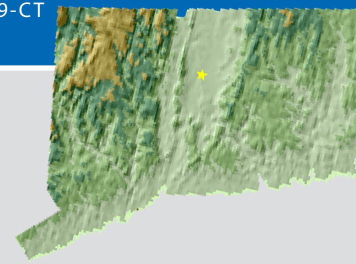

CONNECTICUT

Key Messages

Temperatures in Connecticut have increased about 3°F since the beginning of the 20th century. Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century, with associated increases in heat wave intensity and decreases in cold wave intensity.

Precipitation has increased during the last century, with the highest number of extreme events occurring over the last decade. Increases in the frequency and intensity of extreme precipitation events are projected, as well as increases in winter and spring precipitation.

Sea level has risen at rate of 10–11 inches per century along the Connecticut coast, faster than global rate. Global sea level is projected to rise another 1 to 4 feet by 2100, with even greater rises possible for Connecticut.

Connecticut is located on the eastern coast of the North American continent. Combined with its northerly latitude, its geographical location exposes the state to both the moderating and moistening influence of the Atlantic Ocean, as well as the effects of the hot and cold air masses from the interior of the continent. The topography varies from hilly slopes in the northwestern portion of the state to the southeastern coast along the Long Island Sound, which is characterized by diverse sections of rocky high points and marshes. Its climate is characterized by cold, snowy winters and warm, humid summers. The polar jet stream is often located near the state, giving it highly variable weather patterns, and generally abundant precipitation throughout the year. Temperatures along the coast are moderated by the close proximity to the Atlantic Ocean, with warmer winters and longer frost-free seasons than inland areas. The annual average temperature is 49°F with average temperatures of 26°F in January and 72°F in July. Temperatures above 90°F are rather infrequent, with an average of 8 days a year in Falls Village, 11 days in Hartford, and up to 2 days in New Haven. Similar geographic variations exist for extreme cold (below 0°F), ranging from 7.5 days in Falls Village to 1.5 days in Hartford, and 0.3 days along the coast at New Haven.

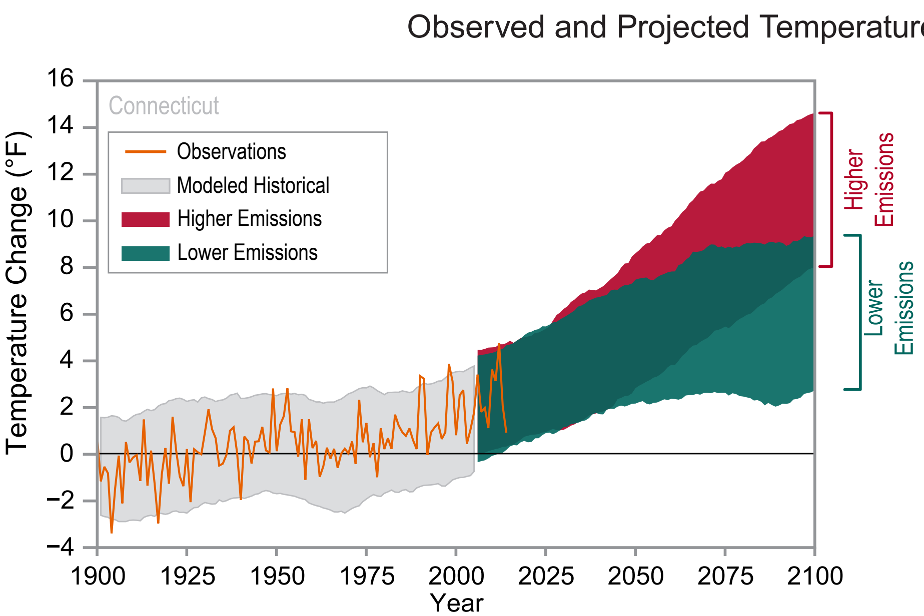

Figure 1: Observed and projected changes (compared to the 1901–1960 average) in near-surface air temperature for Connecticut. Observed data are for 1900–2014. Projected changes for 2006–2100 are from global climate models for two possible futures: one in which greenhouse gas emissions continue to increase (higher emissions) and another in which greenhouse gas emissions increase at a slower rate (lower emissions). Temperatures in Connecticut (orange line) have risen about 3°F since the beginning of the 20th century. Shading indicates the range of annual temperatures from the set of models. Observed temperatures are generally within the envelope of model simulations of the historical period (gray shading). Historically unprecedented warming is projected to continue through the 21st century. Less warming is expected under a lower emissions future (the coldest years being about 3°F warmer than the long-term average; green shading) and more warming under a higher emissions future (the hottest years being about 10°F warmer than the hottest year in the historical record; red shading). Source: CICS-NC and NOAA NCEI.

