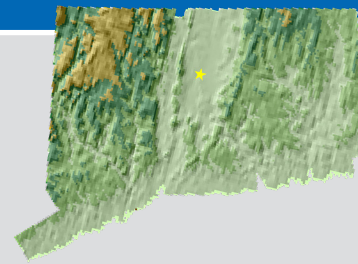

CONNECTICUT

Key Messages

Temperatures in Connecticut have risen almost 3.5°F since the beginning of the 20th century. Under a higher emissions pathway, historically unprecedented warming is projected to continue through this century, with associated increases in heat wave intensity and decreases in cold wave intensity.

Annual precipitation has been highly variable, with a slight increase since 1895. The highest number of extreme precipitation events occurred during 2005–2014. Increases in the frequency and intensity of extreme precipitation events are projected, as are increases in winter and spring precipitation.

Sea level has risen at a rate of 10–12 inches per century along the Connecticut coast, faster than the global rate. Global sea level is projected to rise, with a likely range of 1–4 feet by 2100. Even greater rises are possible for Connecticut.

Connecticut is located on the eastern coast of the North American continent. Combined with its northerly latitude, its geographic location exposes the state to both the moderating and moistening influence of the Atlantic Ocean and 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 diverse sections of rocky high points and marshes along the Long Island Sound of the southeastern coast. Its climate is characterized by cold, snowy winters and warm, humid summers. The jet stream, often located near the state, gives it highly variable weather patterns and generally abundant precipitation throughout the year. Coastal areas experience warmer winters and longer frost-free seasons than inland areas. The annual average temperature is 49.9°F, with average temperatures of 27.2°F in January and 72.4°F in July. Extreme temperatures vary across the state. Days with temperatures above 90°F vary from an annual average of 8 days in Falls Village, in the northwest, to 13 days in Hartford (Hartford Brainard Field), in the central part of the state, and 4 days in New Haven, along the coast in the south. Days with temperatures below 0°F range from an annual average of 7 days in Falls Village to 2 days in Hartford and 1 day in New Haven.

