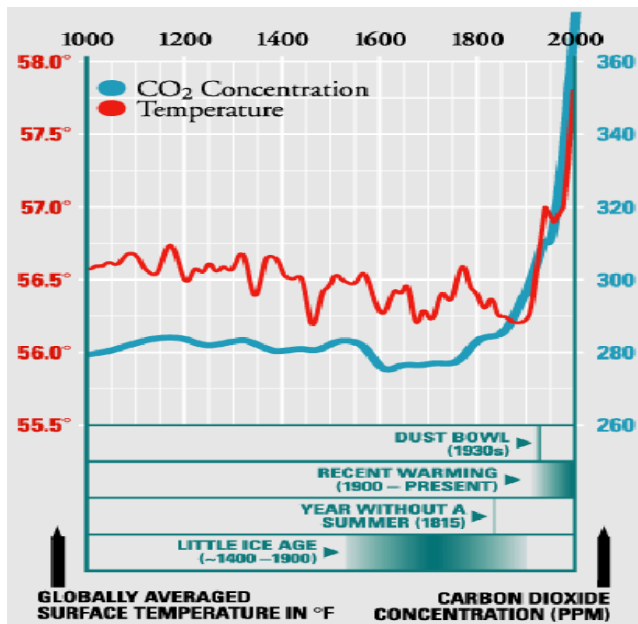
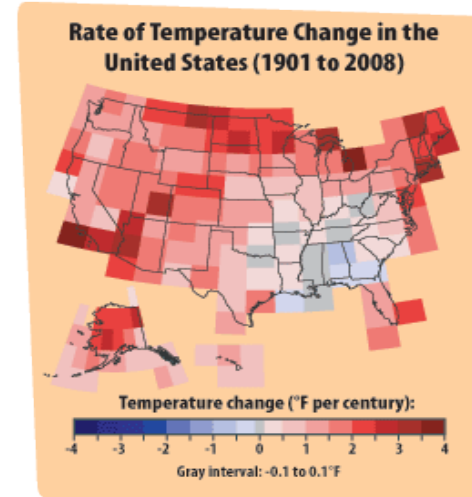
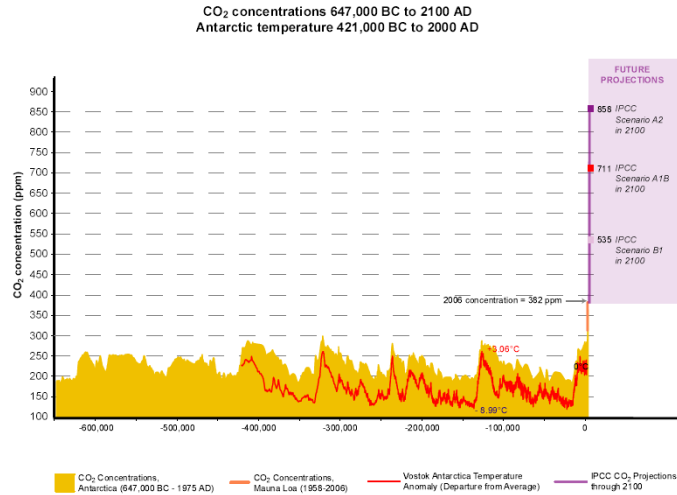