[1]Technical details on models and projections are provided in an appendix, available online at: https://statesummaries.ncics.org/ct.

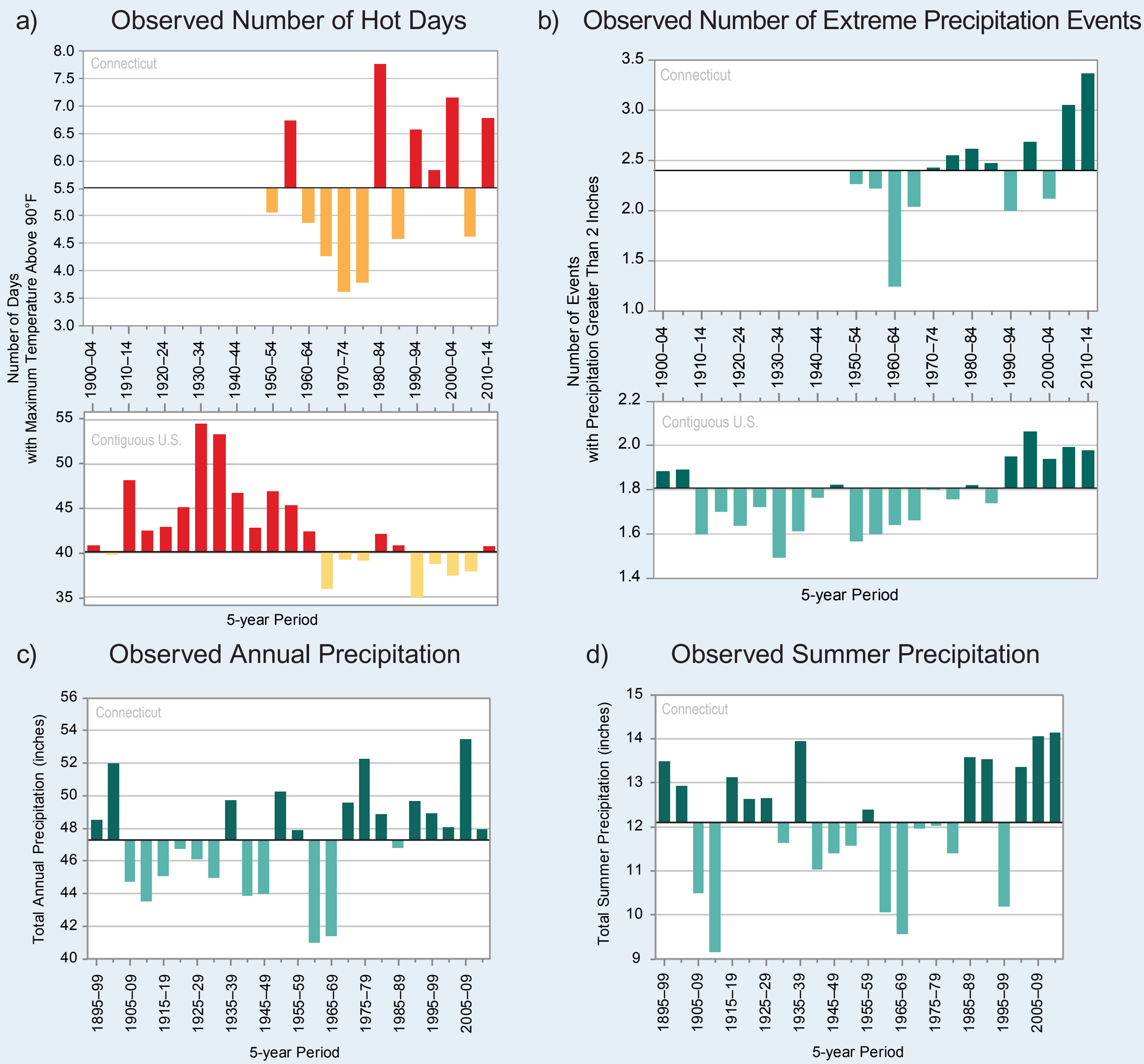

Figure 2: The observed (a) number of hot days (maximum temperature above 90°F), (b) the number of extreme precipitation events (precipitation greater than 2 inches), (c) annual precipitation, and (d) summer precipitation, averaged over 5-year periods. The values in Figures a and b are each from long-term reporting stations (7 for temperature and 11 for precipitation). The values in Figures c and d are from NCEI's version 2 climate division dataset. The dark horizontal lines represent the long-term average. The number of hot days was greatest in the early 1980s, and was also above average during the most recent 5-year period (2010–2014). The number of extreme precipitation events has increased since the mid-20th century, with the greatest amounts occurring during the last decade. Both annual and summer precipitation varied widely throughout the period of record; however, both have been consistently above average since the 1980s. Source: CICS-NC and NOAA NCEI.