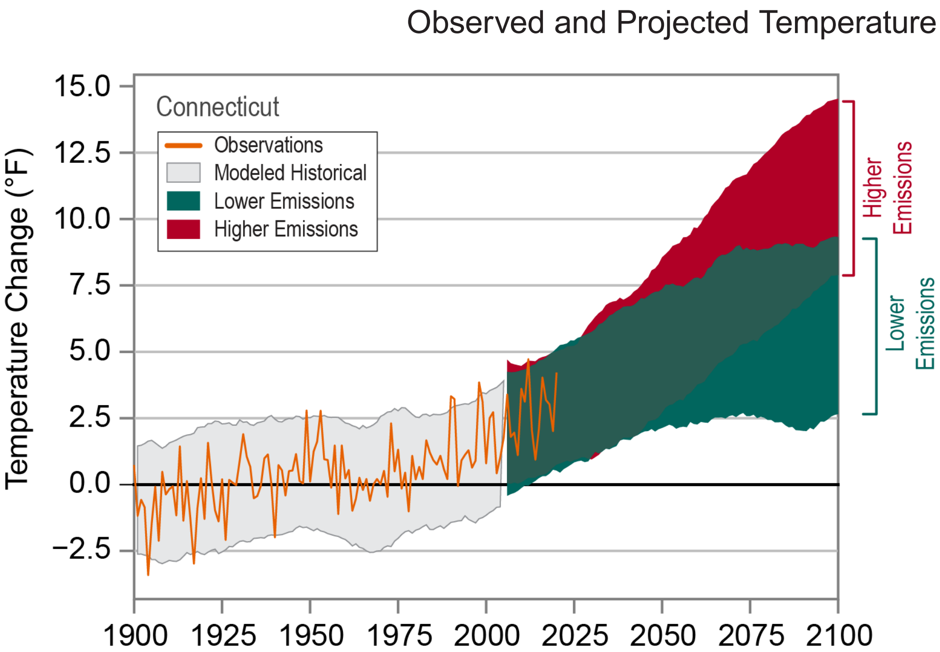

Figure 1: Observed and projected changes (compared to the 1901–1960 average) in near-surface air temperature for Connecticut. Observed data are for 1900–2020. Projected changes for 2006–2100 are from global climate models for two possible futures: one in which greenhouse gas emissions continue to increase (higher emissions) and another in which greenhouse gas emissions increase at a slower rate (lower emissions). Temperatures in Connecticut (orange line) have risen almost 3.5°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 this century. Less warming is expected under a lower emissions future (the coldest end-of-century projections being about 2°F warmer than the historical average; green shading) and more warming under a higher emissions future (the hottest end-of-century projections being about 10°F warmer than the hottest year in the historical record; red shading). Sources: CISESS and NOAA NCEI.