# Climate Change Impacts and Options

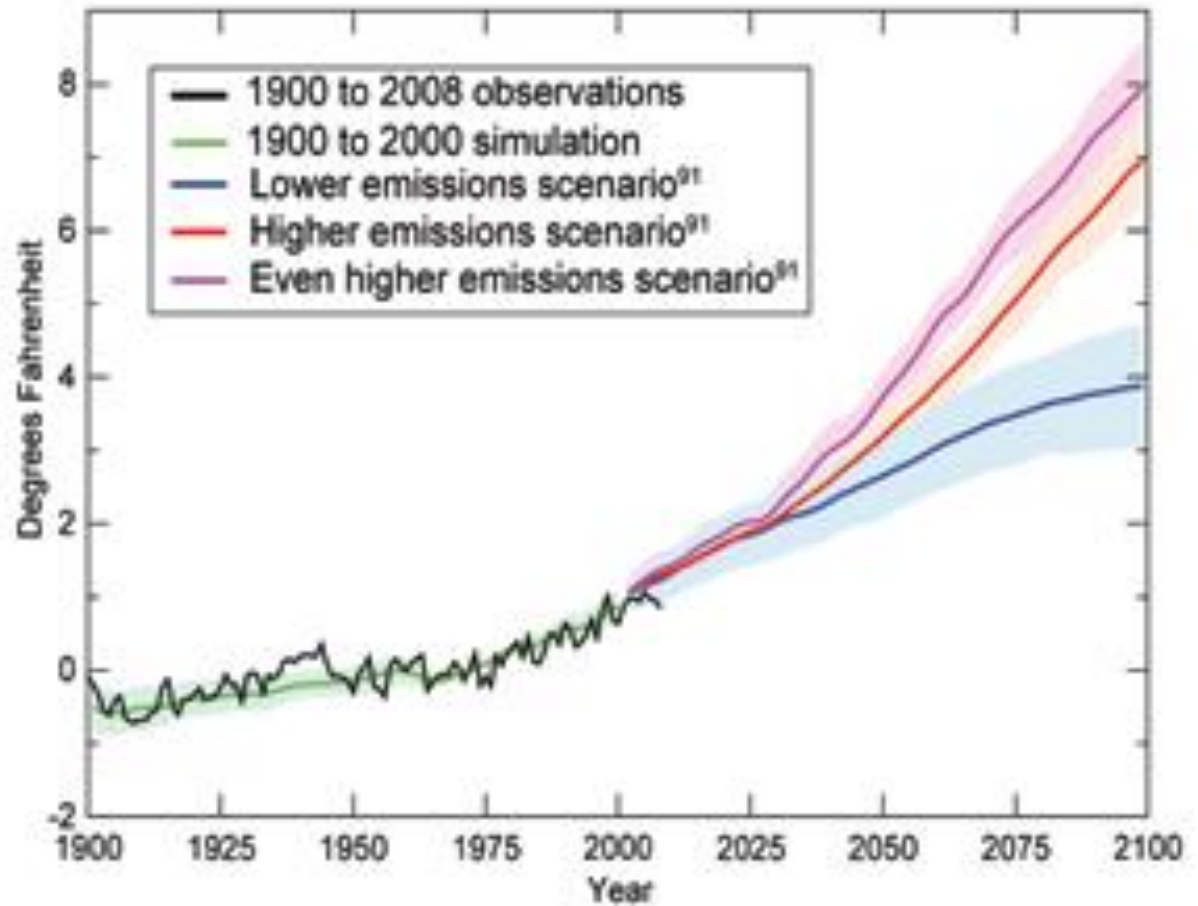
Norman Willard  
Energy and Climate Unit  
US EPA New England  
July 27, 2011

# CO2 and temperature

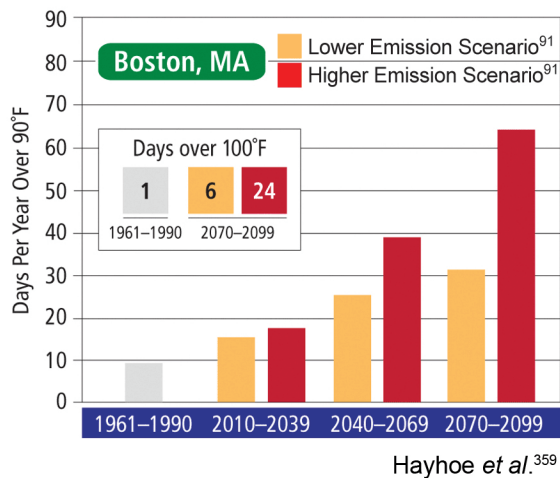


*Emissions are rising and the warming is continuing at rates higher than climate models and the experts predicted. The last decade was the warmest on record. 2009 was the second warmest year after 2005. Last year, 2010, tied 2005 as the warmest years on record.*