Temperatures in Connecticut have increased about 3°F since the beginning of the 20th century (Figure 1). The number of hot days (maximum temperature above 90°F) in Connecticut was greatest in the early 1980s, and also well above average in early 2000s and during the most recent 5-year period (2010–2014) (Figure 2a). The number of warm nights (minimum temperature above 70°F) in Connecticut has been consistently above average since the mid-1980s; the number during the most recent 5-year period was the second highest (Figure 3). The number of very cold nights (minimum temperature below 0°F) has been below average since the mid-1980s with the lowest number on record occurring during the most recent 5-year period of 2010–2014 (Figure 4).

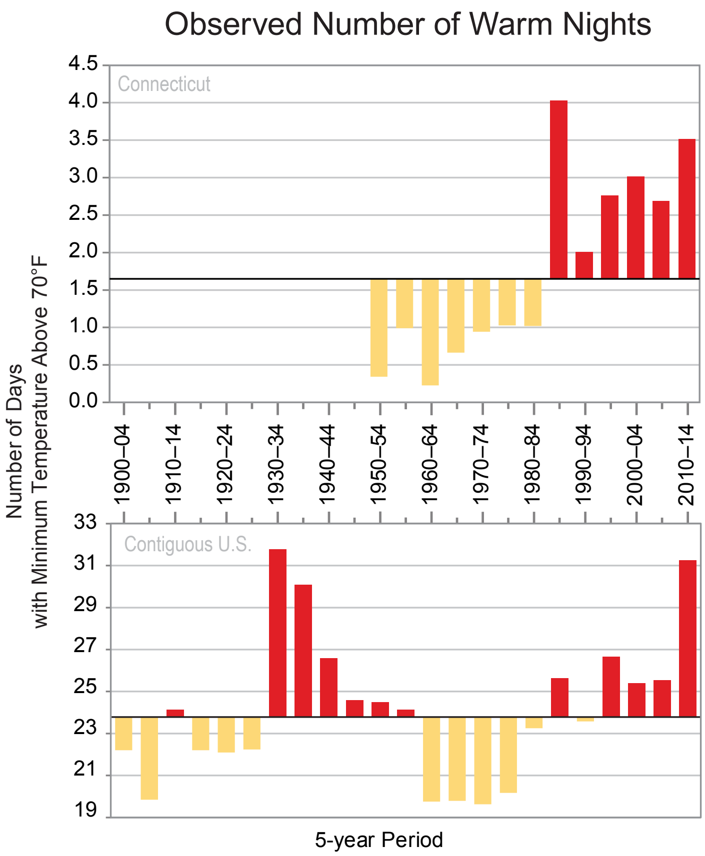

Figure 3: The observed number of warm nights (annual number of days with minimum temperature above 70°F) for 1950–2014, averaged over 5-year periods; these values are averages from seven long-term reporting stations. The number of warm nights in Connecticut has consistently been above average since the mid-1980s with a peak in the number of such nights occurring between 1985 and 1989. The number of warm nights for the contiguous United States (bottom panel) is also shown to provide a longer and larger context. Long-term stations back to 1900 were not available for Connecticut. Source: CICS-NC and NOAA NCEI.