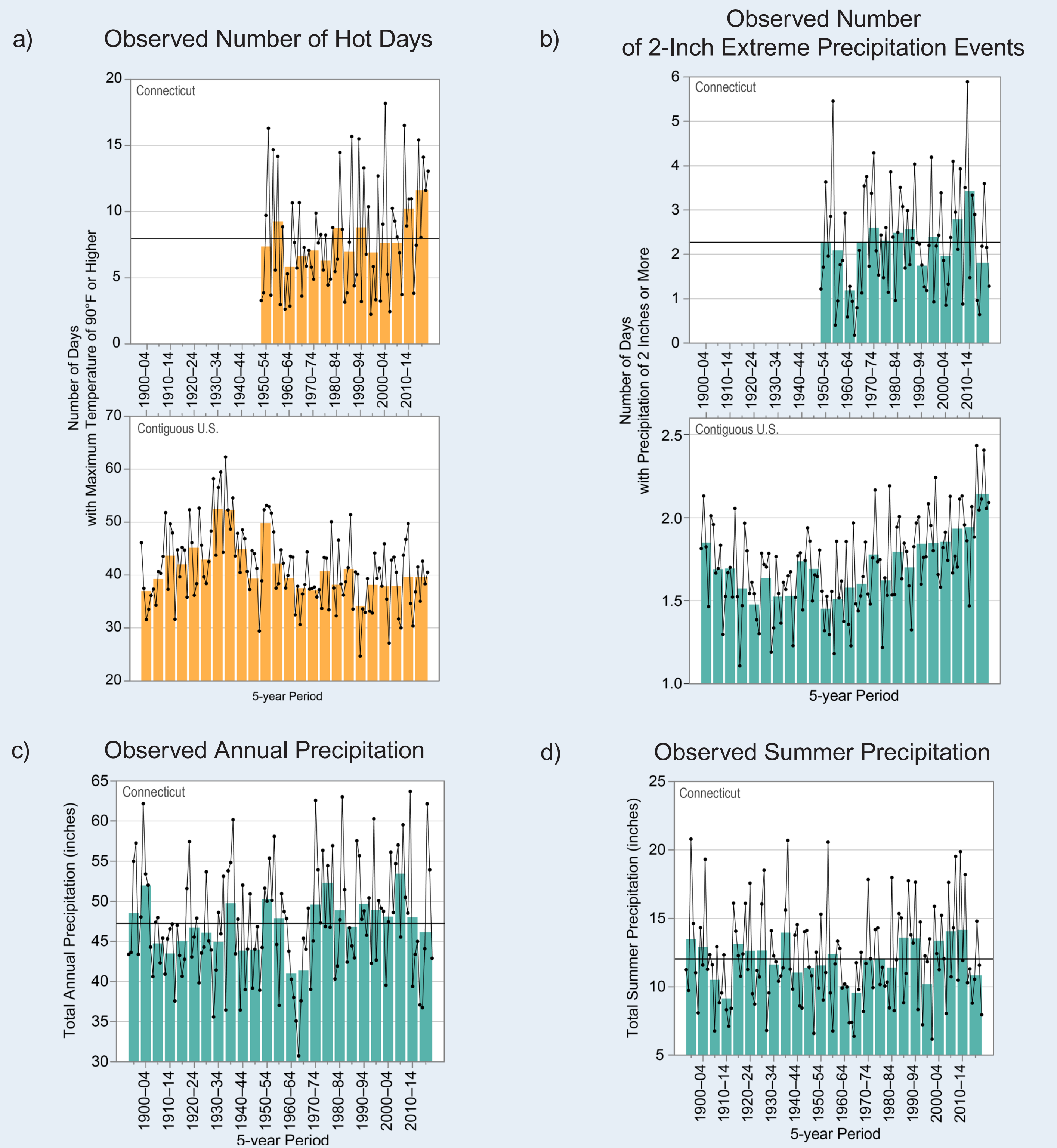

Figure 2: Observed (a) annual number of hot days (maximum temperature of 90°F or higher), (b) annual number of 2-inch extreme precipitation events (days with precipitation of 2 inches or more), (c) total annual precipitation, and (d) total summer (June–August) precipitation for Connecticut from (a, b) 1950 to 2020 and (c, d) 1895 to 2020. Dots show annual values. Bars show averages over 5-year periods (last bar is a 6-year average). The horizontal black lines show the long-term (entire period) averages for Connecticut: (a) 8.0 days, (b) 2.3 days, (c) 47.3 inches, (d) 12.0 inches. Values for the contiguous United States (CONUS) from 1900 to 2020 are included for Figures 2a and 2b to provide a longer and larger context. Long-term stations dating back to 1900 were not available for Connecticut. The greatest number of hot days occurred over the last two multiyear periods (2010–2014 and 2015–2020). The number of 2-inch extreme precipitation events has varied, with the greatest number occurring during the 2005–2009 and 2010–2014 periods; a typical station experiences between 2 and 3 events per year. Annual and summer precipitation varied widely throughout the period of record; however, both have been generally above average since the 1970s. Sources: CISESS and NOAA NCEI. Data: (a) GHCN-Daily from 5 (CT) and 655 (CONUS) long-term stations, (b) GHCN-Daily from 8 (CT) and 832 (CONUS) long-term stations, (c, d) nClimDiv.