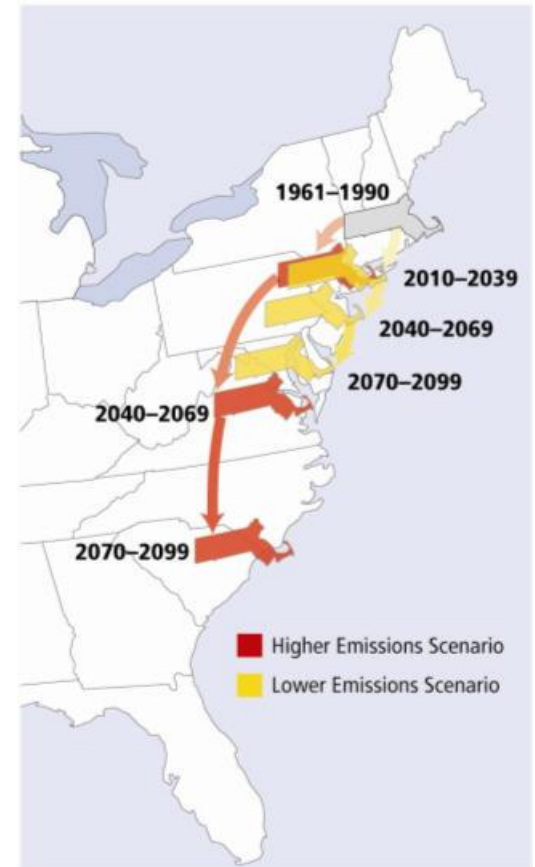
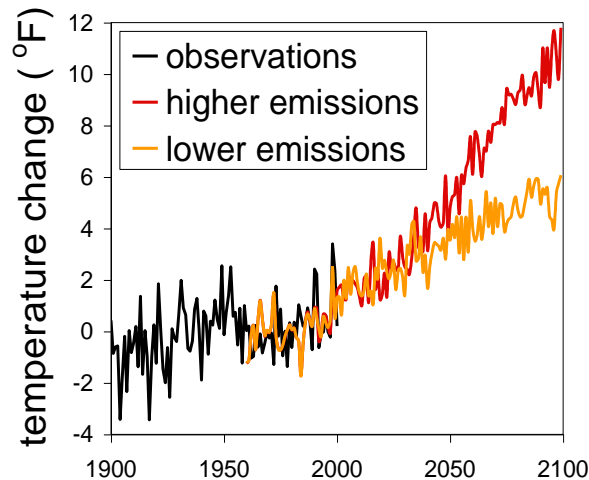
# Projected temperatures