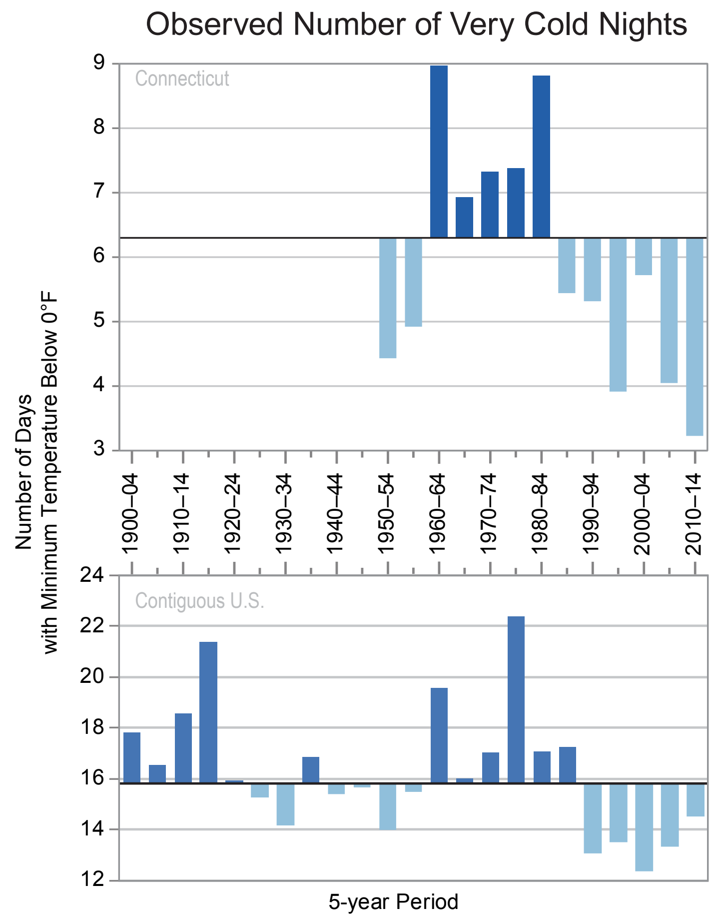

Figure 4: The observed number of very cold nights (annual number of days with minimum temperature below 0°F) for 1950–2014, averaged over 5-year periods; these values are averages from seven long-term reporting stations. The number of very cold nights has been below average since the mid-1980s. The lowest number of very cold nights occurred during the 2010–2014 period. The number of very cold nights for the contiguous United States (bottom panel) is also shown to provide a longer and larger context. Long-term stations back to 1900 were not available for Connecticut. Source: CICS-NC and NOAA NCEI.

Precipitation is abundant but highly variable from year to year. Generally, above average precipitation has occurred in Connecticut since the 1970s. The driest multi-year periods were the 1960s, and the wettest multi-year periods were the 1970s and the 2000s (Figure 2c). The wettest 5-year period on record (2007–2011) averaged 53.75 inches of precipitation, while the lowest of 41 inches occurred during 1962–1966. The single driest year was 1965 with a statewide average of about 31 inches while the wettest year was 2011 with more than 63 inches. In the winter months, average accumulated snowfall ranges between 30 and 35 inches along the coast to 50 inches in Northwest Hills. The highest number of extreme precipitation events (precipitation greater than 2 inches) was recorded during the last decade (Figure 2b). Summer precipitation has been consistently above average in the 2000s (Figure 2d).

Heat waves and cold waves, extreme precipitation events and inland flooding, nor'easters, winter storms, tornadoes, and hurricanes are all part of Connecticut's climate. Over the past decade, the state has experienced numerous disaster declarations for severe winter storms, severe thunderstorms and flooding, and hurricanes and tropical storms. In 2011, Hartford was affected by an unusual snowstorm contributing to a record all-time snowy January with 57 inches of snow. Later that year a Halloween nor'easter impacted New England with snowfall ranging from 12.3 inches in Hartford to 24 inches in Farmington, breaking another record that year for October snowfall. Storm damage costs, especially to power lines, exceeded $500 million for the state. More than 700,000 residents in Connecticut lost power, and in some areas of the