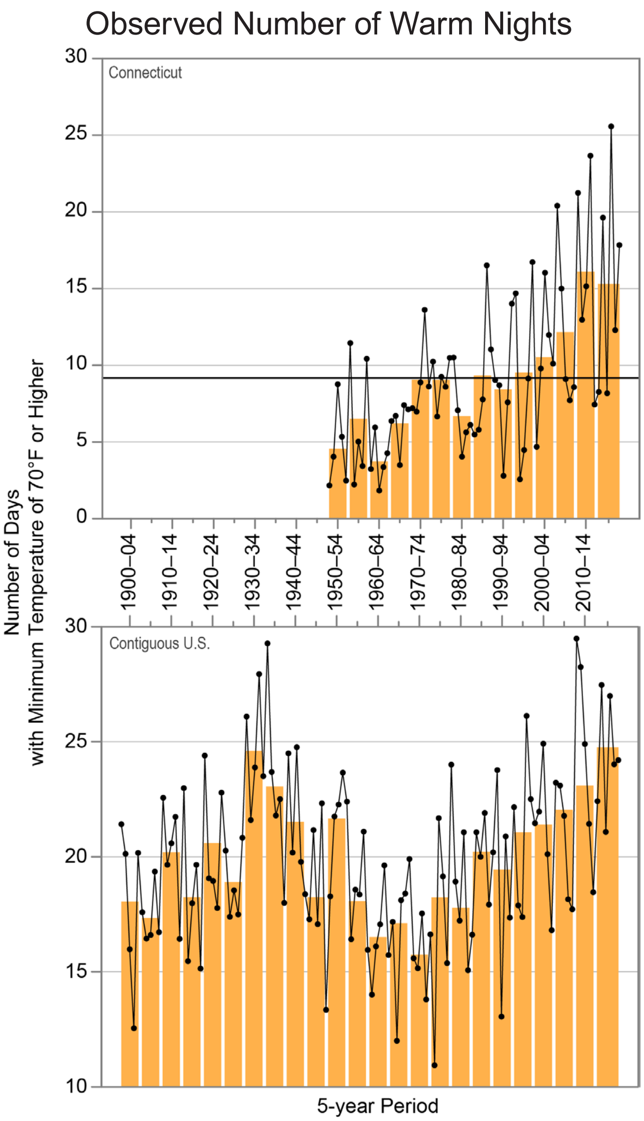

Figure 3: Observed annual number of warm nights (minimum temperature of 70°F or higher) for Connecticut from 1950 to 2020. Dots show annual values. Bars show averages over 5-year periods (last bar is a 6-year average). The horizontal black line shows the long-term (entire period) average for Connecticut of 9.2 nights. Values for the contiguous United States (CONUS) from 1900 to 2020 are included to provide a longer and larger context. Long-term stations dating back to 1900 were not available for Connecticut. The number of warm nights in Connecticut has been steadily increasing since the 1950s; the most recent multiyear period (2015–2020) had the second-highest average. Sources: CISESS and NOAA NCEI. Data: GHCN-Daily from 5 (CT) and 655 (CONUS) long-term stations.

