregnant women (*Our Changing Climate 2012*, p. 4).

- Residents of socioeconomically disadvantaged neighborhoods in the Los Angeles, Sacramento, San Diego and San Francisco metropolitan areas are at greater risk of heat-related illnesses due to the “urban heat island effect” (*Indicators of Climate Change in California*, p. 130).
- Higher temperatures increase ground-level ozone levels, and a longer and more severe wildfire season causes higher ozone and particulate pollution, which worsens respiratory health problems (*Our Changing Climate 2012*, p. 4).

## FIRES

- Ten of the 20 largest fires in California history have occurred since 2005, including 2015’s Rough Fire (#13), which burned more than 150,000 acres and shocked veteran firefighters with its erratic behavior (CAL FIRE, “Top 20 Largest California Wildfires,” 9/11/15; *Los Angeles Times*, “3 major fires burn out of control; governor warns ‘there is more to come,’” 9/14/15).
- California’s third-largest recorded wildfire, the 2013 Rim Fire, burned more than 257,000 acres in and around Yosemite National Park. Fire suppression costs were nearly \$126 million. The fire destroyed private property valued at \$50 million to \$265 million, and it cost an additional \$100 million to \$736 million in lost environmental benefits, such as food provisioning, raw materials, air quality, soil retention, water regulation, and recreation and tourism (*Playing with Fire*, p. 8). About 375,000 residential properties in California are at very high risk of wildfire damage (Botts 2013, p. 22).

## ECOSYSTEMS

- Climate change is strongly influencing biological systems. Some terrestrial species have shifted their range toward cooler regions (closer to the poles and/or higher altitudes) and changed timing of their growth stages (“phenology” or “spring creep”). Aquatic species have exhibited similar responses (*Indicators of Climate Change in California*, p. 119).
- Many of California’s 121 native freshwater fish species—including commercially valuable coho salmon and steelhead trout—are already in decline and are particularly vulnerable to climate change, with 83 percent at high risk of extinction (*Our Changing Climate 2012*, p. 12).

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