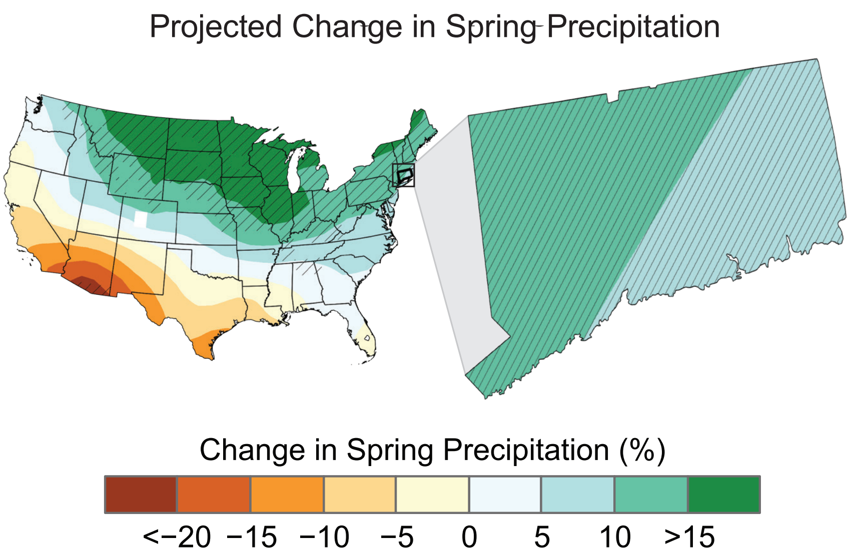

Figure 5: Climate model projections of changes in spring precipitation (%) by the middle of the 21st century relative to the late 20th century under a higher emissions pathway. Hatching represents areas where the majority of climate models indicate a statistically significant change. Precipitation in the spring is projected to increase in Connecticut by mid-century. Source: CICS-NC and NOAA NCEI.

state, outages lasted for more than a week. Since 1900, the Northeast has been affected by 15 landfalling hurricanes, 9 of which affected Connecticut. The Great New England Hurricane of 1938 ("the Long Island Express") was the first catastrophic hurricane to impact New England since 1869. Storm tides of 14 to 18 feet were recorded along the Connecticut coastline, with 18 to 25 foot tides from New London east to Cape Cod. To date, the 1938 hurricane holds the record for the worst natural disaster in the state's 350-year history. In 2012, the state was also impacted by a damaging storm surge from Superstorm Sandy's (a post-tropical storm) landfall. Coastal inundation levels ranged from 5 to 6 feet in the state, with 5.3 feet recorded for New Haven. A FEMA Impact Analysis demonstrated that more than 10,000 coastal residents in Connecticut were exposed to high and very high levels of storm surge.

Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century. Even under a pathway of lower greenhouse gas emissions, average annual temperatures are projected to most likely exceed historical record levels by the middle of the 21st century. However, there is a large range of temperature increases under both pathways, and under the lower pathway, a few projections are only slightly warmer than historical records (Figure 1). Heat waves are projected to become more intense. At the same time, the intensity of cold waves is projected to decrease.

Annual average precipitation is projected to increase, with increases most likely occurring in spring (Figure 5) and winter. Increases in total precipitation and in the number of extreme precipitation events (e.g., storms) may also result in increased coastal and inland flooding risks. Coastal communities, characterized by many rivers, are particularly vulnerable to increases in total precipitation and the number of extreme precipitation events.

Increasing temperatures raise concerns for sea level rise in coastal areas. Since 1880, global sea level has risen by about eight inches. Sea level has risen at the rate of 10–11 inches per century along the Connecticut coast, faster than the global rate. Sea level rise has caused an increase in tidal floods associated with nuisance-level impacts. Nuisance floods are events in which water levels exceed the local threshold (set by NOAA's National Weather Service) for minor impacts. These events can damage infrastructure, cause road closures, and overwhelm storm drains. As sea level has risen along the Connecticut coastline, the number of tidal flood days (all days exceeding the nuisance level threshold) has also gradually increased. The most recent decade (2005–2014) had the greatest number (18) of any 10-yr period (Figure 6). Global sea level is projected to rise another 1 to 4 feet by 2100 as a result of both past and future emissions from human activities (Figure 7), and even greater increases can be expected along the northeast U.S. coast following historical trends. Rising sea levels will have important coastal and floodplain impacts on local communities concentrated in these hazard prone areas.