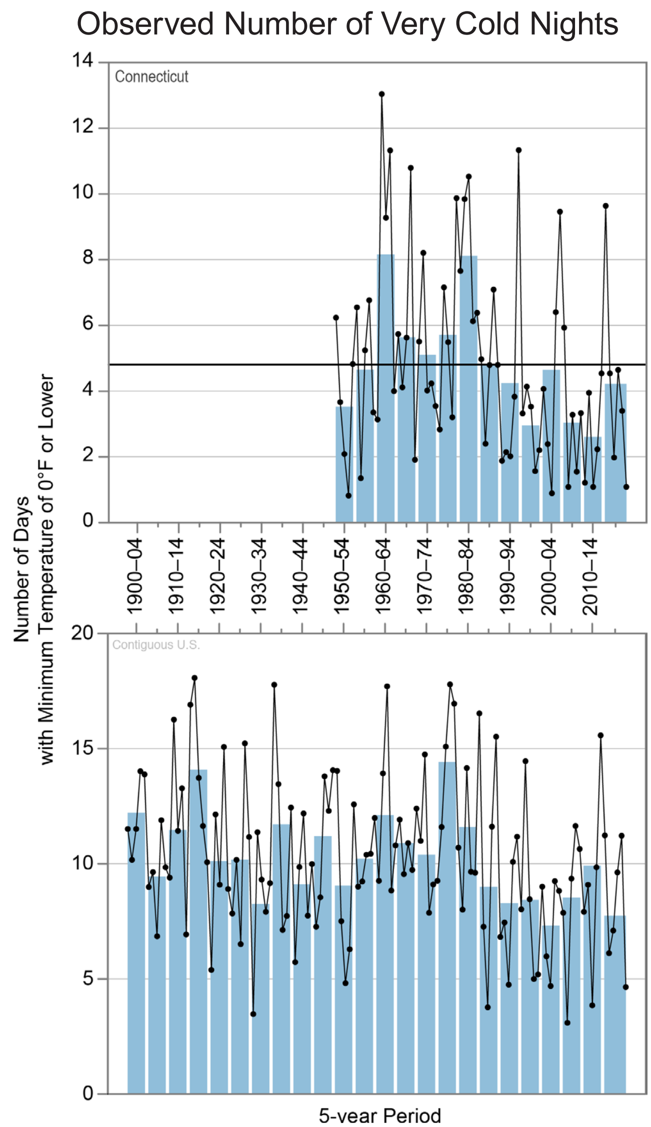

Figure 4: Observed annual number of very cold nights (minimum temperature of 0°F or lower) for Connecticut from 1950–2020. Dots show annual values. Bars show averages over 5-year periods (last bar is a 6-year average). The horizontal black line shows the long-term (entire period) average for Connecticut of 4.8 nights. Values for the contiguous United States (CONUS) from 1900 to 2020 are included to provide a longer and larger context. Long-term stations dating back to 1900 were not available for Connecticut. The number of very cold nights has been below average since the mid-1980s. The lowest multiyear average occurred during the 2010–2014 period. Sources: CISESS and NOAA NCEI. Data: GHCN-Daily from 5 (CT) and 655 (CONUS) long-term stations.

Temperatures in Connecticut have risen almost 3.5°F since the beginning of the 20th century (Figure 1). The greatest number of hot days occurred during the last two multiyear periods (2010–2014 and 2015–2020; Figure 2a). The number of warm nights has been consistently above the long-term (1895–2020) average since 1995; the most recent multiyear period had the second-highest average (Figure 3). The number of very cold nights has been below average since the mid-1980s, with the lowest multiyear average occurring during the 2010–2014 period (Figure 4).

Precipitation in Connecticut is abundant but highly variable from year to year. Generally, annual precipitation has been above average since the 1970s. The driest multiyear periods were the in the 1960s and the wettest in the late 1970s and late 2000s (Figure 2c). The wettest consecutive 5-year interval on record (2007–2011) averaged 53.6 inches per year, while the driest (1962–1966) averaged about 36 inches per year. The single driest year was 1965, with a statewide average of 30.7 inches, while the wettest year was

2011, with 63.7 inches. Seasonal snowfall ranges from between 30 and 35 inches along the coast to 50 inches in the Northwest Hills. The highest number of 2-inch extreme precipitation events was recorded between 2005 and 2014 (Figure 2b). Summer precipitation was generally above average in the 2000s and early 2010s (Figure 2d). Connecticut experienced extreme drought in 2016–2017 and again in 2020, straining water supplies.

Heat and cold waves, extreme precipitation events, 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 an all-time January snowfall record of 54.3 inches (at Hartford Bradley International Airport). Later that year, a Halloween nor'easter impacted New England with snowfall ranging from 12.3 inches in Hartford to 21 inches in Norfolk, the snowiest October on record for both stations. Storm damage costs for the state, especially to power lines, were in the millions of dollars. More than 700,000 residents in Connecticut lost power, and in some areas, outages lasted for more than a week. A blizzard in February 2013 brought heavy snowfall, which caused more than a dozen roofs to collapse; Ansonia recorded 36 inches of snow in 24 hours, breaking the state record. Landfalling hurricanes produced hurricane-force winds 7 times in Connecticut from 1900 to 2019. 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 history. In 2012, the state was also impacted by damaging storm surge when Superstorm Sandy (a post-tropical storm) made landfall. Coastal inundation levels ranged from 5 to 6 feet in the state, with 5.3 feet recorded at New Haven. An impact analysis by the Federal Emergency Management Agency demonstrated that more than 10,000 coastal residents in Connecticut were exposed to high and very high levels of storm surge.