# Temperature projections for New England are startling



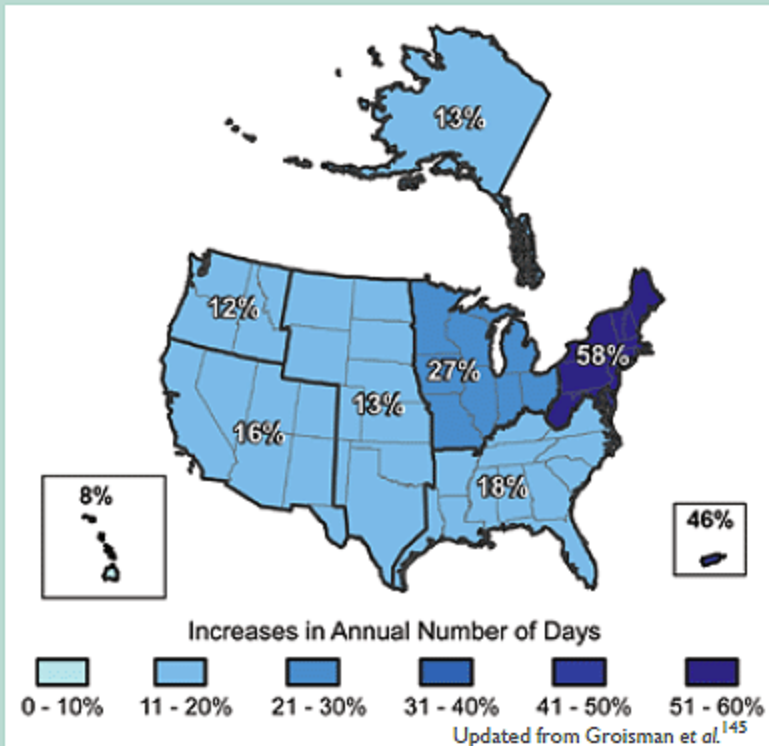
The graph shows model projections of the number of summer days with temperatures over 90°F in Boston, Massachusetts, under lower and higher (referred to as “even higher” on page 23) emissions scenarios.<sup>91</sup> The inset shows projected days over 100°F.<sup>359</sup>



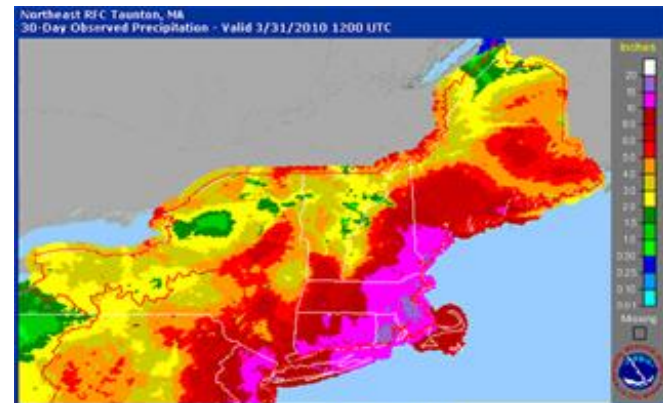
# 50 year precipitation changes

## All New England in top 10

Increases in the Number of Days with Very Heavy Precipitation (1958 to 2007)



The map shows the percentage increases in the average number of days with very heavy precipitation (defined as the heaviest 1 percent of all events) from 1958 to 2007 for each region. There are clear trends toward more days with very heavy precipitation for the nation as a whole, and particularly in the Northeast and Midwest.





# Projected extreme weather events and impacts

- More precipitation in winter and in the form of rain and ice
- More extreme weather events, e.g. 2 and 3 day events, heavy “dumps”, floods, erosion
- Vulnerable WWTP and DW facilities, CSOs
- Stormwater overwhelming built infrastructure - culverts, roads, dams, and energy , communications and transportation systems
- Affecting water quality, quantity and ecosystems
- Emergency preparedness and response





# What Can We Do ?

All of us: Adopt a risk management approach as a strategy for preparing ourselves for an uncertain future:

- Consider a range of possible future climate conditions in adaptation planning
- Identify adaptation options to reduce vulnerabilities
- Implement adaptations that make sense now
- Become more adaptive in planning for the future



# Short-term Options Identified by the National Academies of Science in August 2010

## Coasts & Changes in Hydrologic Cycle

Heavier precipitation/increased flooding:

Improve stormwater management systems and infrastructure;

*\*Improve storm readiness for harbors and marinas;*

*\*Eliminate public subsidies for future development in high hazard areas along the coast;*

Use natural shorelines, setbacks, and buffer zones to allow inland migration of shore habitats and barrier islands over time;



U.S. Navy (*like all other federal agencies*) is planning for climate

[“The Rising Seas: Navy May Request Billions of Dollars to Protect Ports and Bases”](#)

article: *National Defense Magazine* 6/18/2010