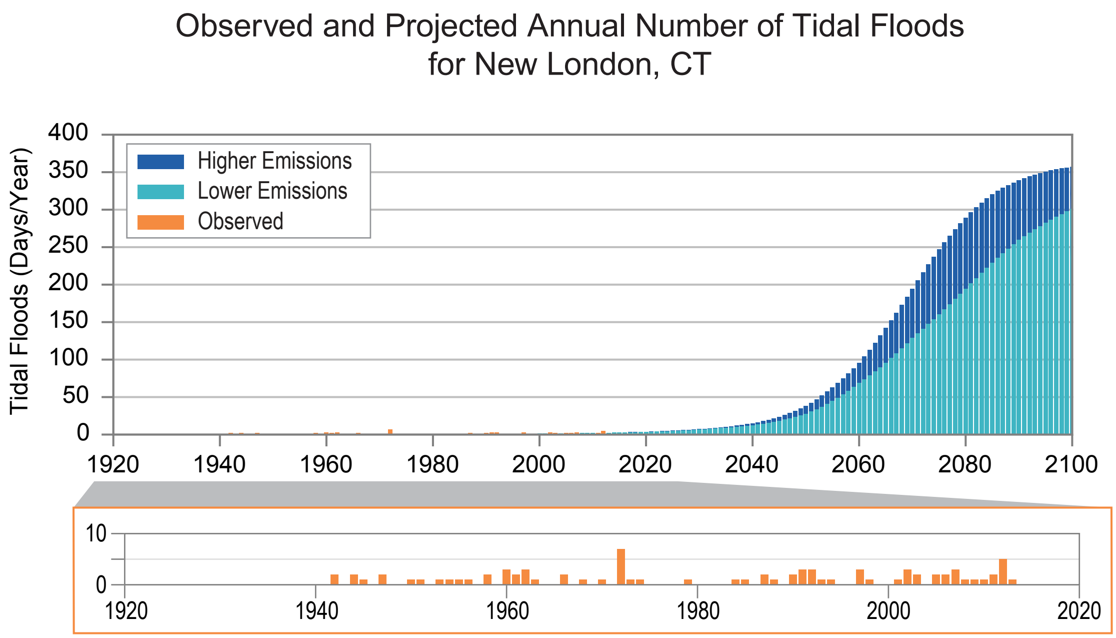

Figure 6: Number of tidal flood days per year for the observed record (orange bars) and projections for two possible futures: lower emissions (light blue) and higher emissions (dark blue) per calendar year for New London, CT. Sea level rise has caused a gradual increase in tidal floods associated with nuisance-level impacts. Nuisance floods are events in which water levels exceed the local threshold (set by NOAA's National Weather Service) for minor impacts, such as road closures and overwhelmed storm drains. The greatest number of tidal flood days (all days exceeding the nuisance level threshold) occurred in 1972 and 2012 at New London. Projected increases are large even under a lower emissions pathway. Near the end of the century, under a higher emissions pathway, some models (not shown here) project tidal flooding nearly every day of the year. To see these and other projections under additional emissions pathways, please see the supplemental material on the State Summaries website (https://statesummaries.ncics.org/ct). Source: NOAA NOS.

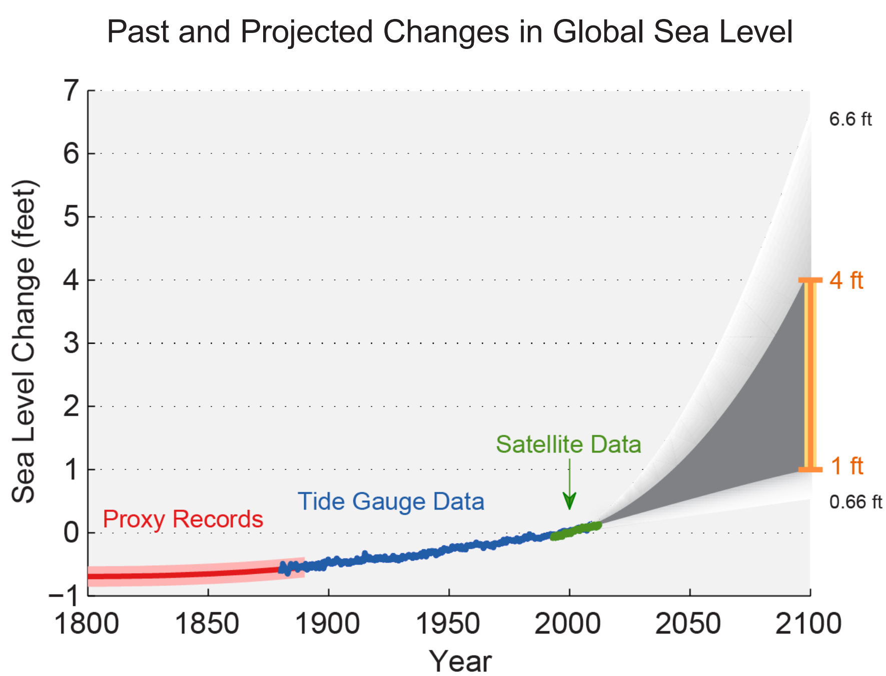

Figure 7: Estimated, observed, and possible future amounts of global sea level rise from 1800 to 2100, relative to the year 2000. The orange line at right shows the most likely range of 1 to 4 feet by 2100 based on an assessment of scientific studies, which falls within a larger possible range of 0.66 feet to 6.6 feet. Source: Melillo et al. 2014 and Parris et al. 2012.