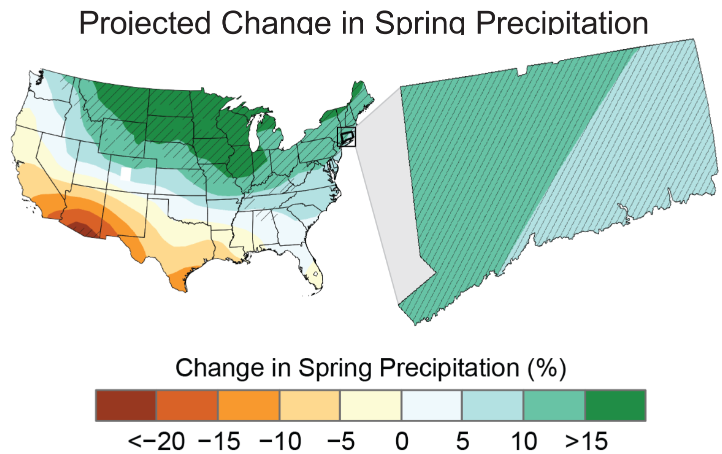

Figure 5: Projected changes in total spring (March–May) precipitation (%) by the middle of the 21st century compared to the late 20th century under a higher emissions pathway. The whited-out area indicates that the climate models are uncertain about the direction of change. Hatching represents areas where the majority of climate models indicate a statistically significant change. Spring precipitation is projected to increase in Connecticut by mid-century. Sources: CISESS and NEMAC. Data: CMIP-5.

Under a higher emissions pathway, historically unprecedented warming is projected to continue through this century. Even under a lower emissions pathway, annual average temperatures are projected to most likely exceed historical record levels by the middle of the century. However, a large range of temperature increases is projected under both pathways, and under the lower pathway, a few projections are only slightly warmer than the recent historical average (Figure 1). The intensity of heat waves is projected to increase, and 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 increase 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 1900, global average sea level has risen by about 7–8 inches. It is projected to rise another 1–8 feet, with a likely range of 1–4 feet, by 2100 as a result of both past and future emissions from human activities (Figure 6). Even greater increases can be expected along the northeastern U.S. coast, following historical trends. Along the Connecticut coast, sea level has risen at the rate of 10–12 inches per century, 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 (2011–2020) had the greatest number (43) of any 10-year period (Figure 7). Rising sea levels will have important coastal and floodplain impacts on local communities concentrated in these hazard-prone areas.

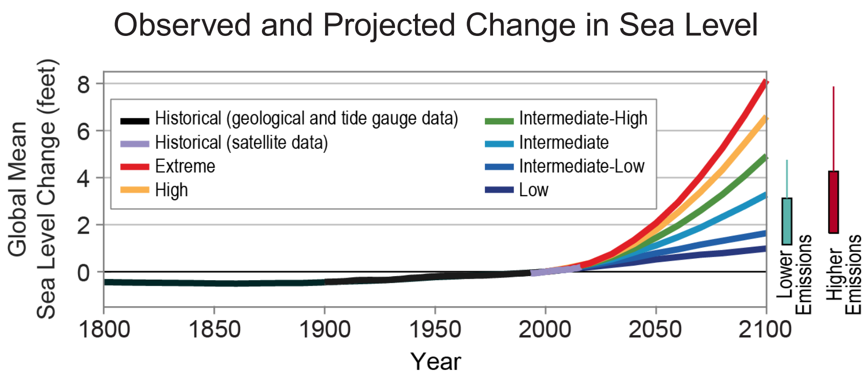

Figure 6: Global mean sea level (GMSL) change from 1800 to 2100. Projections include the six U.S. Interagency Sea Level Rise Task Force GMSL scenarios (Low, navy blue; Intermediate-Low, royal blue; Intermediate, cyan; Intermediate-High, green; High, orange; and Extreme, red curves) relative to historical geological, tide gauge, and satellite altimeter GMSL reconstructions from 1800–2015 (black and magenta lines) and the very likely ranges in 2100 under both lower and higher emissions futures (teal and dark red boxes). Global sea level rise projections range from 1 to 8 feet by 2100, with a likely range of 1 to 4 feet. Source: adapted from Sweet et al. 2017.

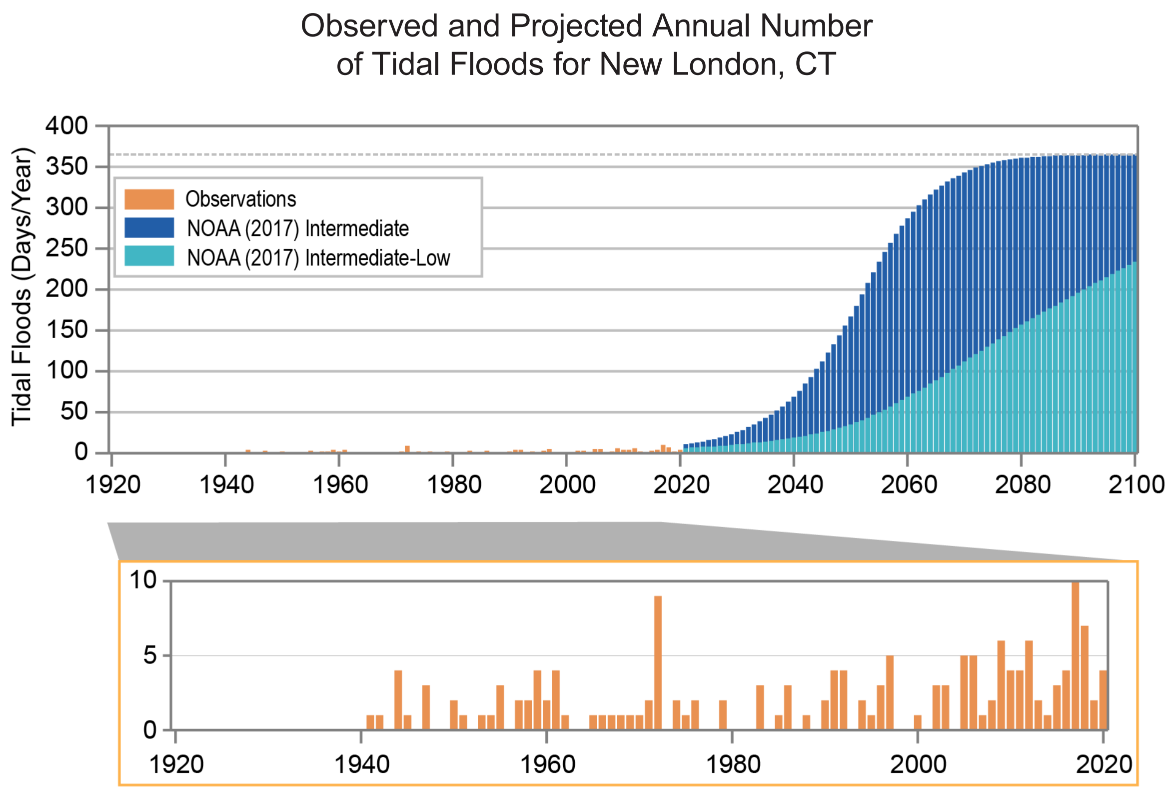

Figure 7: Number of tidal flood days per year at New London, CT, for the observed record (1938–2020; orange bars) and projections for two NOAA (2017) sea level rise scenarios (2021–2100): Intermediate (dark blue bars) and Intermediate-Low (light blue bars). The NOAA (2017) scenarios are based on local projections of the GMSL scenarios shown in Figure 6. Sea level rise has caused a gradual increase in tidal floods associated with nuisance-level impacts. The greatest number of tidal flood days (all days exceeding the nuisance-level threshold) occurred in 2017 at New London. Projected increases are large even under the Intermediate-Low scenario. Under the Intermediate scenario, tidal flooding is projected to occur every day of the year by the end of the century. Additional information on tidal flooding observations and scenarios is available at https://statesummaries.ncics.org/technicaldetails. Sources: CISESS and NOAA NOS.

Technical details on observations and projections are available online at https://statesummaries.ncics.org/technicaldetails.

WWW.NCEI.NOAA.GOV | HTTPS://STATESUMMARIES.NCICS.ORG/CHAPTER/CT/ | LEAD AUTHORS: JENNIFER RUNKLE, KENNETH E. KUNKEL
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